

# CJSLPA • RCOA

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d'orthophonie et  
d'audiologie**



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Association of Speech-Language  
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*Publiée par l'Association  
canadienne des orthophonistes et  
audiologistes*

- ▶ *Dysphagia service delivery by speech-language pathologists in Canada:  
Results of a national survey*  
Catriona M. Steele, Cameron Allen, Jennifer Barker, Rebecca French, Pat Buen,  
Adele Fedorak, Shelley Irvine Day, James Lapointe, Leona Lewis, Carolyn MacKnight,  
Susan McNeil, Julie Valentine and Linda Walsh
  
- ▶ *Occurrence of Otitis Media and Hearing Loss Among First Nations Elementary School Children*  
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Rachel Caissie and Gerard Corsten
  
- ▶ *Brief Report: Immediate Memory for  
Movement Sequences in Children with  
and without Language Impairment*  
Alison M. White and Ronald B. Gillam

## Purpose and Scope

The Canadian Association of Speech-Language Pathologists and Audiologists (CASLPA) is the recognized national professional association of speech-language pathologists and audiologists in Canada. The association was founded in 1964, incorporated under federal charter in 1975 and is committed to fostering the highest quality of service to communicatively impaired individuals and members of their families. It began its periodical publications program in 1973.

The purpose of the Canadian Journal of Speech-Language Pathology and Audiology (CJSLPA) is to disseminate contemporary knowledge pertaining to normal human communication and related disorders of communication that influence speech, language, and hearing processes. The scope of the Journal is broadly defined so as to provide the most inclusive venue for work in human communication and its disorders. CJSLPA publishes both applied and basic research, reports of clinical and laboratory inquiry, as well as educational articles related to normal and disordered speech, language, and hearing in all age groups. Classes of manuscripts suitable for publication consideration in CJSLPA include tutorials, traditional research or review articles, clinical, field, and brief reports, research notes, and letters to the editor (see Information to Contributors). CJSLPA seeks to publish articles that reflect the broad range of interests in speech-language pathology and audiology, speech sciences, hearing science, and that of related professions. The Journal also publishes book reviews, as well as independent reviews of commercially available clinical materials and resources.

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## Objet et Portée

L'Association canadienne des orthophonistes et audiologistes (ACOA) est l'association professionnelle nationale reconnue des orthophonistes et des audiologistes du Canada. L'Association a été fondée en 1964 et incorporée en vertu de la charte fédérale en 1975. L'Association s'engage à favoriser la meilleure qualité de services aux personnes atteintes de troubles de la communication et à leurs familles. Dans ce but, l'Association entend, entre autres, contribuer au corpus de connaissances dans le domaine des communications humaines et des troubles qui s'y rapportent. L'Association a mis sur pied son programme de publications en 1973.

L'objet de la Revue canadienne d'orthophonie et d'audiologie (RCOA) est de diffuser des connaissances relatives à la communication humaine et aux troubles de la communication qui influencent la parole, le langage et l'audition. La portée de la Revue est plutôt générale de manière à offrir un véhicule des plus compréhensifs pour la recherche effectuée sur la communication humaine et les troubles qui s'y rapportent. La RCOA publie à la fois les ouvrages de recherche appliquée et fondamentale, les comptes rendus de recherche clinique et en laboratoire, ainsi que des articles éducatifs portant sur la parole, le langage et l'audition normaux ou désordonnés pour tous les groupes d'âge. Les catégories de manuscrits susceptibles d'être publiés dans la RCOA comprennent les tutoriels, les articles de recherche conventionnelle ou de synthèse, les comptes rendus cliniques, pratiques et sommaires, les notes de recherche, et les courriers des lecteurs (voir Renseignements à l'intention des collaborateurs). La RCOA cherche à publier des articles qui reflètent une vaste gamme d'intérêts en orthophonie et en audiologie, en sciences de la parole, en science de l'audition et en diverses professions connexes. La Revue publie également des critiques de livres ainsi que des critiques indépendantes de matériel et de ressources cliniques offerts commercialement.

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\*La revue de cet article a été coordonnée par Tony Leroux.

# From the Editor

## Winter Issue



Farewell and thank you! This issue of the Canadian Journal of Speech-Language Pathology is my last as editor. I have enjoyed my term as editor, which gave me the opportunity to get to know a wider circle of professionals, academics and CASLPA staff and to learn many new things. It is time now to turn the position over to a new editor who, as new editors do, will bring new ideas and a fresh perspective to CJSPLA. As of January 1, 2008, the new editor of the Journal is Tim Bressmann, Ph.D., of the University of Toronto. Tim has been serving as the associate editor for speech submissions, and I know that he will continue to apply his enthusiasm, diligence and competence in his new role.

The Journal has seen many changes over the last 4 years. Not the least of these changes is the name change that added the word “Canadian” to the title. This change emphasizes that an important purpose of CJSPLA is to highlight research and clinical innovation in the Canadian context. Canada has a different context of service delivery, laws, and linguistic factors than our neighbours to the south, and our context differs even more from countries on other continents. It is crucial to have a venue for articles that focus on our issues.

Another important change is indexing of the journal. Indexing allows potential readers to find CJSPLA articles through their libraries by searching for a key word, title, or author. The first page of every issue lists services that index CJSPLA. The list is growing, and soon we expect that articles will be available on line through university libraries and indexing services.

I would like to acknowledge the people who contributed to the functioning of the Journal. First of all, I heartily thank the associate editors who coordinate reviews of submitted manuscripts and make recommendations to the editor regarding their outcomes. The original team of associate editors was Rachel Caissie, Marilyn Kertoy, Tony Leroux, Linda Rammage, and Pat Roberts. Two associate editors moved on to new challenges; Linda took on the presidency of CASLPA and Tony assumed editorial duties at a French-language journal. Tim Bressmann and Benoît Jutras stepped into their roles. The associate editors all have different styles, but all have proven to be fair-minded and dedicated to keeping the quality of the Journal high. Their countless hours of work have kept the Journal on target and made my job much easier. I owe them all a huge debt of gratitude.

The CASLPA head office has seen several changes during my term. Suzy Frasier, the managing editor when I first started, left shortly after I began. An outside service was used for the preparation of several issues before the decision was made to hire an in-house managing editor. I am eternally grateful to CASLPA for making this decision and bringing in Judith Gallant to take on this role. Judith has done a terrific job in preparing each issue and communicating with authors in an efficient, tactful and friendly manner. I also want to acknowledge warmly the guidance and support of Angie d’Aoust, as well as Ondina Love, both of whom have been extremely helpful whenever I have sought advice. The former editor, Philip Doyle, also deserves thanks for his diligence in completing reviews started under his watch and in providing advice to the rookie editor whenever asked (which was fairly often in the first year).

Lastly, I want to thank the numerous individuals who assisted the Journal by reviewing submissions. Without their expertise, the Journal would not function. We really appreciate the time they take to share their expertise in this way.

I would like to extend my very best wishes for success to the new editor. It is a challenging and time-consuming role with many rewards. I am confident that under Tim Bressmann’s leadership, the Journal will continue to thrive and grow.

The first article in this issue describes a national survey regarding dysphagia service delivery in Canada, by Catriona Steele and her colleagues. The survey was conducted in conjunction with a committee that was developing a position paper on this topic, which appeared in the previous issue of CJSPLA. In the survey, CASLPA members working in Canada responded to questions regarding practice, personnel, and training issues.

Our second article, by Leslie Langan, Ravichandra Sockalingam, Rachel Caissie, and Gerard Corsten, reports on a study of otitis media in children of Mi’kmaq heritage in Nova Scotia. They tested children aged 3-11 at two points in the school year. Their findings support previous reports of a high incidence of otitis media in First Nations children, and found that the rate was higher than expected even among the older children. The authors make recommendations for clinicians based on their results.

A brief report by Alison White and Ron Gillam wraps up this issue. It describes a study of recall and reproduction of visual sequences by children with and without specific language impairment. Their findings contribute to the debate regarding the specificity of specific language impairment – that is, whether the impairment is specific to language or also involves nonlinguistic skills such as visual memory for nonsymbolic material.

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# De la rédactrice en chef

## Numéro de l'hiver



Adieu et merci! Le présent numéro de la Revue canadienne d'orthophonie et d'audiologie (RCOA) sera mon dernier à titre de rédactrice en chef. J'ai beaucoup aimé mon rôle, qui m'a donné l'occasion d'élargir mon cercle de connaissances de professionnels, d'universitaires et de membres du personnel de l'Association canadienne des orthophonistes et audiologistes (ACOA) en plus d'enrichir mes connaissances théoriques. Il est maintenant temps que je passe le flambeau à un nouveau rédacteur en chef qui, comme le font tous les rédacteurs en chef, amènera de nouvelles idées et jettera un regard neuf sur la RCOA. À compter du 1er janvier 2008, le nouveau rédacteur en chef sera Tim Bressmann, Ph.D., de l'*University of Toronto*. Tim agissait déjà comme rédacteur en chef adjoint pour les contributions en orthophonie et je sais qu'il continuera à manifester le même enthousiasme, le même empressement et la même compétence dans ses nouvelles fonctions.

La RCOA a connu de nombreux changements au cours des quatre dernières années dont l'ajout de « canadienne » dans le titre n'a pas été le moindre. Ce changement fait ressortir que l'un des buts importants de la RCOA consiste à mettre au premier plan la recherche et l'innovation en milieu clinique qui se font au Canada. Le Canada diffère de son voisin du sud pour ce qui est de la prestation de services, des lois et des facteurs linguistiques. Notre contexte diffère encore plus de celui qui prévaut sur d'autres continents. Il est essentiel que nous ayons un lieu pour les articles qui mettent l'accent sur nos enjeux.

Un autre changement important est celui de l'indexation de la RCOA, ce qui permet aux lecteurs de trouver des articles par le biais de leur bibliothèque en effectuant une recherche par mot clé, par titre ou par auteur. La première page de chaque numéro dresse la liste des services qui recensent la RCOA. Cette liste s'allonge et nous prévoyons que bientôt les articles seront accessibles en ligne par le biais des bibliothèques universitaires et des services d'indexation.

Je souhaite remercier les personnes qui ont contribué au fonctionnement de la RCOA. D'abord, je remercie sincèrement les rédacteurs en chef adjoints qui coordonnent l'évaluation des manuscrits et qui transmettent leurs recommandations à la rédactrice en chef. L'équipe de rédacteurs en chef adjoints d'origine comprenait Rachel Caissie, Marilyn Kertoy, Tony Leroux, Linda Rammage et Pat Roberts. Deux d'entre eux ont choisi de relever de nouveaux défis – Linda a assumé la présidence de l'ACOA et Tony s'est joint au comité éditorial d'une revue francophone. Tim Bressmann et Benoît Jutras leur ont succédé. Les rédacteurs en chef adjoints ont chacun leur style, mais ils ont tous montré qu'ils étaient objectifs et voués à maintenir la qualité élevée de la RCOA. Les innombrables heures qu'ils ont consacrées à la RCOA ont permis de respecter les échéanciers et ont facilité ma tâche. Je leur dois toute ma gratitude.

Le bureau de l'ACOA a aussi connu de nombreux changements durant mon mandat. Suzy Fraser, directrice de la rédaction quand je suis entrée en fonction, a quitté son poste peu après mon arrivée. On a ensuite fait appel à un service externe pour préparer plusieurs numéros avant de décider d'engager quelqu'un à l'interne pour le faire. Je serai éternellement reconnaissante à l'ACOA d'avoir pris cette décision et d'avoir choisi Judith Gallant pour occuper ce poste. Judith a accompli un travail merveilleux pour préparer chaque numéro et communiquer avec les auteurs de manière efficace, pleine de tact et aimable. Je veux aussi souligner les conseils et le soutien que m'ont offerts Angie D'Aoust et Ondina Love, qui m'ont été d'un grand secours quand j'ai eu besoin d'aide. Le rédacteur en chef précédent, Philip Doyle, mérite aussi mes remerciements pour son empressement à terminer les évaluations commencées sous son mandat et pour les conseils qu'il a prodigués à la rédactrice en chef débutante que j'étais; j'ai trop souvent cherché conseil auprès de lui durant la première année.

Enfin, je souhaite remercier les nombreuses personnes qui ont contribué à la RCOA en évaluant les articles soumis. Sans leur expertise, la RCOA ne fonctionnerait pas. Nous apprécions sincèrement le temps que vous y avez consacré pour partager votre savoir.

J'offre tous mes vœux de réussite au prochain rédacteur en chef. Il a accepté un rôle exigeant et auquel il devra consacrer beaucoup de temps, mais qui sera très gratifiant. Je sais que sous la direction de Tim Bressmann, la RCOA continuera à prospérer.

Le premier article de ce numéro, signé par Catriona Steele et ses collègues, décrit une enquête nationale sur la prestation de services de traitement de la dysphagie au Canada. Cette enquête a été menée en collaboration avec un comité chargé d'élaborer un nouvel énoncé de position en la matière; l'énoncé a paru dans le numéro précédent de la RCOA. Dans le cadre de cette enquête, les membres de l'ACOA travaillant au Canada ont dû répondre à des questions concernant l'exercice, le personnel et la formation.

Le second article, de Leslie Langan, Ravichandra Sockalingam, Rachel Caissie et Gerard Corsten, traite d'une étude sur l'otite moyenne chez des enfants d'ascendance mi'kmaq de Nouvelle-Écosse. Les auteurs ont évalué des enfants de 3 à 11 ans à deux moments durant l'année scolaire. Leurs résultats corroborent ceux d'études précédentes montrant une fréquence élevée d'otite moyenne chez les enfants des Premières Nations et montrent que le taux était plus élevé que prévu même chez les enfants plus âgés. À partir de leurs résultats, les auteurs formulent des recommandations pour les cliniciens.

Un rapport sommaire, d'Alison White et Ron Gillam, termine ce numéro. Il décrit une étude sur la mémorisation et la reproduction de séquences visuelles chez les enfants avec ou sans trouble du langage. Les constatations des auteurs éclairent le débat entourant la spécificité de troubles particuliers du langage – c'est-à-dire si le trouble est spécifique au langage ou s'il touche aussi les compétences non linguistiques, telles que la mémoire visuelle de matériel non symbolique.

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## ■ Dysphagia service delivery by speech-language pathologists in Canada: Results of a national survey

## ■ La prestation de service d'orthophonie à des personnes dysphagiques au Canada : résultats d'une enquête nationale

Catriona M. Steele  
Cameron Allen  
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Pat Buen  
Rebecca French  
Adele Fedorak  
Shelley Irvine Day  
James Lapointe  
Leona Lewis  
Carolyn MacKnight  
Susan McNeil  
Julie Valentine  
Linda Walsh

### Abstract

In 2006, a committee was formed to develop a new position paper on dysphagia (swallowing disorders) for the Canadian Association of Speech-Language Pathologists and Audiologists (CASLPA). In the course of their work, the committee conducted an electronic survey of Canadian speech-language pathologists who practice in the area of dysphagia. The survey explored the contexts in which dysphagia services are provided and identified trends and issues in dysphagia service delivery across Canada. The results of this survey, completed by 396 speech-language pathologists, are reported in this article.

### Abrégé

En 2006, un comité a été formé pour élaborer un nouvel énoncé de position sur la dysphagie (troubles de déglutition) pour l'Association canadienne des orthophonistes et audiologistes (ACOA). Dans le cadre de son travail, le comité a sondé par voie électronique des orthophonistes canadiens qui exercent dans le domaine de la dysphagie. Cette enquête a exploré le contexte dans lequel les services de traitement de la dysphagie sont offerts et a relevé des tendances et des problèmes dans la prestation de ces services au Canada. Les résultats du sondage, auquel 396 orthophonistes ont répondu, sont présentés dans cet article.

**Key words:** dysphagia, swallowing, speech-language pathology, service delivery, survey, practice patterns

## INTRODUCTION

The origins of dysphagia (swallowing disorders) as an area of clinical practice for speech-language pathologists can be traced back to the 1970s, and the subsequent publication of the first edition of Logemann's seminal textbook on the subject in 1983 (Logemann, 1983). In recognition of this rapidly emerging area of practice, CASLPA published its first position paper on the topic of dysphagia in 1995 (Jacobson et al., 1994, 1995). Subsequently in 1998, dysphagia sections were added to CASLPA's Scope and Foundations of Practice document (CASLPA, 1998) and to the national certification examination. The Scope and Foundations of Practice document outlines knowledge and competency expectations for Canadian S-LPs working in the area of dysphagia as well as the components of swallowing service delivery.

Recent annual CASLPA membership surveys have shown strong interest in the development of a new dysphagia position paper. Consequently, a committee of clinicians who work in the area of dysphagia was formed in September, 2005 with this mandate. Representatives from almost every province were included on the committee with the exception of Prince Edward Island and the Territories. In order to understand the current context of dysphagia service delivery by speech-language pathologists (S-LPs) in Canada, the position paper committee conducted a survey of CASLPA members on this topic. The position paper that resulted from this committee has recently been made available (CASLPA, 2007).

## METHODS

A survey containing 100 forced-choice or open text questions was developed and administered to a pilot sample of 100 clinicians who attended a professional development workshop in Toronto in February, 2006. Following a preliminary review of responses to the pilot survey, the survey questions were refined, and a new survey was posted on an internet-based survey site ([www.surveymonkey.com](http://www.surveymonkey.com)) for a 3-month period from April-June, 2006. E-mail notices advertising the survey were circulated to the CASLPA membership, inviting their participation and an advertisement was included in the association's quarterly e-newsletter. The provincial regulatory bodies and associations were also asked to advertise the survey to their

members. A hard copy francophone version of the survey was made available upon request.

## RESULTS

A total of 400 completed surveys were received either by electronic or hard copy between April 1 and June 30, 2006. This number excluded all hard copy responses to the initial pilot survey. Responses from four completed surveys were excluded from subsequent analysis because they were submitted by CASLPA members currently working outside Canada. Based on current membership data, approximately 700 CASLPA members report working in the area of dysphagia. While this figure does not reflect individuals who are not members of CASLPA, it suggests that the survey response rate represents approximately 50% or more of eligible respondents who were approached to participate. Current (2005) Canadian Institute of Health Information estimates suggest that there are a total of 6,331 S-LPs in Canada (CIHI, 2005). This survey therefore reflects responses from approximately 6% of the total Canadian S-LP workforce.

### Response Demographics

Information regarding age and gender was not collected in the survey. Survey respondents were drawn from all 10 provinces and two of the three territories, with both urban and rural representation, as shown by the open circles in Figure 1. Membership in CASLPA and distribution of responses across the provinces and territories is shown in Table 1. It should be noted that while the survey was



Figure 1. Map of Canada showing locations of survey respondents (open circles)



made available in both official languages, there were proportionately fewer responses received from the province of Quebec. Additionally, all respondents in Manitoba resided in the Winnipeg metropolitan area. The conclusions drawn from the survey regarding service delivery patterns may, therefore, not be typical of those provided in Quebec or rural Manitoba.

Survey respondents were asked to describe the type(s) of facility in which they worked (primary workplace), with the opportunity to select more than one facility type, where appropriate. The majority of respondents ( $n = 234, 59\%$ )

reported working in acute care hospitals with 31% ( $n = 123$ ) and 30% ( $n = 119$ ) describing their workplaces as inpatient or outpatient rehabilitation facilities, respectively. The breakdown of workplace category across the provinces and territories is shown in Table 2. Within these facilities, respondents reported that the predominant model of service delivery for dysphagia was 5 days per week (Monday to Friday). In 4% of cases ( $n = 14$ ), 7-day-per-week coverage of dysphagia was reported. These situations were reported only in certain provinces. Three individuals in British Columbia and seven individuals in Ontario reported providing 7-day coverage, as did four additional respondents, one each in

Alberta, Saskatchewan, New Brunswick and Prince Edward Island. Further inspection of these data identified that 7-day-per-week coverage was not isolated to major urban communities.

Approximately two-thirds of survey respondents indicated that their primary place of employment was an agency operating across multiple sites or campuses. Overall 37% ( $n = 147$ ) of survey respondents indicated that their primary job involved working in more than one site. Interestingly, 25% ( $n = 99$ ) of the total survey response pool reported that they concurrently held more than one job, and of those working for two employers, approximately one-third of these ( $n = 36$ ) reported working across multiple locations for their second job. The frequency of holding two concurrent positions and working across multiple sites is shown in Table 3.

**Table 1**  
*Distribution of survey respondents by CASLPA membership and province/territory*

Province/Territory	N	CASLPA Members	Non-Members
British Columbia	65	100%	n/a
Yukon	2	100%	n/a
Alberta	69	86%	14%
Northern Territories	1	100%	n/a
Saskatchewan	17	100%	n/a
Manitoba	14	93%	7%
Ontario	130	98%	2%
Quebec	24	83%	17%
New Brunswick	32	91%	9%
Prince Edward Island	5	100%	n/a
Nova Scotia	21	100%	n/a

n/a = not applicable

**Table 2**  
*Distribution of survey respondents by practice setting and province/territory*

Province/Territory	N	Acute Care/ General Hospital	Inpatient Rehabilitation Hospital	Outpatient Assessment Clinic	Outpatient Rehabilitation Facility	Long-Term Care Facility	Palliative Care Program	Community or Home Care Service	Nursing Home/ Home for the Aged	Private Practice	School
British Columbia	65	66%	34%	25%	31%	32%	20%	25%	12%	6%	2%
Yukon	2					50%		50%			
Alberta	69	55%	35%	30%	28%	19%	4%	16%	9%	1%	12%
Northern Territories	1	100%		100%	100%						100%
Saskatchewan	17	53%	12%	24%	24%	18%	6%	12%	18%		12%
Manitoba	14	36%	50%	64%	50%	50%	7%		14%		
Ontario	130	60%	29%	21%	27%	20%	18%	19%	5%	3%	2%
Quebec	24	71%	25%	21%	38%	13%	8%				
New Brunswick	32	53%	31%	28%	31%	3%	16%	28%	28%		16%
Prince Edward Island	5	80%	40%								20%
Nova Scotia	21	52%	24%	33%	29%	10%	5%		5%	14%	14%
Newfoundland and Labrador	16	69%	50%	38%	50%	31%	13%	6%			
TOTAL	396	59%	31%	27%	30%	21%	13%	16%	9%	3%	6%

**Table 3***Work patterns with respect to number of positions held concurrently and frequency of working in multiple locations*

	Primary Employment			Secondary Employment		
	<i>N</i>	Multiple Sites?	Work at >1 Site?	Secondary Employment	Multiple Sites?	Work at >1 Site?
British Columbia	65	57%	43%	22%	9%	3%
Yukon	2	100%	100%			
Alberta	69	49%	42%	25%	13%	13%
Northern Territories	1	100%	100%			
Saskatchewan	17	59%	71%	53%	18%	24%
Manitoba	14	36%	21%	21%		
Ontario	130	62%	29%	31%	9%	8%
Quebec	24	63%	21%	21%	4%	
New Brunswick	32	69%	28%	9%	3%	
Prince Edward Island	5	20%	40%	20%		
Nova Scotia	21	81%	43%	10%	10%	5%
Newfoundland and Labrador	16	88%	50%	38%	6%	13%
<b>TOTAL</b>	<b>396</b>	<b>60%</b>	<b>37%</b>	<b>25%</b>	<b>9%</b>	<b>7%</b>

**Table 4***Speech-language pathology staffing complements reported by survey respondents.*

Province/Territory	<i>N</i>	1 S-LP on staff	2 S-LPs on staff	3 S-LPs on staff	4 S-LPs on staff	5 S-LPs on staff	6-10 S-LPs on staff	11-15 S-LPs on staff	>15 S-LPs on staff	Complement Unknown
British Columbia	65	18%	5%	9%	6%	11%	25%	12%	11%	3%
Yukon	2	50%				50%		50%		
Alberta	69	17%	9%	9%	3%	9%	19%	14%	20%	
Northern Territories	1						100%			
Saskatchewan	17	29%	6%	18%	12%	12%	6%		6%	12%
Manitoba	14	14%	7%				29%	36%	14%	
Ontario	130	12%	8%	8%	10%	5%	22%	15%	17%	4%
Quebec	24	4%	4%	4%	13%	13%	33%	8%	21%	
New Brunswick	32	16%	19%	6%	9%	3%	16%	13%	13%	6%
Prince Edward Island	5	60%		40%						
Nova Scotia	21	10%	5%	24%	5%	19%	10%	10%	14%	5%
Newfoundland and Labrador	16	6%	25%	13%	6%		6%	6%	38%	
<b>TOTAL</b>	<b>396</b>	<b>15%</b>	<b>8%</b>	<b>9%</b>	<b>7%</b>	<b>8%</b>	<b>20%</b>	<b>13%</b>	<b>16%</b>	<b>3%</b>

n/a = not applicable

The majority of survey responses (49%,  $n = 194$ ) were collected from clinicians working for agencies/facilities employing at least six speech-language pathologists. Sole-charge clinicians accounted for 15% ( $n = 59$ ) of the overall responses received, while 33% ( $n = 131$ ) reported working in agencies employing between two and six speech-language pathologists. Speech-language pathology staffing complements are shown by province in Table 4.

Survey respondents were asked to indicate the percentage of their clinical caseloads that involved individuals with dysphagia (Table 5). This revealed that clinicians in regions of the country with fewer speech-language pathologists were more likely to service dysphagia as part of a general caseload (up to 25%), while clinicians in major urban communities were more likely to have dysphagia accounting for 25% or more of their caseload.

**Table 5**  
Percent of caseload dedicated to dysphagia

	N	Caseload: % of cases with dysphagia				
		<10%	10-25%	25-50%	50-75%	>75%
British Columbia	65	22%	3%	23%	22%	25%
Yukon	2	50%				50%
Alberta	69	19%	10%	12%	12%	41%
Northern Territories	1	100%				
Saskatchewan	17	18%		24%	18%	24%
Manitoba	14		21%	14%	29%	36%
Ontario	130	12%	11%	18%	15%	41%
Quebec	24	17%	17%	13%	21%	29%
New Brunswick	32	31%	13%	6%	22%	19%
Prince Edward Island	5	60%		40%		
Nova Scotia	21	43%	14%	10%	29%	
Newfoundland and Labrador	16	13%	38%	13%	13%	25%
<b>TOTAL</b>	<b>396</b>	<b>19%</b>	<b>11%</b>	<b>16%</b>	<b>17%</b>	<b>31%</b>

Overall, 124 respondents (31%) reported caseloads with a predominant focus on dysphagia (75% or more of referrals). This included 12 individuals who reported being sole-charge clinicians in their primary worksite.

Survey respondents were asked to identify the lower and upper age limits for patients seen on their dysphagia caseload. This facilitated the grouping of responses into caseloads that were purely pediatric (upper age limit of 17,  $n = 50$ , i.e., 13% of total), purely adult (lower age limit of 18,  $n = 241$ , i.e., 61% of total), purely geriatric (lower age limit of 65,  $n = 7$ , i.e., 2% of total) or mixed (both pediatric and adult,  $n = 76$ , i.e., 19%); 23 respondents failed to provide any information regarding caseload age limits.

### Clinical Services

The clinical services section of the survey was divided into three sections: inpatient services, outpatient services and community-based/in-home services. Each respondent completed only those sections of the survey pertinent to his or her own work setting and patterns.

#### Inpatient Services

A total of 70% ( $n = 278$ ) of the survey respondents reported that their primary job involved the provision of dysphagia services to inpatients. The majority of these 278 respondents came from acute care facilities (51%,  $n = 142$ ) followed by facilities providing both acute care and inpatient rehabilitation (22%,  $n = 61$ ). A further 16% ( $n = 44$ ) described their work settings as inpatient rehabilitation facilities and the remaining 11% ( $n = 31$ ) worked in long-term care or nursing home settings.

### Swallowing screening

The term *swallowing screening* is generally used to refer to a minimally invasive evaluation procedure that provides quick determination of a) the likelihood that dysphagia exists, b) whether the patient requires referral for further swallowing assessment, c) whether it is safe to feed the patient orally (for the purposes of nutrition, hydration and administration of medication), and d) whether the patient requires referral for nutritional or hydrational support. The majority of screening procedures described in the literature have focused on identifying overt signs of aspiration (Martino, Pron, & Diamant, 2000; Perry & Love, 2001).

In the screening section of this survey, the objective was to investigate the extent to which formal swallowing screening mechanisms are established and operating in Canadian health care facilities and to learn which health care providers are involved in performing screening procedures.

Of the 278 survey respondents working in inpatient health care facilities, 161 (58%) reported that some sort of formal swallowing screening procedure was in place in their primary workplace. The most common form of screening process was a clinical pathway type approach, which involves automatic referral for swallowing assessment of patients who have been recognized to have past or current medical histories of high-risk diagnoses (46% of the time,  $n = 74$ ). The next most-common screening procedures involved asking the patient whether they were experiencing swallowing difficulty (22% of the time,  $n = 35$ ) or general observation for swallowing difficulties during routine or planned oral intake, such as at mealtime (13% of the time,  $n = 21$ ). Observation for cough during water swallows was reported to be used as a screening procedure only 2% of the time ( $n = 3$ ) and evaluation of the gag reflex or pharyngeal sensation were reported to be used less than 1% of the time ( $n = 1$ ). In 16% ( $n = 26$ ) of the cases where formal screenings were reported to be in place, no further detail regarding the type of procedure in use was provided. By far the majority of formal swallowing screening procedures were reported to be performed by nursing staff (75%,  $n = 121$ ). Occupational therapists, speech-language pathologists and clinical dietitians were reported to be directly responsible for performing swallowing screenings 10% ( $n = 16$ ), 8%

( $n = 13$ ) and 4% ( $n = 6$ ) of the time, respectively. Screening by physicians was reported to be the model in only 2% ( $n = 3$ ) of facilities where formal swallowing screening occurred, and the designated professional was not identified in the remaining 2 cases.

### Clinical (“bedside”) swallowing assessments

The clinical (bedside) swallowing assessment (henceforth, CBSA) has been described by the American Speech-Language Hearing Association (ASHA, 2004) as a non-instrumental evaluation that includes a) a case history, b) a review of medical/clinical records and observations, c) a structural and functional assessment of the muscles and structures used in swallowing, d) functional assessment of actual swallowing ability, and e) judgments regarding the adequacy of airway protection and respiratory-swallow coordination. CBSAs may also include an assessment of the effect of alterations in bolus delivery or use of therapeutic postures or maneuvers on the swallow, and may involve the use of low-technology tools such as stethoscopes and oxygen saturation monitors to aid in forming clinical impressions.

In this survey, CBSAs were reported to be a service component provided by the overwhelming majority of the 278 survey respondents who provided inpatient services (99%,  $n = 275$ ). Speech-language pathologists were reported to be the professionals most frequently responsible for CBSAs 80% ( $n = 60$ ) of the time in rehabilitation and long-term care institutions, 82% ( $n = 116$ ) of the time in acute care facilities, and 94% of the time in facilities providing a continuum of care from acute care through rehabilitation ( $n = 57$ ). When the S-LP was not the responsible professional, this role was typically reported to be performed by occupational therapists ( $n = 17$ , 6% of the time across inpatient settings), with rare leadership by clinical dietitians ( $n = 4$ , 1% across inpatient settings). With respect to interdisciplinary collaboration for CBSAs, the assessment was reported to be conducted solo by the responsible profession 36% of the time ( $n = 99$ ); participation by other team members in CBSAs was reported 42% of the time for clinical dietitians ( $n = 116$ ), and 24% ( $n = 66$ ) and 19% ( $n = 52$ ) of the time for occupational therapists and nursing staff, respectively. However, the involvement of multiple professions in CBSAs was reported to be collaborative only 47% of the time ( $n = 130$ ) across all 278 inpatient settings combined and as low as 43% ( $n = 61$ ) in the 142 acute care facilities surveyed.

### Instrumental swallowing assessments

Instrumental swallowing assessments come in two major forms: endoscopic (the Flexible Endoscopic Examination of Swallowing, or FEES) and radiographic (the Videofluoroscopic Swallowing Study, or VFSS). Of the two, VFSS was expected to be in broader use within inpatient health care facilities across Canada due to regulatory restrictions in some provinces around the act of transnasal scope insertion.

FEES was reported to be available in 23% ( $n = 33$ ) and 24% ( $n = 15$ ) of the Canadian acute care and acute-rehab continuum facilities where survey respondents worked. Slightly less access to this procedure (13%,  $n = 6$ ) was reported in rehabilitation facilities and the procedure was reported to be unavailable in long-term care settings. When available (54 respondents), endoscopic swallowing examinations were most commonly reported to be provided either during an otolaryngology appointment with the S-LP observing and participating (33%,  $n = 18$ ) or by the S-LP independently (28%,  $n = 15$ ). The reported involvement of physicians (typically otolaryngologists) in endoscopic swallowing assessments was isolated to facilities with an acute care component. Independent performance of FEES by speech-language pathologists (including scope insertion) was reported 6% ( $n = 3$ ) of the time in rehabilitation facilities and 15% ( $n = 21$ ) and 7% ( $n = 4$ ) in acute and acute-rehabilitation continuum facilities, respectively. A variation on FEES involves the use of a dual-channel endoscope, allowing delivery of a calibrated air-puff through the second channel to allow visual evaluation of mucosal response to sensory stimulation (FEESST). This model of scope was reported to be used in 6% ( $n = 3$ ) of the inpatient endoscopic swallowing examinations described by survey respondents.

From the 278 survey respondents working in inpatient health care facilities, 76% ( $n = 211$ ) reported performing VFSS in their practice. The bulk of VFSS practice was concentrated in acute (57%,  $n = 120$ ) or acute care-rehabilitation continuum facilities (25%,  $n = 53$ ) compared to rehabilitation (15%,  $n = 22$ ) and long-term care facilities (3%,  $n = 6$ ). On-site VFSS equipment was reported to be available 84% ( $n = 177$ ) of the time for those performing the procedure, with a further 11% ( $n = 23$ ) of these clinicians (predominantly from rehabilitation facilities) reporting that they had privileges to attend and perform VFSS at a nearby hospital. Quick access to VFSS for inpatients (within 1 day) was restricted to facilities with an acute care component (17%,  $n = 36$ ), with the median reported wait-time reported as between 2 and 5 working days (54%,  $n = 114$ ). Wait-times of 1 to 2 weeks and 2 to 4 weeks were reported for a further 13% ( $n = 27$ ) and 4% ( $n = 8$ ) of respondents who performed VFSS respectively.

The staffing complement for inpatient VFSS was reported to always include a radiologist or radiology resident 70% of the time ( $n = 148$ ); 9% ( $n = 19$ ) of the reported inpatient VFSS procedures were reported to be performed without a radiologist present. Speech-language pathologists and radiation technologists were reported to be always present for inpatient VFSS 96% ( $n = 203$ ) and 86% ( $n = 181$ ) of the time, respectively, and there were no cases reported where a speech-language pathologist would perform a VFSS with neither a radiologist or a radiation technologist present. Other professions were reported to be predominantly present at inpatient VFSS on an occasional basis. These included occupational therapists (always present: 9%,  $n = 19$ , sometimes present: 25%,  $n = 53$ );

clinical dietitians (always present: 4%,  $n = 8$ ; sometimes present: 33%,  $n = 70$ ; nursing staff (always present: 2%,  $n = 4$ ; sometimes present: 48%,  $n = 101$ ); attending physician (always present: 1%,  $n = 2$ ; sometimes present: 2%,  $n = 4$ ); respiratory therapists (always present: 5%,  $n = 11$ ; sometimes present: 55%,  $n = 116$ ); and physiotherapists (always present: 1%,  $n = 2$ , sometime present: 9%,  $n = 19$ ).

### Intervention

With respect to inpatient dysphagia intervention, survey respondents were asked to indicate the availability of four different kinds of intervention: 1) support for enteral feeding, 2) texture modified oral diets, 3) face-to-face direct treatment to train the use of compensatory or rehabilitative maneuvers, and 4) training and education for caregivers to support the patient in implementing treatment recommendations. All four of these intervention options were reported to be available by at least 82% ( $n = 203$ ) of the 247 survey respondents working in acute care, acute-rehab continuum or rehabilitation facilities. Enteral feeding support (63%,  $n = 20$ ) and face-to-face direct treatment (70%,  $n = 22$ ) were reported to be slightly less available in long-term care facilities. Speech-language pathologists were reported to be the profession most frequently responsible for dysphagia intervention by the overwhelming majority of survey respondents working in inpatient facilities (87%,  $n = 242$ ), with participation by occupational therapists, clinical dietitians and nursing staff reported 11% ( $n = 31$ ), 7% ( $n = 19$ ) and 11% ( $n = 31$ ) of the time, respectively. With respect to the duration of dysphagia intervention, 14% ( $n = 39$ ) of survey respondents in inpatient facilities indicated that the number of sessions provided to patients would vary depending on perceived patient need, with no specified maximum; this response was most commonly seen for respondents working in inpatient rehabilitation facilities. The median response for direct treatment duration was two to five sessions, reported by 41% ( $n = 108$ ) of the 263 respondents who reported providing inpatient dysphagia intervention. Treatment courses of six to ten sessions or more than 10 sessions were reported by only 8% ( $n = 22$ ) of the total inpatient clinician response pool, and were most common in inpatient rehabilitation settings.

### Outpatient Services

A total of 54% ( $n = 212$ ) of the survey respondents reported that they provided swallowing services to outpatients. These individuals came from a variety of different employment settings. For the purposes of the analyses, the outpatient services responses were divided according to the following employment setting categories: 1) facilities providing a continuum of care, either from acute care through rehabilitation, and/or from rehabilitation through long-term care (58%,  $n = 123$ ), 2) acute care facilities (26%,  $n = 54$ ), 3) inpatient rehabilitation centers (1%,  $n = 2$ ), 4) freestanding outpatient assessment clinics (1%,  $n = 2$ ), 5) outpatient rehabilitation centers (9%,

$n = 18$ ), long-term care or nursing home facilities (4%,  $n = 9$ ), 7) schools (1 respondent), and 8) private practices (1%,  $n = 3$ ).

### Outpatient clinical (“bedside”) swallowing assessments

As with the inpatient section of the survey, the outpatient section enquired about the provision of clinical (bedside) swallowing assessments (CBSAs). These were reported to be available in 92% ( $n = 195$ ) of the facilities offering outpatient services. CBSAs for outpatients were reported to be least available in acute care facilities (81%,  $n = 44$ ). Speech-language pathologists were reported to be the profession responsible for outpatient CBSAs in 87% ( $n = 170$ ) of the cases where CBSAs were offered. When the S-LP was not the responsible professional, this role was reported to most commonly be assumed by the occupational therapist (3% of the time,  $n = 6$ ), with clinical dietitians taking the lead in a few cases (1% of the time,  $n = 2$ ). Outpatient CBSAs were reported to be conducted solo by a single profession 55% of the time ( $n = 107$ ) and by a collaborating team 39% of the time ( $n = 76$ ). Occupational therapists and clinical dietitians were reported to participate in outpatient CBSAs 21% ( $n = 41$ ) and 23% ( $n = 45$ ) of the time, respectively.

### Outpatient instrumental swallowing assessments

Outpatient endoscopic swallowing examinations were reported to be offered by only 14 (6%) of the survey respondents who provided outpatient swallowing services. These individuals were employed exclusively in acute care or continuum facilities. In 6 of these 14 cases (42%), the S-LP reported that he or she was independently responsible for scope insertion. Endoscopy was reported to be performed collaboratively between the otolaryngologist and speech-language pathologist in four cases (29%) and in another four cases (29%) the model was not described. Single channel endoscopes were utilized in the majority of cases, with the dual channel option in use in only one reported case.

Outpatient VFSS examinations were reported to be available in 57% ( $n = 121$ ) of the 212 facilities providing outpatient swallowing services. Of these, schools (no cases, 0%) and long-term care facilities ( $n = 41$ , 33%) had the poorest availability of VFSS. In those facilities providing outpatient VFSS, the equipment was reported to be available in-house 82% ( $n = 99$ ) of the time, and clinicians indicated that they had privileges to attend and perform VFSS at another health care facility 13% of the time ( $n = 16$ ). In the remaining 5% of cases ( $n = 6$ ), outpatients were reported to be referred and sent to another facility for videofluoroscopy. Wait-times for outpatient VFSS are shown in Table 6.

The staffing complement for outpatient VFSS was reported to always include a radiologist or radiology resident 71% of the time ( $n = 86$ ); 12% ( $n = 15$ ) of the reported outpatient VFSS procedures were reported to be performed without a radiologist present. Speech-language

**Table 6**  
Wait-times for outpatient videofluoroscopy

	Frequency	Percent
1 working day or less	1	1
2-5 working days	10	7
1-2 weeks	26	19
2-4 weeks	36	27
More than 1 month	31	23
Not reported	30	22
Total	134	

pathologists and radiation technologists were reported to be present for outpatient VFSS 97% ( $n = 117$ ) and 82% ( $n = 99$ ) of the time, respectively. Other professions were reported to be predominantly present at outpatient VFSS on an occasional basis: occupational therapists (always present: 15%,  $n = 18$ ; sometimes present: 21%,  $n = 25$ ); clinical dietitians (always present: 5%,  $n = 6$ ; sometimes present: 23%,  $n = 28$ ); nursing staff (always present: 2%,  $n = 2$ ; sometimes present: 18%,  $n = 22$ ); attending physician (always present: 1%,  $n = 1$ ; sometimes present: 5%,  $n = 6$ ); respiratory therapists (always present: 7%,  $n = 8$ ; sometimes present: 25%,  $n = 30$ ); physiotherapists (always present: 6%,  $n = 7$ ).

### Outpatient interventions

Support for outpatient enteral feeding was reported to be available in slightly more than half of the facilities offering outpatient swallowing services (54%,  $n = 114$ ), with the lowest levels of support found in private practice settings (33%,  $n = 1$ ). Caregiver training and texture modification support were more available for outpatients overall (77%,  $n = 163$ ; and 75%,  $n = 159$ ). The poorest availability of these interventions was found in long-term care facilities (67%,  $n = 82$  for both caregiver training and texture modification support). Face-to-face direct therapy for outpatients with dysphagia was available in 67% ( $n = 142$ ) of the 212 facilities providing outpatient services. The lowest levels of availability were found in long-term care and inpatient rehabilitation facilities (44%,  $n = 54$ ; and 50%,  $n = 1$ , respectively). Where face-to-face direct therapy was offered, speech-language pathologists were reported to be the professionals most frequently responsible 98% of the time ( $n = 139$ ). Direct treatment was reported to be provided by a single profession 63% of the time ( $n = 89$ ). Involvement by other professions in face-to-face direct dysphagia therapy was reported as follows: occupational therapists (12% of the time,  $n = 17$ ); dietitians (26%,  $n = 37$ ) and nursing staff (2%,  $n = 3$ ). Text comments also mentioned occasional participation by clinical psychologists, physiotherapists and family members. The average number of direct face-to-face dysphagia therapy sessions provided to outpatients was reported to be un-fixed or unknown 25% of the time ( $n = 36$ ), and was most commonly reported to be between two and five sessions (31% of the time,  $n = 44$ ). Outpatient

treatment duration was reported to be limited to a single face-to-face session in 16% of cases ( $n = 23$ ) and courses of more than six sessions were reported only 13% of the time ( $n = 18$ ).

### Community-based/In-home Dysphagia Services

A total of 25% ( $n = 98$ ) of the survey respondents reported that their primary job involved traveling to provide in-home or community-based swallowing services. These individuals worked for a wide variety of employment settings, ranging from pure community based agencies (including private practices) to community services provided through an agency providing a full continuum of inpatient, outpatient, long-term care and educational services. For the purposes of the analyses, the community based services responses were divided according to the following employment setting categories: those based purely in the community (16%,  $n = 16$ ); those associated with an ambulatory care health facility (13%,  $n = 13$ ); and those associated with a residential health care facility (60%,  $n = 59$ ). The type of employment setting was not reported by 10 respondents (10%) who indicated that they provided community-based services. Analysis of the locations of the different types of employment settings offering community-based dysphagia services revealed that purely community-based and ambulatory-care associated services were more likely to be found in major urban centres, while services affiliated with residential health care facilities were more commonly found in smaller communities.

### Community-based clinical (“bedside”) swallowing assessments

As with the previous sections of the survey, questions were posed about the provision of clinical (bedside) swallowing assessments (CBSAs) to patients in the community. These were reported to be available in all except 2 (98%) of the facilities offering community-based dysphagia services. Speech-language pathologists were reported to be involved in community-based CBSAs 95% of the time ( $n = 91$ ). Occupational therapists were reported to participate in community-based CBSAs 40% of the time ( $n = 38$ ), with the lowest level of participation seen in community-based services affiliated with residential health care facilities (36%,  $n = 21$ ). Clinical dietitians were reported to participate in 28% ( $n = 27$ ) of the CBSAs occurring in the community; involvement by dietitians was not a characteristic of community-based CBSAs offered by agencies affiliated with ambulatory health care facilities. Participation by nursing staff in community-based CBSAs was reported 5% of the time ( $n = 5$ ). Collaboration across professionals as a team was the predominant, but not exclusive, model for community-based CBSAs (57% of the time,  $n = 55$ ).

### Community-based instrumental swallowing assessments

Thirty-five percent ( $n = 34$ ) of the 98 survey respondents working in the community told us that they were unable to access any form of instrumental swallowing

assessment for their patients. Of the 64 respondents who indicated that they were able to access instrumental procedures for community-based patients, 92% ( $n = 59$ ) indicated that they were able to access VFSS. By contrast, only 6% ( $n = 6$ ) of the community-based S-LPs reported having access to endoscopy, with this access restricted exclusively to community-based agencies affiliated with residential health care facilities. Speech-language pathologists working for community-based agencies were reported to have privileges to perform VFSS inside facilities with radiological equipment in 31% of reported cases ( $n = 18$ ). Wait-times for VFSS for community-based patients were most commonly reported as being 1-2 weeks (30%,  $n = 18$ ), 2-4 weeks (28%,  $n = 17$ ) or 1-2 months (25%,  $n = 15$ ). Waits of less than 1 week were reported in 9% of cases ( $n = 5$ ), and excessively long waits of greater than 3 months in duration were reported for the remaining 9% of cases ( $n = 5$ ).

### Community-based dysphagia interventions

Caregiver training (95%,  $n = 93$ ) and texture modification support (90%,  $n = 88$ ) were the most common forms of swallowing intervention provided in the community. Support for enteral feeding was reported to be available in 67% ( $n = 66$ ) of the community-based swallowing services. In-home, face-to-face direct therapy for dysphagia was reported to be available 79% of the time ( $n = 77$ ). The number of face-to-face treatment sessions was reported to be un-fixed in 30% of these cases ( $n = 23$ ), and most commonly ranged from 2-5 sessions (46%,  $n = 35$ ). Face-to-face treatment limited to a single session was reported to be the norm by 10% ( $n = 8$ ) of the community-based survey respondents providing treatment, and courses of more than 6 sessions in duration were reported to be available 13% of the time ( $n = 10$ ).

### Training, Procedural Knowledge and Continuing Education

#### University Training

Survey respondents were asked to optionally disclose the name of the university where they received their clinical speech-language pathology training, and the year of their graduation. A total of 84 respondents (21%) identified the university where they had trained, with two-thirds of these being schools located in Canada, and all except one of the remaining responses representing graduates of schools in the United States. Seven Canadian university training programs were represented: University of British Columbia, University of Alberta, University of Western Ontario, University of Toronto, Université d'Ottawa, McGill University and Dalhousie University. There were no responses disclosed as representing graduates of the Université de Montréal, or the more recently established program at Université Laval.

With respect to the number of years since graduating with a clinical degree in speech-language pathology, 94 respondents (24%) disclosed this information. Overall, these 94 survey respondents reported a mean duration of

14 years since graduation (range 1-37 years). This broke down further into 12% ( $n = 11$ ) with post-graduation experience of less than 2 years, 15% ( $n = 14$ ) with 3-5 years' experience, 18% ( $n = 17$ ) who had been practicing in the profession for between 6 and 10 years, 19% ( $n = 18$ ) with 10-15 years' experience and 36% ( $n = 34$ ) with more than 15 years of professional experience since graduation. Thus, based on these 94 respondents, this survey appears to reflect the responses of an experienced group of speech-language pathologists.

Respondents were also asked whether they had recent experience (in the past 2 years) in supervising students on clinical placements; this was reported to be the case by only 39 respondents (10%). Survey respondents were further asked to comment on their impressions of the adequacy of three aspects of student preparation in the area of dysphagia: theoretical knowledge, procedural knowledge, and clinical skills. These impressions were reported by a total of 94 survey respondents and are summarized in Table 7. In general, this table suggests that clinicians have the impression that students arrive on clinical placements involving dysphagia cases with inadequate preparation, particularly with respect to procedural knowledge and clinical skills.

**Table 7**  
*Survey respondents' appraisal of the adequacy of student preparation in dysphagia*

	Theoretical Knowledge	Procedural Knowledge	Clinical Skills
Inadequate	28%	48%	53%
Adequate	64%	49%	45%
Very Good	9%	3%	2%

#### Procedural Knowledge

In order to understand the extent to which Canadian speech-language pathologists provide a variety of different swallowing assessment and treatment procedures, each survey respondent was asked to describe their frequency of using six specific assessment procedures and 19 specific intervention procedures. It should be noted that inclusion of these techniques in the survey does not imply endorsement of the technique by CASLPA, nor does it imply that evidence supporting the technique necessarily exists in the research literature. The procedures that were selected for inquiry included one assessment and seven intervention techniques that were expected to be familiar to the majority of survey respondents, based on the fact that they have been extensively described in the swallowing literature, including most textbooks: videofluoroscopy; postural compensations; the supraglottic and super-supraglottic swallows; the Mendelsohn manoeuvre; the

Masako (tongue-hold) manoeuvre; oral motor exercises; and thermal-tactile stimulation. FEES and suctioning (oral, pharyngeal and tracheal) were included as techniques that have been described in practice statements and clinical guideline documents as optional components of speech-language pathology practice, but were considered unlikely to be in wide use given the need for training, supervision or delegation by other medical professionals. Two assessment techniques (cervical auscultation and pulse oximetry) and several intervention techniques (lingual pressure generation exercises, the Shaker exercise, surface EMG biofeedback, neuromuscular electrical stimulation and Vital Stim) were considered likely to be familiar to survey respondents (but not in wide use) given that they are currently under investigation. Three intervention techniques from other domains that are claimed to have potential benefits for swallowing were expected to be unfamiliar to the majority of survey respondents (Facial Nerve Rehabilitation; Lee Silverman Voice Treatment; and Respiratory Resistance Training). Finally, three controversial techniques were included: deep pharyngeal neuromuscular stimulation, blue dye testing and glucose oxidase monitoring. Tables 8, 9a and 9b document the survey responses regarding utilization of these assessment and intervention techniques, respectively. In total, 318 respondents completed the assessment utilization questions and 311 respondents completed the intervention utilization questions on the survey. For each technique the mode responses regarding utilization are highlighted in bold font.

These tables confirm that videofluoroscopy is the predominant form of instrumental swallowing assessment in use in Canada. It is interesting to note that despite recent controversy regarding the safety of administering blue dye to detect aspiration in tracheotomized patients (Maloney & Metheny, 2002; Maloney et al., 2000; Maloney & Ryan, 2002; Metheny & Clouse, 1997; Metheny et al., 2002), this procedure is reported to be in current use by 37% ( $n = 118$ ) of the survey respondents.

Mode responses regarding the established intervention techniques showed that only postural compensations and oral motor exercises were reported to be in frequent use by the majority of survey respondents. Only 12% ( $n = 37$ ) of survey respondents reported frequent use of tracheal suctioning. Of the less established intervention techniques, the Shaker exercise, tongue-pressure generation exercise and surface EMG biofeedback were reported to be in the widest use (54%,  $n = 168$ ; 27%,  $n = 84$ ; and 17%,  $n = 53$ , respectively). At this time, treatment involving the administration of electrical current is in very limited use in Canada. In light of the current lack of empirical evidence guiding the use of electrical stimulation for dysphagia intervention (Ludlow et al., 2006; Steele, 2004; Steele, Thrasher, & Popovic, 2007; Suiter, Leder, & Ruark, 2006), this minimal reported utilization is considered to reflect appropriate caution on the part of clinicians regarding this new technology. Of the three cross-modality interventions, the Lee Silverman Voice Treatment (LSVT) was the most commonly utilized (31% of the time).

### Radiation protection awareness training

One topic of interest in this survey was to determine how much training in radiation protection awareness had been received by clinicians who perform videofluoroscopic swallowing assessments. This is of particular interest, given the report by survey respondents that radiologists are not present in the radiology suite during performance of the VFSS examination 9-12% of the time. A recent survey of members of the American Speech-Language Hearing Association's Special Interest Division 13 (Swallowing and Swallowing Disorders) suggested that 43% of responding clinicians performing videofluoroscopy had never received any education regarding radiation protection or awareness (Steele & Murray, 2004). It was of interest, therefore, to evaluate the level of radiation education received by Canadian clinicians. Of the 396 survey respondents, 249 reported involvement in either inpatient and/or outpatient videofluoroscopy at their primary workplace. The majority

of these individuals (80%,  $n = 199$ ) did not provide any information regarding their past radiation protection awareness training, and a further 9% ( $n = 22$ ) reported that they had never received any training regarding radiation protection. Formal radiation protection awareness training in the workplace, for one or more hours, was reported to have been received by only 3% ( $n = 7$ ) of the survey respondents involved in videofluoroscopy.

**Table 8**

*Reported utilization for six selected dysphagia assessment procedures.*

	VFSS	FEES	Cervical Auscultation	Pulse Oximetry	Blue Dye Test	Glucose Oxidase
Never heard of the procedure	0%	2%	8%	16%	4%	<b>50%</b>
Not used at my workplace	23%	<b>74%</b>	<b>36%</b>	<b>32%</b>	<b>45%</b>	41%
Available at work, but I do not use	2%	13%	22%	19%	14%	8%
Use infrequently	9%	7%	15%	23%	27%	1%
Use frequently	<b>65%</b>	4%	19%	11%	10%	0%

*Note.* Mode responses are shown in bold font.



**Table 9a.**  
Reported utilization for 10 selected dysphagia intervention procedures.

	Established Compensatory Techniques					Established Rehabilitative Techniques		Suctioning		
	Postural Compensations	Supraglottic Swallow	Super-Supraglottic Swallow	Mendelsohn Maneuver	Makaso Maneuver	Oral Motor Exercises	Thermal Tactile Stimulation	Oral	Pharyngeal	Tracheal
Never heard of the procedure	1%	2%	3%	4%	22%	0%	3%	3%	5%	4%
Not used at my workplace	3%	9%	11%	10%	16%	2%	23%	21%	37%	30%
Available at work, but I do not use	3%	9%	13%	11%	16%	4%	26%	<b>43%</b>	<b>47%</b>	<b>53%</b>
Use infrequently	18%	<b>54%</b>	<b>54%</b>	<b>51%</b>	<b>29%</b>	32%	<b>40%</b>	22%	10%	9%
Use frequently	<b>75%</b>	25%	19%	25%	16%	<b>61%</b>	9%	12%	1%	3%

Note. Mode responses are shown in bold font.

**Table 9b.**  
Reported utilization for nine additional selected dysphagia intervention procedures.

	Techniques Currently Under Investigation					Anecdotal Evidence	Cross-System Techniques		
	Lingual Pressure Generation Exercises	Shaker Exercise	sEMG Biofeedback	Neuromuscular Electrical Stimulation	Vital Stim	Deep Pharyngeal Neuromuscular Stimulation	Facial Nerve Rehabilitation	Lee Silverman Voice Treatment	Respiratory Resistance Training
Never heard of the procedure	28%	15%	7%	12%	40%	21%	23%	9%	<b>62%</b>
Not used at my workplace	<b>32%</b>	16%	<b>68%</b>	<b>81%</b>	<b>53%</b>	<b>71%</b>	<b>55%</b>	<b>34%</b>	31%
Available at work, but I do not use	13%	14%	8%	5%	4%	6%	10%	25%	5%
Use infrequently	22%	<b>40%</b>	13%	2%	3%	1%	9%	26%	2%
Use frequently	<b>5%</b>	14%	4%	0%	1%	1%	2%	5%	0%

Note. Mode responses are shown in bold font.

### Continuing Education

In addition to understanding clinicians' utilization of specific assessment and intervention procedures, the survey sought to learn about the kinds of continuing education that clinicians pursue with respect to dysphagia. A total of 97 respondents completed this section of the survey. The most common forms of continuing education reported were workshops, conferences or research symposia (97% of the time,  $n = 95$ ) and on-the-job training or mentorship with more experienced clinicians (90% of the time,  $n = 87$ ). Participation in a local or regional dysphagia interest group was reported by 43% of those who acquired post-graduate dysphagia-related continuing education ( $n = 42$ ), and participation in a journal club was reported by 22% ( $n = 21$ ). Additional university coursework had been completed by 12 survey respondents (12%). Continuing education in the area of dysphagia was expected to be something that might not be readily accessible to clinicians in all regions of the country. Respondents were asked to

identify perceived impediments to acquiring dysphagia-related continuing education. The most commonly perceived impediments were financial (17%,  $n = 69$ ), the lack of workshops being offered (10%,  $n = 39$ ) and the geographical accessibility of workshops (17%,  $n = 69$ ). A lack of available time to attend continuing education events was reported to be an impediment by 9% ( $n = 36$ ) of the survey respondents.

### CONCLUSION

This survey paints a comprehensive picture of dysphagia service delivery by Canadian S-LPs in 2006. It is clear that the demand for dysphagia services has grown over the past decade and that S-LPs play the leading role in meeting this demand in Canadian health-care settings. Formal swallowing screening procedures are commonly used to identify patients who require referral for swallowing assessment. Instrumental assessments, particularly videofluoroscopy, are in wide use by Canadian S-LPs.

Wait-times for these procedures can be lengthy, particularly for outpatients. Dysphagia intervention approaches predominantly involve diet texture modification and established compensatory techniques.

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## ■ Occurrence of Otitis Media and Hearing Loss Among First Nations Elementary School Children

## ■ Occurrence de l'otite moyenne et de la perte auditive chez les écoliers des Premières Nations

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### Abstract

This study investigated the occurrence of otitis media and hearing loss among First Nations children for different age groups. The study also explored whether the presence of otitis media and hearing loss persisted throughout the school year. The 48 participants were children of Mi'kmaq heritage from a First Nations elementary school in Nova Scotia. Children underwent pneumatic otoscopy, tympanometry, and pure tone audiometry on two separate occasions 6 months apart. Three age groups (3-5 years, 6-8 years, and 9-11 years) were compared. Consistent with previous research, results revealed that First Nations children suffer from high occurrence of otitis media and hearing loss. Indeed, middle ear pathology and hearing loss were found in more than 20% of the children. Otitis media with effusion was the most common type of middle ear pathology observed. Although the occurrence of hearing loss tended to decline with increasing age, the 6 to 11 year-old children continued to show an abnormally high occurrence of middle ear pathology and hearing loss, a trend contradictory to that found in the general population. In each age group, occurrences of otitis media and hearing loss were similar for the two evaluations conducted 6 months apart, suggesting that otitis media remains high throughout the school year. Half of the children found to have middle ear pathology in the first evaluation presented with the same pathology 6 months later. The importance of regular hearing screenings and proper audiological and medical follow-up in First Nations children is highlighted.

### Abrégé

La présente étude porte sur l'occurrence de l'otite moyenne et de la perte auditive chez les enfants des Premières Nations de divers groupes d'âge. Elle analyse aussi si la présence d'une otite moyenne et d'une perte auditive persiste tout au long de l'année scolaire. L'étude porte sur 48 enfants d'ascendance mi'kmaq d'une école des Premières Nations de la Nouvelle-Écosse. Les enfants ont subi une otoscopie pneumatique, une tympanométrie et une audiométrie tonale à deux occasions à six mois d'intervalle. Les chercheurs ont comparé les résultats de trois groupes d'âge (3 à 5 ans, 6 à 8 ans, 9 à 11 ans). À l'instar de recherches antérieures, les résultats ont révélé que les enfants des Premières Nations souffrent d'une occurrence élevée d'otite moyenne et de perte auditive. De fait, on a relevé une pathologie de l'oreille moyenne et une perte auditive chez plus de 20 % des enfants. L'otite moyenne avec effusion est la pathologie de l'oreille moyenne la plus courante. Bien que l'occurrence de la perte auditive tende à diminuer avec l'âge, les enfants de 6 à 11 ans continuent à présenter une occurrence anormalement élevée de pathologie de l'oreille moyenne et de perte auditive, une tendance contradictoire à celle de la population en général. Pour chaque groupe d'âge, les occurrences d'otite moyenne et de perte auditive étaient similaires pour les deux évaluations menées à six mois d'intervalle, ce qui laisse entendre que l'otite moyenne demeure élevée tout au long de l'année scolaire. La moitié des enfants atteints d'une pathologie de l'oreille moyenne lors de la première évaluation présentaient la même pathologie six mois plus tard. Cet article fait ressortir l'importance du dépistage auditif régulier et d'un suivi audiolinguistique et médical convenable pour les enfants des Premières Nations.

**Key words:** Otitis media, hearing loss, schoolchildren

Hearing loss has been reported to be highly prevalent among Canadian Aboriginal children compared to other groups of people, with prevalence rates among the school-age population ranging between 4-30% (e.g., Ayukawa, Bruneau, Proulx, Macarthur, & Baxter, 1997; Ayukawa, Lejeune, & Proulx, 2000; Eriks-Brophy & Ayukawa, 2000; Julien, Baxter, Crago, Ilecki, & Therien, 1987; Ling, McCoy, & Levinson, 1969; Schilling, Buelow, & Duval, 2002; Woods, Moffatt, Young, O'Neil, Tate, & Gillespie, 1994). These studies were conducted in various regions across northern Canada and demonstrate that hearing impairment in school-aged Inuit children has been highly prevalent for over 3 decades. More specifically, Julien et al. (1987) reported hearing loss in Inuit children to be 23%, and more recently, in 2002, 30% of Inuit children were identified with hearing loss (Schilling et al., 2002). Comparatively, prevalence rates among the general population (nonspecific races) including 38,000 school-aged children found only 2.63% to have a hearing impairment (Lundeen, 1991). Evidently, Aboriginal children, in particular Inuit children, suffer from exceedingly high rates of hearing loss.

Few studies exist regarding hearing loss among Aboriginal children living in the southern regions of Canada, namely First Nations children. One study completed on an entire reservation in British Columbia reported abnormal hearing among 31.3% of the community (Cambon, Galbraith, & Kong, 1965). Another study in British Columbia found 19.2% of First Nations children to have a hearing impairment (Doyle & Morwood, 1976). More recently, a prevalence study completed on the eastern coast of Canada revealed hearing loss in 17.4% of First Nations elementary school children compared to 3.7% of non-Aboriginal age-matched children from a nearby community (Van Ek & Sockalingam, 2004). Although limited in number, these studies suggest that high rates of hearing impairment also exist among Aboriginal children beyond the arctic region.

Narrowly defined, otitis media is the presence of inflammation in the middle ear cavity. The terminology, definitions and classification of middle ear disease has evolved over the past few decades. A multitude of terms have been used to describe the inflammatory condition of the middle ear, often resulting in confusion and misunderstanding among clinicians and researchers (Bluestone & Klein, 1995). To avoid ambiguity, the terms and classification used in this study are defined below.

Acute otitis media (AOM) is the presence of middle ear effusion with the rapid and short onset of signs and symptoms of inflammation of the middle ear cavity. One or more symptoms include acute onset of otalgia, otorrhea, fever, malaise, irritability, anorexia, vomiting or diarrhea. Local findings present with a full or bulging tympanic membrane with limited or absent movement to pneumatic otoscopy. Erythema may be present (Bluestone & Klein, 1995). After resolution of AOM symptoms middle ear effusion may persist for weeks to months following AOM, although this condition is indistinguishable from otitis

media with effusion (Rosenfeld & Bluestone, 2003).

Otitis media with effusion (OME) is the presence of inflammation of the middle ear cavity with relatively asymptomatic middle ear effusion. OME is distinct from AOM because it lacks the signs and symptoms of an acute ear infection (e.g., fever) (Bluestone, 1998). OME may occur spontaneously because of poor Eustachian tube function or as an inflammatory response following AOM. The middle ear effusion may be serous, mucoid or purulent. The most frequent otoscopic finding is opacification of the tympanic membrane, which makes assessment of the type of effusion not possible. Thus, the diagnosis of OME is limited to the observation that fluid of a non-specific nature is present in the middle ear space. Local findings reveal a convex or retracted tympanic membrane with impaired mobility on the pneumatic otoscopy. However, bulging or fullness of the tympanic membrane may be visualized. In addition, an air-fluid level or air bubbles may be observed. The duration of the presence of the middle ear effusion can be acute (less than 3 weeks), subacute (3 weeks to 3 months) or chronic (more than 3 months) (Bluestone, 1998; Bluestone & Klein, 1995).

Atelectasis of the tympanic membrane, which may or may not be associated with otitis media, is either collapse or retraction of the tympanic membrane. Collapse involves passivity, whereas retraction implies active pulling inward of the tympanic membrane, usually due to negative middle ear pressure. Atelectasis of the tympanic membrane is not considered a type of otitis media, but rather a related condition which may be present prior to, concurrent with or after an episode of OME (Bluestone & Klein, 1995).

Hearing loss secondary to otitis media can be affected not only by reduced air pressure in the middle ear space, but also by fluid retained in the middle ear cavity. The effusion compromises the traditional sound pathway of the middle ear by decreasing the tympano-ossicular mobility because of the supplemental mass, stiffness or friction of the middle ear mechanism which results in loss of hearing sensitivity (Bluestone & Klein, 1995; Rosenfeld et al., 2004).

Fluctuating conductive hearing loss is present in most children who have middle ear effusion as a result of OME or AOM. Due to their lack of symptoms, OME and persistent middle ear effusion following AOM and their concomitant hearing loss often go unrecognized by parents. The loss of hearing ranges from mild to moderate (15 to 40 dB), with an average hearing threshold of 27 dB HL (Rosenfeld & Bluestone, 2003). This variation in hearing loss is not influenced by the quality or viscosity of the fluid in the middle ear cavity (i.e., ears with serous fluid are not less impaired than those with more viscous fluid). Instead the volume of the effusion has been found to have an impact on hearing threshold. Ears that are only partially filled with fluid (as evident by the presence of an air-fluid level or bubbles on the pneumatic otoscopy) have less of a hearing impairment than those ears completely filled with fluid (Fria, Cantekin, & Eichler, 1985; Wiederhold, Zajtchuk, Vap, & Paggi, 1980).

Otitis media has been reported to be highly prevalent among Canadian Aboriginal children compared to other groups of people. More specifically, since the 1960s researchers have been finding overwhelming rates of chronic otitis media (COM) among this population (e.g., Baxter, 1999; Julien et al., 1987; Ling et al., 1969; Tremblay, 1990). COM is typically defined in these studies as a chronic infection of the middle ear cleft including perforation of the tympanic membrane, with and without otorrhea. This type of otitis media is uncommon in non-native children (Baxter, 1999) and is often a result of AOM, but may also occur when chronic or persistent OME is present (Bluestone, 1998).

Longitudinal data collected from the Eastern Canadian Arctic (Baffin Zone) has shown an evolving pattern of middle ear disease between 1968-1998. In particular, in the late 1960s and 1970s COM was the most common type of ear disease and AOM and OME were seldom seen. However, starting in the 1980s this pattern of ear disease began to change and AOM and OME were more frequently being diagnosed and no longer were discharging ears prevalent (Baxter, 1999; Baxter, Stubbing, Goodbody, & Terraza, 1992). On the contrary, a study (Ayukawa et al., 1997) in Nunavik, Quebec compared prevalence rates of otitis media between 1987 and 1997 and discovered that rates of OME decreased from 3.1% to 0%, whereas the prevalence of COM increased from 9.4% to 16.9%. These findings suggest that although a decreasing trend is occurring in some areas, the problem of COM continues to persist (Ayukawa et al., 1997; Baxter, 1999).

There is more limited data on the prevalence and types of otitis media present in First Nations children outside of the Arctic Circle. Studies which report otitis media in First Nations children in the southern regions of Canada suggest that OME is the most common condition followed by some cases of perforated tympanic membranes, drainage of ears, and cholesteatoma (Cambon et al., 1965; Doyle & Morwood, 1976; Scaldwell & Frame, 1985). Cambon et al. (1965) reported the prevalence rate of middle ear disease among the First Nations population in British Columbia to be 13.7% (results were not given separately for children). Another study of western Canada found prevalence of middle ear disease in First Nations children to be 12.7% (Doyle & Morwood, 1976). Scaldwell and Frame (1985) investigated the prevalence rate of otitis media among 739 Cree and Ojibway school-aged children in six communities in Ontario and found that OME was present in 23% of the children. These studies were completed in western Canada and Ontario, and there is a dearth of knowledge on the types of otitis media diagnosed in the First Nations population on the eastern coast of Canada.

Parental report has also been used to provide insight in the prevalence of middle ear disease among First Nations children. The First Nations Regional Longitudinal Health Survey (2005) conducted a nation-wide survey on 270 First Nations communities across Canada (excluding Nunavut). According to parents, chronic ear infections are among the top three most common health conditions experienced by

the First Nations children (0-11 years) and youth (12-17 years). In particular, 9.2% of children and 5% of youth were reported to suffer from chronic ear infections or ear problems (likely otitis media). The First Nations Regional Longitudinal Health Survey (2004), which provided data for 13 Mi'kmaq communities around Nova Scotia, showed that parents reported ear problems to be the most common (18%) chronic health condition that their children (0-11 years) experienced. Similarly, the youth population (12-17 years) self-reported that ear problems ranked in the top two or three most common health problems, with 22% of females affected, and 24% of males experiencing ear problems. Interestingly, the First Nations Regional Longitudinal Health Survey (2005) also reported that only 1 in 4 (25%) of those children who suffer from ear infections were receiving treatment for them.

In the general population, typical prevalence patterns show episodes of otitis media to decline significantly after the first year of life, becoming relatively uncommon in children 7 years and older (Bluestone & Klein, 1995). In contrast, prevalence rates of COM among the Inuit school-age population have been found to range between 3.1-50% (e.g., Ayukawa et al., 1997; Baxter, 1999; Baxter & Ling, 1974; Julien et al., 1987; Ling et al., 1969; Woods et al., 1994). Similarly, high rates of otitis media and hearing loss have been found among school-age Mi'kmaq children of Nova Scotia, with reports of type B tympanograms (suggestive of effusion in the middle ear) ranging from 10 to 16% and hearing loss ranging from 16 to 20% (Van Ek & Sockalingam, 2004). These prevalence rates are exceptionally high especially considering that they represent children who are of school age.

In the general population, by the age of 3 years, children can be categorized into one of three groups: otitis media free, occasional otitis media or otitis prone (Bluestone & Klein, 1995). Clearly, Aboriginal children are often considered to be part of the later grouping. It has also been suggested that in Aboriginal children otitis media has the potential to establish itself and become chronic beyond the age of 3 (Ayukawa et al., 1997). On the contrary, persistent middle ear effusion in the general population is more common in children 2 years of age or younger (Pelton, Shurin, Donner, & Klein, 1977). In the general population middle ear disease is considered a disease of infancy and early childhood and its occurrence early in life is attributed to factors such as maturing anatomy, physiology, and immunology (Bluestone & Klein, 1995). It is not clear why the Aboriginal population seems to remain at risk for developing otitis media beyond early childhood (Baxter, 1999).

Although there are several studies demonstrating the high occurrence of otitis media and hearing loss in Canadian Inuit children, there are a limited number of studies on First Nations children in the southern regions of Canada. There is also limited research on the occurrence of middle ear pathology and hearing loss among First Nations children of different age groups. Moreover, there is a lack of studies examining whether the presence of otitis media

and hearing loss persists throughout the school year.

The objectives of the present study were to (1) examine the occurrence and type of middle ear pathology in Mi'kmaq elementary school children on two separate evaluations throughout the school year, (2) examine the occurrence of hearing loss among Mi'kmaq elementary students on two different occasions throughout the school year, and (3) examine the distribution of hearing loss and middle ear pathology across student ages.

## Method

### Participants

The participants were 48 children (29 boys and 19 girls) of Mi'kmaq heritage from a First Nations elementary school in Nova Scotia. They represented 80% of all students from that First Nations elementary school. Out of these 48 children, 47 took part in the first evaluation and 41 took part in the second evaluation. Participation in each evaluation was based on those students in school attendance on each particular evaluation day. The participants included children enrolled in the school's headstart program, grade primary level, as well as all subsequent grades represented at the school (i.e., grades 1 to 6). The mean age of all the participants at the time of the initial assessment was 6.73 years (SD = 2.32 years), with a range of 3 to 11 years. Parental consent was obtained from all students involved prior to the commencement of the study.

### Procedure

Two separate otolaryngological and audiological evaluations were conducted during the school year (October and April). On both evaluation dates, pneumatic otoscopy was performed by the same otolaryngologist and the audiological evaluations were completed by the same audiologist with the assistance of graduate students. All evaluations were performed in one of three consultation rooms located in the medical center of the Mi'kmaq First Nations community.

The otolaryngological examination included a pneumatic otoscopy evaluation. The U.S. Department of Health and Human Services strongly recommends the use of pneumatic otoscopy in clinical practice as the primary diagnostic method for diagnosing otitis media (Rosenfeld et al., 2004). The pneumatic otoscopy allows visual inspection of the ear canal and tympanic membrane, using a light source and magnifying lens. As well, the pneumatic otoscopy is used to create a seal in the ear canal and then slight positive and negative pressure is applied in order to observe the tympanic membrane and evaluate its mobility (Bluestone & Klein, 1995).

An otolaryngologist assessed each child's ears with the pneumatic otoscopy. Diagnoses were classified according to the following criteria: (1) normal tympanic membrane, (2) retracted tympanic membrane/negative pressure, (3) otitis media with effusion, (4) acute otitis media, (5) tympanostomy tube (normal), (6) tympanostomy tube (with otorrhea), (7) dry tympanic membrane perforation,

(8) tympanic membrane perforation with otorrhea, and (9) granulation or cholesteatoma.

Tympanometry was performed with a Microtym 2 Middle Ear Analyzer (Welch Allyn) to evaluate immittance characteristics of the middle ear system. The U.S. Department of Health and Human Services suggests the use of tympanometry as an optional diagnostic tool to confirm the diagnosis of middle ear effusion (Rosenfeld et al., 2004). Only type B tympanogram (Jerger, 1970) was considered to be abnormal and indicative of OME (Babonis, Weir, & Kelly, 1991; Dempster & Mackenzie, 1991). Type B tympanogram has been found to have a positive predictive value (83.6%) for middle ear effusion (Babonis et al., 1991).

Although both pneumatic otoscopy and tympanometry essentially measure the same thing, that is, tympanic membrane mobility, they have been recognized to compliment each other because the strengths of one measure can offset the weaknesses of the other test. Tympanometry provides a quantitative measure of the tympanic membrane activity, whereas pneumatic otoscopy gives a qualitative diagnosis (Stool et al., 1994). A diagnosis of middle ear pathology was determined based on clinical findings with the pneumatic otoscopy. Middle ear dysfunction revealed through tympanometry was used to supplement the pneumatic otoscopy findings.

Pure tone air-conduction threshold audiometry was conducted on all participants using a AD226 Diagnostic Audiometer (Interacoustics) and a TDH-50P supra-aural headphones (Telephonics). The ambient noise in the testing rooms were measured with a sound level meter revealing an average ambient noise level that did not exceed 35 dBA (with a range of 30 to 40 dBA). Hearing sensitivity was classified as normal if the average of hearing thresholds obtained at 500, 1000, 2000, and 4000 Hz was 25 dB HL or better. The decision to use a 25-dB HL cut-off, rather than a 15-dB HL cut-off as per ANSI (1996) classification for slight hearing loss, was based on the fact that testing did not occur in a sound treated room which could have interfered with the measurement of thresholds at soft intensities. If average hearing thresholds exceeded 25 dB HL then the loss was classified as mild (26-30 dB HL), moderate (31-50 dB HL), moderately severe (51-70 dB HL), or severe (71-90 dB HL). The parents/guardians of those students diagnosed with otitis media and/or a hearing loss were contacted by telephone and referred for further medical follow-up and/or audiological testing.

## Results

Pneumatic otoscopy was performed on 47 students in the October evaluation and 41 students (5 students absent, 2 students no longer attended that school) in the April evaluation. The percentage of children diagnosed with middle ear pathology in at least one ear was 25.5% ( $n = 12$  children) in the October evaluation and 24.4% ( $n = 10$  children) in the April evaluation. In the October evaluation, 7 of the 12 children affected presented with

a unilateral middle ear pathology, while in the April evaluation 5 of the 10 children affected presented with a unilateral middle ear pathology.

As seen in Figure 1, the most common type of middle ear pathology observed (both ears combined) on both evaluation dates was OME. There were no occurrences of AOM, tympanic membrane perforations, granulation or cholesteatoma in either screening. Half (50%) of those students found to have a middle ear pathology in the October evaluation presented with the same pathology (i.e., OME, retracted tympanic membrane, or tympanostomy tube with otorrhea) in the April evaluation.

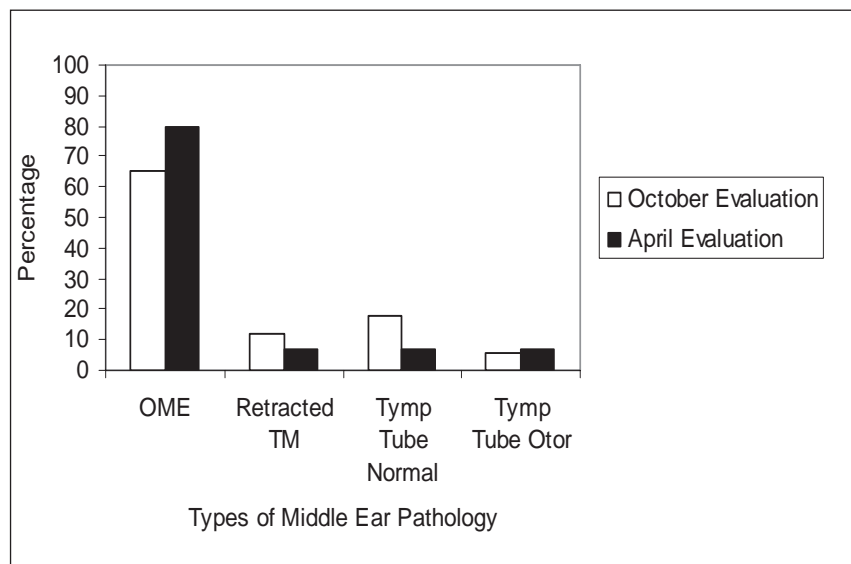


Figure 1. Types of middle ear pathology observed in ears with middle ear problems in the October and April evaluations. (OME: otitis media with effusion; TM: tympanic membrane; Tymp Tube Normal: tympanostomy tube in normal conditions; and Tymp Tube Otor: tympanostomy tube in place with otorrhea).

Figure 2 shows the percentage of children with middle ear pathology across three age ranges: 3 to 5 years, 6 to 8 years, and 9 to 11 years. At both evaluations, all age groups tended to have a similar percentage of children with middle ear pathology, except for the 3-5 year-old children who tended to show a slightly higher occurrence in the October evaluation.

Pure tone audiometry was performed on 45 of the 47 students who participated in the October assessment (two students could not be tested due to noncompliance). Of those students tested, 20% ( $n = 9$ ) were found to have a hearing loss in at least one ear. A unilateral hearing loss was identified in five of the students affected and a bilateral hearing loss was found in four of the students affected.

In the April assessment, pure tone audiometry was completed on 40 of the 41 students (one student was noncompliant). Results revealed that 25% ( $n = 10$ ) of students had a hearing loss. Of these students, five were found to have a unilateral hearing loss and 5 had a bilateral hearing loss.

Figure 3 shows the percentage of hearing loss in both evaluation sessions for the three age groups. Children between 3 to 5 years of age had the highest percentage of hearing loss (50% in the October evaluation and 37% in the April evaluation), whereas the 9 to 11 year-old children had the smallest percentage of hearing loss (6% in the October evaluation and 15% in the April evaluation).

The degree of hearing loss was determined by averaging the thresholds across all frequencies (500, 1000, 2000, 4000 Hz). As seen in Table 1, the degree of hearing loss identified in both evaluation sessions ranged from mild to moderately severe. In both evaluation sessions, the majority of children with hearing loss (77% and 70% for the October and April evaluations, respectively) were found to have a mild hearing impairment.

## Discussion

The purpose of the present study was to compare the occurrence of types of middle ear pathology and hearing loss on two separate occasions during the school year and for different age groups of First Nations students. Each evaluation included pneumatic otoscopy performed by an otolaryngologist, as well as tympanometry and pure tone audiometry conducted by an audiologist and graduate students.

The percentage of children found to have a middle ear pathology in at least one ear was 25.5% and 24.4% for the October and April evaluations, respectively. These results are consistent with prevalence rates of middle ear disease in Aboriginal school-aged children reported in the Arctic, as well as in other First Nations communities of Canada. For example, on First Nations reservations throughout Ontario, Scaldwell and Frame (1985) found that 23% of all children sampled had a middle ear pathology. The most common type of middle ear pathology observed in both evaluation sessions in the present study was OME, which has also been found to be the most frequent ear pathology in First Nations children living in British Columbia and Ontario (e.g., Doyle & Morwood, 1976). This finding is not surprising considering that OME is easily overlooked in an asymptomatic child (Rosenfeld & Bluestone, 2003).

The occurrence of hearing loss was 20% in the October evaluation and 25% in the April evaluation. These rates are exceptionally high in comparison to the prevalence of hearing loss in non-Aboriginal students in a nearby community (3.7%) (Van Ek & Sockalingam, 2004) and in school-age children in the general population (2.63%) (Lundeen, 1991). These findings are consistent, however, with those found in Aboriginal children across northern and southern regions of Canada (e.g., Ayukawa et al., 1997; Doyle & Morwood, 1976).

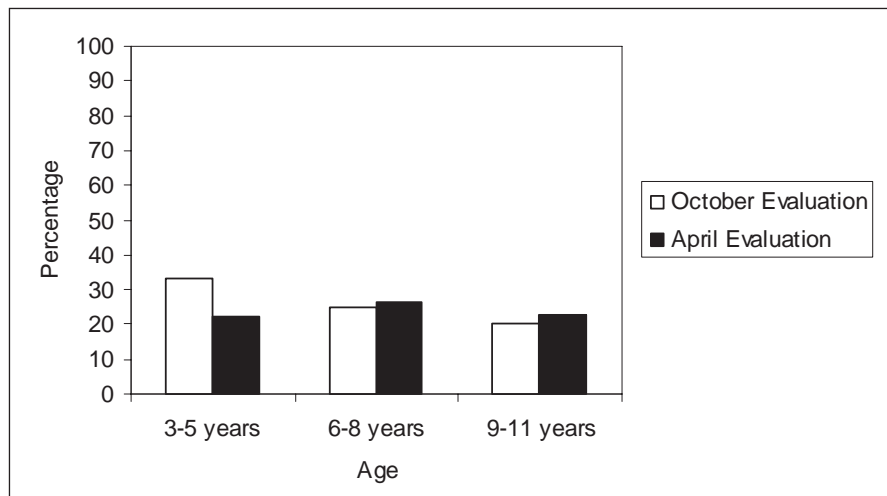


Figure 2. Percentage of children, within each age group, with middle ear pathology in at least one ear in the October and April evaluations. Total number of children in the 3-5 years, 6-8 years, and 9-11 years groups were 12, 20, and 15, respectively, for the October evaluation, and 9, 19, and 13 for the April evaluation.

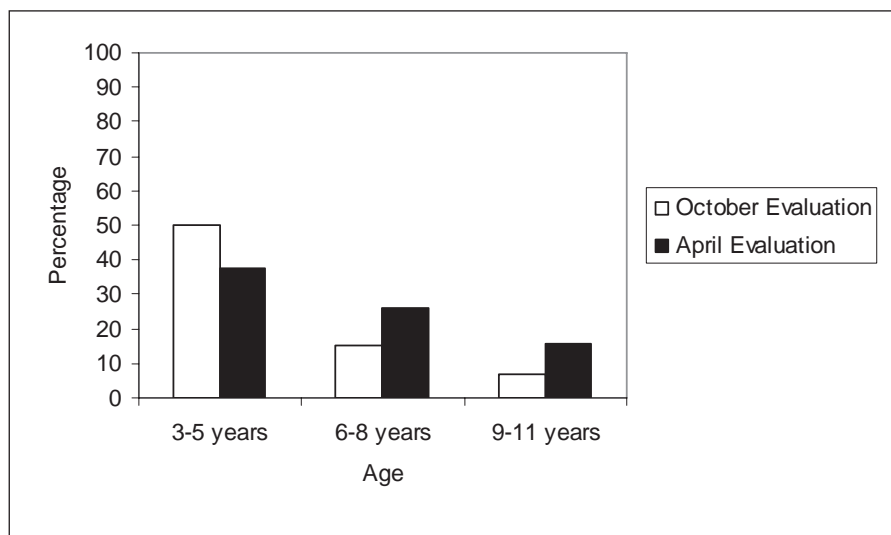


Figure 3. Percentage of children, within each age group, with hearing loss in at least one ear in the October and April evaluations. Total number of children in the 3-5 years, 6-8 years, and 9-11 years groups were 10, 20, and 15, respectively, for the October evaluation and 8, 19, and 13 for the April evaluation.

In general, in both evaluation sessions, middle ear pathology was found to be equally high among the three age groups, except for a somewhat higher occurrence in the 3 to 5 year-old children in the October evaluation only. Although the occurrence of hearing loss at each evaluation session tended to decrease with increasing age, it continued to remain relatively high in the 6 to 11 year-old students. These findings contradict those found in the general population, where rates of otitis media decline significantly after the first year of life, becoming relatively uncommon in

children 7 years and older (Bluestone & Klein, 1995). It does, however, support the contention that Aboriginal children are more prone to persistent or recurrent middle ear effusion (Bluestone & Klein, 1995), and that in Aboriginal children otitis media has the potential to establish itself and become chronic beyond the age of 3 (Ayukawa et al., 1997).

The present study also found the occurrence of middle ear pathology to be equally high during both the October evaluation (25%) and the April evaluation (24%). The occurrence of hearing loss was also found to be equally high during the October evaluation (20%) and the April evaluation (25%). Moreover, 50% of the students found to have middle ear pathology in October continued to exhibit the same pathology in April. These results suggest that middle ear disease and hearing loss among the Mi'kmaq elementary school children in eastern Canada remain relatively high throughout the school year. The persistence of middle ear pathology over a 6-month period found in the present study, coupled with the First Nations Regional Longitudinal Health Study (2005) report that only one in four children with middle ear problems were receiving treatment, highlight the need for adequate medical and audiological follow-up. In this study, the parents of children who were identified with middle ear problems in October were contacted by telephone and referred for medical consultation and/or audiological assessment; however, half of these children still presented with the same middle ear pathology in April. The present study did not investigate whether parents complied with the recommendation and/or the efficacy of medical or audiological intervention. Future studies should examine compliance with medical and audiological recommendations and efficacy of treatment of middle ear pathology in First Nations children.

The majority of the children with hearing loss exhibited a mild degree of hearing loss, and half of them were found to have a unilateral hearing loss. This trend is consistent with the notion that hearing loss associated with otitis media is typically relatively mild (Bluestone & Klein, 1995). It is important to note that the hearing evaluations conducted in the present study were based on a 25-dB threshold cut-off and consequently would have missed those children with a



**Table 1**

*Distribution of the degree of hearing loss among children found to exhibit a hearing problem in October in April*

Degree of hearing loss	Evaluation Session	
	October	April
Mild (26-30 dB HL)	7 (77%)	7 (70%)
Moderate (31-50 dB HL)	2 (22%)	2 (20%)
Moderately severe (51-70 dB HL)	-	1 (10%)
Severe (71-90 dB HL)	-	-

slight degree of hearing loss. This is especially noteworthy considering that even a 15-dB hearing loss, or unilateral hearing loss, can pose educational and learning problems for children (Dobie & Berlin, 1979; Flexer, 1999; Northern & Downs, 1991). Moreover, conductive hearing loss often fluctuates and may go unrecognized by parents due to the often asymptomatic nature of otitis media (Rosenfeld & Bluestone, 2003). Therefore, in the classroom, on any given day, children may unknowingly suffer from hearing loss which adversely affects their ability to hear and attend to the teacher (Berg, 1987). In addition, the effects of unrecognized hearing loss within the classroom are often associated with problems or causes other than hearing impairment. For example, when a child is off-task or struggles to keep up with the rapid pace of class discussion, the cause of that child's behaviour may be attributed to noncompliance, attention problems or learning difficulties rather than hearing problems (Crandell, Smaldino, & Flexer, 1995).

The fluctuating hearing loss associated with otitis media suggests that on any given day in the classroom, First Nations children may not be receiving the necessary instruction provided by the teacher. Moreover, OME, the most common middle ear pathology found in the present study, is often asymptomatic and therefore these children may experience a loss of hearing that goes unnoticed. In view of the high rates of conductive hearing loss in the Aboriginal elementary school population, modifications to the classroom environment (for example, installation of soundfield amplification systems) should be considered to accommodate their incomplete and inconsistent hearing.

Overall, the present study demonstrates that, similar to the Inuit population and First Nations children from western and central Canada, Mi'kmaq elementary school children of Nova Scotia suffer from considerably high rates of otitis media and hearing loss. Past research has recognized this pattern since the 1960s and the present findings suggest that middle ear pathology and hearing loss continue to be an ongoing problem for Aboriginal children. The reasons for the inflated prevalence rates among the First Nations population are unknown, but future research should continue to investigate otitis media

and conduct hearing screenings to develop longitudinal data on Aboriginal children. A more comprehensive body of research will contribute to a better understanding of the etiology of these high rates in this particular population.

Clinicians should be mindful of the high occurrence of middle ear pathology and hearing loss among First Nations children and, when possible, conduct regularly hearing and tympanometry screenings on this population. Considering that these children suffer from persisting and recurring otitis media, these screenings will enable clinicians to monitor the hearing and middle ear status, provide the necessary referrals, and help identify those children who may be at educational risk due to hearing problems. In addition, it is important for clinicians to provide education on the occurrence of otitis media and hearing loss to First Nations communities in order to raise awareness and implement remediation strategies.

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## ■ **Brief Report: Immediate Memory for Movement Sequences in Children with and without Language Impairment**

## ■ **Rapport sommaire : mémoire immédiate des séquences de mouvement chez les enfants ayant ou non un trouble du langage**

Alison M. White  
Ronald B. Gillam

### **Abstract**

This study investigated the immediate recall and reproduction of visually presented movements by children with and without language impairments (LI). Ten children with LI ranging in age from 6:0 to 8:9 (years:months) and 10 age-matched peers with typically-developing language completed tasks requiring them to reproduce sequences of nonsymbolic arm movements that were presented at eight different rates of speed ranging from .5 s per movement to 4 s per movement. The children with LI performed significantly poorer than the control group in recalling arm movements across the presentation rates. Both groups of children tended to recall and reproduce arm movements presented at very slow intervals (4 s per movement) better than they recalled and reproduced arm movements presented at very fast intervals (.5 s per movement). These results suggest that children with LI have immediate visuospatial memory deficits for serial position and that children both with and without LI benefit from having visual information presented at a slow rate.

### **Abrégé**

La présente étude porte sur la mémorisation et la reproduction de mouvements présentés visuellement à des enfants ayant ou non un trouble du langage. Dix enfants atteints d'un trouble du langage âgés de 6,0 à 8,9 ans (ans,mois) et dix enfants du même âge ayant un langage au développement caractéristique ont accompli une tâche leur demandant de reproduire des séquences de mouvements non symboliques des bras présentées à huit rythmes différents, allant de 0,5 s par mouvement à 4 s par mouvement. Les enfants ayant un trouble du langage ont nettement moins bien réussi que ceux du groupe contrôle, peu importe le rythme de présentation. Les deux groupes d'enfants se rappelaient généralement mieux des mouvements de bras et les reproduisaient mieux quand ils étaient présentés à un rythme très lent (4 s par mouvement) que quand ils étaient présentés à un rythme très rapide (0,5 s par mouvement). Ces résultats suggèrent que les enfants ayant un trouble du langage ont une déficience de la mémoire immédiate visuo-spatiale pour la position sérielle et que les enfants des deux groupes bénéficient que l'information visuelle soit présentée à un rythme lent.

**Key words:** immediate memory, language impairments, arm movements, rate of processing

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Children with language impairments (LI) exhibit difficulties with expressive and/or receptive language that impede their ability to communicate with those around them. Many of these children do not present with an organic etiology for their language impairments or exhibit significant deficits in other developmental areas (Leonard, 1998). Despite this general level of specificity, research has revealed that these children tend to demonstrate difficulties on a variety of nonverbal tasks (Bishop, 1992; Johnston, 1999). Based on these findings, it has been proposed that a general underlying psychological mechanism or a variety of psychological mechanisms may give rise to these children's difficulties with language development (Gillam, Cowan, & Marler, 1998; Miller, Kail, Leonard, & Tomblin, 2001; Tallal, Stark, Kallman, & Mellits, 1981). This study focused on memory as a psychological mechanism that may affect language development.

A leading theoretical explanation of language impairment suggests that difficulties with the cognitive abilities related to working memory processes have a negative impact on language development (Ellis Weismer & Hesketh, 1996; Gathercole & Baddeley, 1990; Montgomery, 1993). Much of the current research on memory is based upon the Baddeley and Hitch (1974) model of working memory, hereafter referred to as the Baddeley WM model. According to the Baddeley WM model, working memory consists of four components: a phonological loop, a visuospatial sketchpad, a central executive, and an episodic buffer (Baddeley, 2003). Verbal information is processed by the phonological loop, while visual and spatial information is processed by the visuospatial sketchpad. A central executive monitors the flow of information through the phonological loop and the visuospatial sketchpad. An episodic buffer provides additional storage for information from all sensory modalities and creates a unified code using this information.

This study concerns memory for visually-presented serial information. Serial memory plays an integral role in language processing by maintaining linguistic and phonological information in order while individuals process the meanings of words. According to the Baddeley WM model, phonological and visual information must be rehearsed or it will decay. Phonological information is maintained in the phonological store and rehearsed through the articulatory loop (Baddeley, 2003). Visuospatial information is similarly maintained through the visual cache and rehearsed through the inner scribe of this model (Logie, 1995). The central executive of the Baddeley WM model is significantly involved in the recall of visually presented information as well by allocating mental resources to simultaneous attention, coding, rehearsal, and recall processes (Romine & Reynolds, 2004; Rudkin, Pearson, & Logie, 2007).

A number of researchers have hypothesized that children with LI have deficits in encoding and recalling serial position of phonological stimuli (Fazio, 1998; Gillam, Cowan, & Day, 1995; Gillam et al., 1998). Less

research has examined the recall of visually-presented serial information in children with LI. Research in this area has so far provided equivocal results. Bavin, Wilson, Maruff, and Sleeman (2005) found that children with LI performed significantly poorer than their age-matched peers with typically developing language on a serial memory task that required them to recall on a computer sequences of boxes that changed color. However, Archibald and Gathercole (2006) found that children with LI performed similarly to age-matched children with typically developing language on a serial memory task that required them to recall sequences of dots presented on a computer grid.

If children with LI do have problems with recalling some visually-presented serial information, it is not clear whether their difficulties are due to visuospatial or phonological memory difficulties alone or in combination with executive processing limitations. Executive processing has been defined as the ability to plan actions, maintain these plans in working memory prior to execution, and hinder irrelevant information and actions from occurring (Pennington & Ozonoff, 1996). Executive processing functions correspond closely with the actions of the central executive of the Baddeley WM model (Baddeley, 2003).

Hoffman and Gillam (2004) investigated the role of the central executive in children with LI while examining their recall of serial visuospatial stimuli and visually and auditorily presented serial phonological stimuli within a dual-processing experiment. They found that children with LI recalled both serial visuospatial and phonological stimuli with significantly less accuracy than their peers and that a large group difference occurred when children were required to disperse information processing demands across both phonological and visuospatial domains. These results were interpreted as indicating that children with LI may have smaller storage capacities in both phonological and visuospatial domains and executive functioning difficulties related to coordinating multiple processing resources effectively.

The current study further addressed whether children with LI do or do not have memory deficits for visually-presented serial information. We studied memory for nonsymbolic arm movements because these movements were less likely to lend themselves as directly to phonological encoding than other types of visually-presented stimuli such as common objects and numbers. It was thought that use of nonsymbolic movements may lead the children to exert extra mental coordinating effort to process multiple mental steps and to rely more heavily on visual encoding than on phonological encoding as a memory strategy. The present study does not allow us to be certain to what extent the phonological loop or the visuospatial sketchpad were used to encode the nonsymbolic movements. Previous research on typically-developing children, however, has shown us that children in the primary grades do not rely primarily on verbally-based strategies to encode and recall movement sequences, although they have exhibited emerging use of these strategies (Bouffard & Dunn, 1993; Ille & Cadopi, 1999; David, 1985).

Rate of information processing is another potential variable that may influence serial memory in children with LI. Children with LI may be sensitive to the rate at which information is presented due to inefficient use of executive coordinating functions (Hoffman & Gillam, 2004). It is also possible that children with LI may be slower to encode information into working memory and/or have faster memory decay due to deficits in encoding, storage, and rehearsal components of the phonological loop and/or visuospatial sketchpad (Fazio, 1998). The literature in this area has also proved to be inconclusive. For example, Fazio (1998) found that children with LI performed poorer than their peers with typically-developing language at recalling sequences of common objects, scribble drawings, and unfamiliar faces presented at a fast rate of 1.5 s per item with a 400 ms interstimulus interval (ISI). However, the two groups performed similarly when recalling sequences presented at a slow rate of 3.5 s per item with a 400 ms ISI. The present study further examines rate of information presentation as a variable in the serial memory of children with LI and attempts to assist in defining the critical window for processing speed by testing children with and without LI across a continuum of presentation rates.

Clinically, the results of this study may have implications for how speech-language pathologists plan assessment and intervention for children with LI. If the children with LI do demonstrate difficulties with the study's serial memory task, it may lead us to believe that some children with LI may benefit from having intervention assisting with executive functioning embedded into language therapy activities. Further, poor performance on a task that may require children to integrate visual and phonological information may lead us to take caution in teaching children with LI to primarily use visual self-cueing strategies to recall linguistic information. It may be more beneficial to use dynamic assessment to reveal what the most effective cueing strategies are for a child when recalling linguistic information. The results for the effect of rate on the children's recall and reproduction of the movements will give us insight into whether children with LI will remember visually-presented information best in language therapy and in the classroom if it is presented at a slow rate, a medium rate, or a fast rate.

The overall purpose of this study was to determine whether children with LI recall and reproduce sequences of nonsymbolic arm movements as accurately as their age-matched peers with typically-developing language and whether the rate of presentation influences performance in either group. The specific research questions were 1) Do children with LI recall and reproduce sequences of nonsymbolic arm movements as well as their age-matched peers with typically-developing language and 2) What is the effect of presentation rate on children with LI's recall and reproduction of sequences of nonsymbolic arm movements in comparison to their age-matched peers with typically-developing language?

## Methods

### Participants

Twenty children participated in two groups in this study. The group of children with LI consisted of 10 children, and the control group (CON) consisted of 10 chronologically age-matched peers with typically-developing language. Each group comprised 8 males and 2 females. The mean ages for the groups were: LI, 7 years, 5 months ( $SD = .75$ , range = 6:0-8:8), CON, 7 years, 4 months ( $SD = .87$ , range = 6:0-8:9). All of the children were monolingual English speakers. Both groups had none of the following as indicated by a checklist completed by their parent(s)/guardian(s): mental retardation, severe emotional disturbances, visual deficits other than corrected to normal, Autism Spectrum Disorders, hearing loss, and/or motor disorders (medically-diagnosed or neurogenically-based). The mean scaled score for the groups on the Grammatical Completion and Sentence Imitation Subtests of the Test of Language Development: Primary – 3rd Edition (TOLD: P3) [norming  $M=10$ ,  $SD=3$ ] were: LI, 5.1 ( $SD = 2.73$ ) and CON, 11.2 ( $SD = 1.94$ ). The children in the LI group all had diagnoses of language impairment from speech-language pathologists and were receiving language intervention services in school and/or private clinic settings.

### Stimuli

The stimuli for the experimental task consisted of 16 sequences of nonsymbolic arm movements presented at rates ranging from .5 s per movement to 4 s per movement. There were five movements in each sequence, and two sequences were created at each of the following presentation rates: .5 s per movement, 1 s per movement, 1.5 s per movement, 2 s per movement, 2.5 s per movement, 3 s per movement, 3.5 s per movement, and 4 s per movement (i.e., 2 sequences x 8 presentation rates = 16 sequences). Each movement was included in each sequence. The movements included in the sequences were (1) both arms extended horizontally from the body, (2) both arms extended in front of the body with palms facing out, (3) both arms bent towards the face with index fingers pointing at the face, (4) one hand placed on top of the head with the palm facing down and the other arm extended horizontally, and (5) both arms extended in a 45-degree angle opposing one another as to create a diagonal line.

The sequences of movements were videotaped as they were performed by an adult. The rate calculations were averages based on the total time it took the individual to make all five movements in a sequence. These total times were within +/- .3 s of the exact times that would have been created by performing the movements at the exact rates. The rate calculations were made using the iMovie film-editing program.

Two videotapes were created to counterbalance the order in which the presentation rates of the sixteen movement sequences occurred. The sequences were placed in order from most rapid to least rapid in rate on the first videotape and were placed in the opposite order, from least

rapid to most rapid in rate, on the second videotape. The order in which these sequences were presented was edited using the iMovie film-editing program. Possible order effects were analyzed by comparing the mean number correct at each rate for the children within each group who received the first videotape to those that received the second videotape. Order effects revealed were none to minimal as indicated by nonsignificant interactions at all presentation rates (Table 1 and 2).

**Table 1**  
*Order effects for LI group*

Rate of presentation	Video 1 Mean	Video 1 SD	Video 2 Mean	Video 2 SD	<i>t</i>	<i>p</i>
4.0/s	2.50	3.00	1.60	1.14	0.57	.601
3.5/s	1.25	1.25	1.40	2.19	-0.13	.901
3.0/s	2.25	0.96	1.20	1.30	1.39	.207
2.5/s	1.75	2.22	1.60	0.89	0.13	.261
2.0/s	0.75	0.50	1.20	1.30	-0.71	.508
1.5/s	1.50	1.29	1.40	0.55	0.15	.892
1.0/s	1.75	1.50	1.60	1.52	0.15	.887
.5/s	1.0	1.0	0.82	0.70	0.00	1.000

**Table 2**  
*Order effects for CON group*

Rate of presentation	Video 1 Mean	Video 1 SD	Video 2 Mean	Video 2 SD	<i>t</i>	<i>p</i>
4.0/s	3.00	2.00	5.20	2.68	-1.47	.183
3.5/s	2.00	1.58	3.20	1.30	-1.31	.228
3.0/s	3.20	1.30	1.40	1.14	2.32	.049
2.5/s	3.80	1.79	2.20	1.92	1.36	.210
2.0/s	3.60	2.88	2.40	1.14	0.87	.424
1.5/s	3.20	1.48	2.20	2.17	0.85	.423
1.0/s	3.60	1.82	3.80	0.45	-0.24	.822
.5/s	2.20	0.84	1.60	1.82	0.67	.529

Children also completed the Sentence Imitation and the Grammatical Completion Subtests of the TOLD:P3 (Newcomer & Hammill, 1997). The Sentence Imitation Subtest required a child to recall sentences immediately after the examiner produced them. The Grammatical Completion Subtest required a child to orally complete sentences produced by the examiner. The Nonword Repetition Subtest of the Comprehensive Test of Phonological Processing (CTOPP) (Wagner, Torgeson, & Rashotte, 1999) was administered to assess phonological working memory. The Nonword Repetition Subtest required a child to repeat phonetic sequences that were not words immediately after they were presented through an audiocassette player.

## Procedures

The examiner initially requested that each child directly imitate each of the five movements individually in order to train the movements of the experimental task. After all five movements were imitated individually, each child was asked to recall and demonstrate all five movements together in any order before any data were collected. The examiner continued to train the movements until each child had accurately reproduced all five movements together or had participated in six training trials. The purpose of these training trials was to minimize learning (i.e., learning the movements) as a potential variable. All children participating in the study successfully imitated all five movements. Eight of the ten children in the LI group and all children in the control group recalled the five movements in any order during the training trials.

After participating in the training trials, each child participated in two practice trials in which sequences of two of the five movements were presented on a television monitor and data were not collected. One of the practice trials was presented at a 1 s per movement rate, and the other practice trial was presented at a 4 s per movement rate. Each practice trial was repeated until the child being tested accurately responded or had viewed the practice trial stimuli three times. Each child was expected to immediately recall and reproduce each sequence. As in training the movements, the purpose of the practice trials was to minimize learning (i.e., learning the task) as a potential variable. All children accurately responded to the practice trial stimuli before moving on to the trials from which

data were collected.

The 16 trials of sequences of the five movements were presented on a television monitor. Children were required to recall and reproduce each sequence immediately after it was presented. Data were collected on the children's ability to recall and reproduce these sequences. All of the children produced a response for each sequence by producing movements immediately after each sequence and completed the task. In total, the children viewed and attempted to recall and reproduce 80 movements. The two orders of movements were counterbalanced across the two groups.

All the participants were videotaped while they performed the experimental task. Responses were also recorded and scored online by the examiner. These responses were later rescored by the examiner using the videotaped recordings of the participants.

The scoring system rewarded a point for each movement recalled in exact serial position of a sequence. This scoring system was used because previous serial memory research demonstrated that children with LI were poorer at recalling exact serial positions than recalling correct order without exact serial positions (Gillam et al., 1995). The quality of the production of the movements was not a criterion for correct production. There were 80 possible correct points for each administration of the 16 sequences.

### Reliability

Interater reliability was assessed by having an independent rater examine and rescore the videotapes for a randomly selected sample of 20% of the participant pool. The resulting scored responses from the examiner and the independent rater were compared to determine point-by-point reliability. There was 98% agreement between the examiner's scoring and that of the independent rater.

### Results

Data were analyzed using Poisson regression supported by the SAS statistical package. Poisson regression is a generalized linear statistical model that is most appropriate for analyzing results that include count variables and a Poisson distribution, which is typically skewed to the right. The data for both groups were slightly skewed to the right but were within  $\pm 2$  SD of error. Reported probability levels of the Poisson regression analyses reflected generalized estimating equation adjustments for potential clustering effects within each child due to repeated measurements.

The main effects model included the group (LI versus CON) and the rate effect (rates .5, 1, 1.5, 2, 2.5, 3, 3.5 compared to rate 4). The generalized estimating equation of the Poisson regression analyses revealed that across the task presentation rates, the children in the LI group recalled significantly fewer movement items than the children in the CON group [LI  $M = 11.67$ ,  $SD = 3.77$ ; CON  $M = 23.2$ ,  $SD = 6.66$ ] [ $Z = -5.62$ ,  $p < .0001$ ] [Figure 1]. There was also a main effect for presentation rate. Across groups, children tended to recall arm movements presented at 4 s intervals better than they recalled arm movements presented at .5 s intervals ( $p < .007$ , adjusted  $p$  level due to multiple tests for  $p$ ) (Table 3). Performance across groups at the 1.5 s, 3.0 s, and 3.5 s rate also approached significance. The interaction for group  $\times$  rate was non-significant ( $F = 3.95$ ,  $p = .79$ ), demonstrating that the overall rate effect did not differ across groups (Table 4).

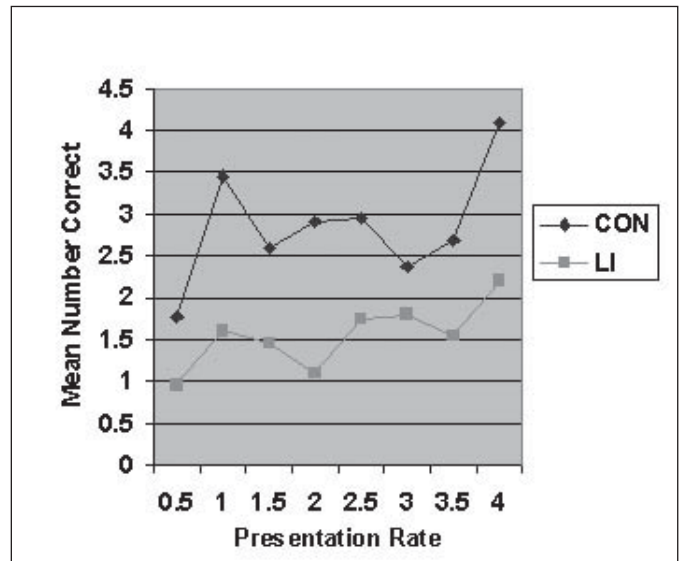


Figure 1. Mean number of items recalled in accurate serial position per sequence by the children with language impairment (LI) and the control group (CON) for each presentation rate.

Table 3

Mean, SD, difference, Z, and p values for each presentation rate

Rate of presentation	Mean	SD	Difference	Z	P
4.0/s	3.05	2.42	0.00	-	-
3.5/s	1.98	1.71	-.44	-1.87	.062
3.0/s	2.00	1.34	-.41	-1.94	.053
2.5/s	2.26	1.81	-.27	-1.12	.261
2.0/s	2.00	1.87	-.39	-1.57	.117
1.5/s	2.07	1.49	-.34	-1.97	.048
1.0/s	2.52	1.72	-.13	-.58	.563
.5/s	1.40	1.14	-.71	-2.98	.003

Table 4

Difference, Z, and p values for the interaction effect between group and rate

Rate of presentation	Difference	Z	P
4.0/s	0.00	n/a	-
3.5/s	0.05	.08	.940
3.0/s	.46	1.07	.284
2.5/s	.13	.23	.819
2.0/s	-.28	-.59	.553
1.5/s	.24	.66	.510
1.0/s	-.08	-.15	.885
.5/s	.18	.35	.728

Further data analyses revealed that when the phonological STM task (NWR Subtest) was factored in as a covariate, the main effect for the experimental task was no longer significant ( $Z = -1.19, p = .23$ ), and the phonological memory task was significant as a covariate ( $Z = 2.79, p < .01$ ) (Table 5). The children's performance on the Grammatical Completion Subtest language measure also reduced the effect of the group difference on the experimental task when added as a covariate. The main effect for group on the experimental task stayed marginally significant ( $Z = -1.93, p = .053$ ) when the Grammatical Completion Subtest results were added, and this measure did not have a significant value as a covariate using this model ( $Z = 1.37, p = .17$ ). Performance on the Sentence Imitation Subtest had less of an effect as a covariate of the experimental task than performance on the phonological STM task or the Grammatical Completion Subtest. The main effect for group on the experimental task maintained significance ( $Z = -2.57, p = .01$ ) when performance on the Sentence Imitation Subtest was added, and performance on the Sentence Imitation Subtest did not approach significance as a covariate using this model ( $Z = 1.24, p = .22$ ).

**Table 5**  
*Difference, Z, and p values for main effect model with nonword repetition added as a covariant*

Parameter	Difference	Z	P
Experimental Task - LI	-.25	-1.19	.234
Experimental Task - CON	0.00	n/a	n/a
.5/s Rate	-.71	-2.98	.003
1.0/s Rate	-.13	-.58	.562
1.5/s Rate	-.34	-1.97	.048
2.0/s Rate	-.39	-1.57	.117
2.5/s Rate	-.27	-1.12	.261
3.0/s Rate	-.41	-1.94	.053
3.5/s Rate	-.44	-1.87	.062
4.0/s Rate	0.00	n/a	n/a
Nonword Repetition Task	.08	2.79	.005

## Discussion

This study was designed to investigate memory for serial position in children with and without LI on a task involving the recall and reproduction of sequences of visually-presented nonsymbolic arm movements that were presented at a variety of rates. The first research question concerned whether children with LI recalled and reproduced sequences of visually presented nonsymbolic arm movements as well as their peers with typically developing language. The children with LI recalled and reproduced significantly fewer movements in correct serial position than their age-matched peers with typically developing language. The results of this study support the

findings by Fazio (1998), Gillam and colleagues (Gillam et al., 1995; Gillam et al., 1998), Bavin et al. (2005), and Hoffman and Gillam (2004) showing that children with LI have difficulties recalling sequences of visually-presented information. The findings in this study are inconsistent with the results from a study by Archibald and Gathercole (2006) showing that children with LI do not perform more poorly than their age-matched peers when demonstrating their memory span for sequences of visually presented dot matrixes.

A possible reason for the difference in findings between this study and the study by Archibald and Gathercole (2006) may be that the ages of the participants differed. The age range of the participants in this study was 6;0 to 8;9 years, whereas the children in the Archibald and Gathercole (2006) study were generally older (7;0 to 12;5 years). Prior research on children with typical development has demonstrated that children use more effective memory strategies and integrate use of more memory strategies to recall information as they become older (Bouffard & Dunn, 1993; Imbo & Vandierendonck, in press; Kee, 1994). It may be possible that children with LI are delayed in their use of memory strategies during the primary grades and as they mature their strategy use begins to become more similar to their peers with typically developing language.

It is likely that this study concerned multiple components of the Baddeley WM model. Rudkin and colleagues (2007) argued that most information processing tasks involve more than one component of this model and that a pure measure of one component may not exist. Since a dual-task methodology was not used to examine whether any relationships between primary functions of the components of the model and the experimental task existed, we cannot identify the relative contributions of the components of the model with certainty. We did, however, complete an examination of covariance between the experimental task and a phonological memory task that gave some insight into involvement of both the visuospatial sketchpad and the phonological loop.

Efficiency in the functioning of the central executive may also have potential for explaining the difference between the performance by the groups of children on the experimental task. Prior research has established that the central executive plays a major role in recalling serial information and in performing the mental imagery necessary to plan and execute movement (Romine & Reynold, 2004; Rudkin et al., 2007; Salway & Logie, 1995). It has been hypothesized that sequentially presented information is more difficult to encode in a gestalt pattern than simultaneously presented information and that there may be an increased need for effective strategy use by the central executive to recall this information (Rudkin et al., 2007; Vogel, Woodman, & Luck, 2001). Perhaps children with LI have less mature strategy use for recalling information than children with typically developing language due to central executive functioning deficits. Findings by Akshoomof, Stiles, and Wulfeck (2006) that children with LI use less mature strategies for recalling



and reproducing drawings than their peers with typically developing language support this hypothesis. Further, the children with LI in the present study may have had difficulty coordinating the transfer of information across the visuospatial sketchpad and the phonological loop, which may have overtaxed their central executive systems.

Possible central executive deficits in using mental imagery to recall and reproduce movements may also be related to the children with LI's poorer performance on the experimental task. This hypothesis is consistent with findings by Johnston and Ellis Weismer (1983) that revealed that children with LI performed more poorly than children with typically developing language on a mental rotation task due to deficits in mental imagery.

The second research question examined the effect of presentation rate on recall and reproduction of sequences of visually presented nonsymbolic arm movements in children with LI in comparison to their peers with typically developing language. The results of this study revealed that children in both groups recalled serial position information from visually presented sequences of nonsymbolic arm movements at the slowest presentation rate (4 s interval) significantly better than at the fastest presentation rate (.5 s interval).

These results are inconsistent with the findings by Fazio (1998) and Gillam and colleagues (1998) that showed a significant group effect for rate. Fazio (1998) found that there was a main effect for rate when comparing children with LI's recall of visually-presented serial information at 1.5 s intervals and 3.5 s intervals, whereas the results in this study indicate that significant differences in performance are only observed with a wider difference in rates by comparing performance at .5 s intervals to 4.0 s intervals. These results, however, are consistent with the findings of Hoffman and Gillam (2004) that children with LI and children with typically developing language do not differ significantly in recall based on the variable of rate. The findings in the study by Hoffman and Gillam (2004) that a main effect occurred for rate at a more narrow difference of 1.25 s with a 1.25 ISI and 2.25 s with a 2.25 ISI rates varied from the wider difference between .5 s and 4.0 s rates needed for a significant difference in performance in this study.

These inconsistencies in the amount of difference needed in rate to produce a significant effect across groups may have been related to the lack of power for analyses due to the small participant group sizes in this study. It is possible that the critical window for rate was also not captured because of the use of steady rate increases. Perhaps using very fast rates and very slow rates rather than steady increments of increased rate will identify a more robust effect for rate and give us more insight into the critical window for rate in future studies.

Clinically, the findings of this study have many implications for how speech-language pathologists plan assessment and intervention for children with LI. Since the children with LI performed poorly on a task that may

have heavily relied upon the central executive resources of the Baddeley WM model, it is likely that some children with LI may benefit from intervention targeting central executive functions. For example, children with LI may need assistance in learning and using strategies for word finding and recalling linguistic information. Research has shown that children can learn to use strategies for learning and recalling information as young as 5 years of age (Johnston, Johnson, & Gray, 1987), so it may be beneficial to start teaching some children with LI executive functioning strategies in the primary grades. They also may need intervention to help them learn to sequence, organize, and self-monitor when communicating oral and written information.

Since the children with LI performed poorly on a task that possibly required integration of phonological and visuospatial memory, speech-language pathologists should perhaps be cautious when using clinician-directed visual cueing strategies and when teaching children with LI to use visually-based self-cueing strategies to recall linguistic information. Dynamic assessment may reveal that some children respond better to other methods of clinician-directed cueing and self-cueing (i.e., contextual-based). Further, the rate of presentation results suggest that both children with LI and children with typically developing language may benefit from having visually presented sequential information presented at a slow rate in language therapy and in the classroom.

Limitations of this study included the small number of participants, the possibility that the children could have been at different points in their perceptual learning curves when measurement began, and the possibility that the children's motor execution of the movements could have influenced the performance of the groups on the experimental task. To address these limitations, future research will need to include larger participant groups and the use of span tasks rather than serial memory tasks with set number of items. Research studies investigating the recall of movements will need to use an output method, such as choosing between pictures of movements, that does not incorporate motor execution. A task that incorporates the recall of movements will additionally need to be examined using a dual-processing paradigm to reveal if significant interference occurs when participants are performing a secondary phonological, visual, or motor task. This dual-processing paradigm will allow us to examine whether the task primarily uses the phonological loop, the visuospatial sketchpad, or another motor or kinesthetic memory entity not currently included in the Baddeley WM model to encode and store the movement stimuli.

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## Author Note

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## Book Review / Évaluation de ressource écrit

*KiddyCat : Communication Attitude Test for  
Preschool and Kindergarten Children Who Stutter*  
Martine Vanryckeghem and Gene J. Brutton (2007)

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The KiddyCat comprises a 12-item Communication Attitude Test for Preschool and Kindergarten Children who Stutter, a test instruction and scoring sheet that facilitates administration, and a manual. The purpose of and rationale underlying the development of the KiddyCat are addressed in the Preface, the Introduction and Rationale sections and in other sections of the manual. The manual also describes the normative sample and addresses reliability, validity, test administration, scoring, normative data and related age and gender analyses, and test interpretation. In this review I will discuss the stated purpose and rationale, test format, psychometric properties, administration, scoring, and interpretation of scores, and potential uses of the KiddyCat.

### Purpose

The authors indicate that the KiddyCat provides the clinician with information about the speech-associated attitudes of preschool and kindergarten children. They state, “the information that it reveals about a child’s speech-associated attitude adds direction and power to the procedures and actions of the therapist. In doing so it serves to enhance the process of improvement among preschool and kindergarten children who stutter” (p. vii), that the KiddyCat can “serve as a useful means of validly distinguishing between” (p. 3) children who do and do not stutter, and that a child’s answer to particular items on the test can “help guide client-specific treatment in reducing the negative speech-related beliefs that impede the instatement of fluency” (p. 11). It appears that the authors developed the KiddyCat because they believe that it is necessary to assess speech-associated attitudes to identify and effectively treat preschool and kindergarten children who stutter, that the linguistic and reading level and delivery system of the Communication Attitude Test (Brutton, 1984) developed for school-age children is not appropriate for these younger children, and that the “reliability and validity of parental observations are not convincing” (p. 3). In support of the latter statement and with respect to research in stuttering, the authors refer to a study of the concordance of stuttering and non-stuttering school-age children and their parents

(Vanryckeghem, 1995) that used the Communication Attitude Test (Brutton, 1984). The authors state: “They [parents of school-age children] often appear to reflect their own attitude about their offspring’s speech disorder rather than one that is in keeping with that of their child” (p. 3).

In the preface the authors state that “reactivity, such as a negative attitude toward one’s speech, is a fundamental aspect of the identification of a child who stutters” and that the KiddyCat test procedure “highlights the importance of a speech-associated attitude as a behavioural dimension that is a *necessary* supplement” to the use of dysfluency in the identification of children who stutter” (p. vi-vii). However, it is notable that, as shown in Figure 1, page 8 (also reported in Vanryckeghem, Brutton, & Hernandez, 2005), approximately 13% of the participants who stutter in the normative sample had KiddyCat scores of 0. That is, their KiddyCat score suggests that they did not have any negative speech-associated attitudes; however, they had been diagnosed as children who stutter. These data do not support the assertion that the presence of a negative attitude is fundamental or necessary to the identification of stuttering in preschool and kindergarten children.

The authors also state that “successful therapy requires attention to more than a child’s speech disruption” and “[inner] reactions need to be addressed if treatment is to be successful and if the changes are to be maintained” (p. vii). There is no evidence to support this position. In contrast, there is a large literature that gives substantial evidence of the long term effectiveness (e.g., Jones et al., 2005) of the Lidcombe Program (Onslow, Packman, & Harrison, 2003), a behavioural treatment program in which stuttering in preschool children is directly consequated by parents under the supervision of the clinician and speech-associated attitudes are not addressed. Also, the evidence for the effectiveness of the Lidcombe Program does not support the statement that “negative speech-related beliefs...impede the instatement of fluency” (p. 11) in preschool children.

### Test Format

As the authors point out, a simple downward extension of the Communication Attitude Test (Brutton, 1984) for school-age children would not be appropriate for the target age group. In the KiddyCat the authors use a question format (e.g., Do you like to talk?) which is more appropriate for preschool and kindergarten children than are declarative statement formats (e.g., I like to talk.) (e.g., Chapman & Tunmer, 1995). As well, an interview format is appropriately used.

### Normative Sample

In discussing the normative sample, the authors state that the KiddyCat is based on a representative sample of 63 children who do not stutter (36 boys; 27 girls) and 45 preschool and kindergarten children who stutter (30 boys; 15 girls) from four geographical sections of the United States

and from rural and urban areas. The reported age range for both groups is 3 to 6 years. To evaluate the adequacy of the normative sample, the Agency for Healthcare Research and Quality Report No 52, *Criteria for Determining Disability in Speech-Language Disorders* (AHRQ; Biddle, Watson, Hooper, Lohr, & Sutton, 2002), was consulted. In terms of the representativeness of the sample, information regarding sex, geographic region, and residence (urban or rural) has been provided. It is notable that the proportions of boys to girls who stutter in the normative sample is representative of the 2:1 ratio of male to female children who stutter in this age group (Yairi & Ambrose, 1992). However, no information regarding race, family income, or educational attainment of parents has been provided. Also, the sample size falls short of the AHRQ recommended minimum of 100 per group. This recommendation appears to be consistent with Altman's (1991) suggestion that a total sample size of 200 is needed for diagnostic tests.

### Psychometric Properties

In the sections related to reliability and validity, the authors provide evidence of reliability of the KiddyCat in terms of internal consistency and content validity. Internal consistency was reported to be .75 and .72 for children who do and do not stutter respectively; according to Jackson (1988) these are acceptable estimations of reliability. Evidence of test-retest reliability is needed to establish stability of scores over time.

Regarding content validity, the authors indicate that test items were developed from statements that preschool and kindergarten children who stutter made about their speech that were recorded in their clinical files. Determining content validity is a subjective process; however, evidence of content validity could have been strengthened by having a panel of judges experienced in diagnosing stuttering in preschoolers review the items and determine if the questions satisfy the content domain. It is still possible to do a post hoc evaluation of face validity (see Portney & Watkins, 2000).

Evidence of construct validity is indicated by the statistically significant differences in the KiddyCat scores of children who do and do not stutter that is reported in the Normative Data section. That is, the KiddyCat has the ability to differentiate between children who do and do not stutter. The reported effect size of 1.44 is large. Although the authors discuss criterion-related validity of the Communication Attitude Test for school-age children they have not provided evidence of criterion-related validity of the KiddyCat.

### Test Administration, Scoring, and Interpretation of Scores

The instructions for test administration, scoring, and interpretation of scores appear to be clear overall. The authors report that differences between girls and boys for both groups of children were not statistically significant; thus they state that gender differences do not need to be considered when interpreting KiddyCat scores. Similarly, the authors also report that differences between younger

(3- and 4-year-olds) and older (5- and 6-year-olds) children who stutter were not statistically significant; however, differences for the non-stuttering groups were statistically significant. Means, standard deviations, and a cutoff score to determine atypical speech-associated attitudes are provided. The authors also discuss clinical implications for test results. Specifically, they suggest that the "clinician should attend to the attitudinal reaction to specific test items" (p. 11).

### Potential Uses of the KiddyCat

From a clinical perspective the KiddyCat test can be a useful adjunct to the clinical assessment protocol for clinicians who wish to use a measurement tool to better understand the speech-associated attitudes of preschool and kindergarten children who are being assessed for stuttering. Judicious use of the KiddyCat in clinical work seems to be more appropriate than use with all preschool and kindergarten children who are brought in for a stuttering assessment given that there is as yet no evidence to support the authors' opinion that assessing speech-associated attitudes or addressing them in therapy is necessary to diagnose or successfully treat stuttering in these young children. From a research perspective, the KiddyCat has value as a research tool to better understand the impact of stuttering on preschool children. At present, evidence of internal consistency, content validity, and construct validity in terms of the ability of the KiddyCat to differentiate preschoolers who stutter from those who do not has been presented for one sample of preschool and kindergarten children. This is laudable and a good start to establishing the scale's reliability and validity; however, until psychometric testing is more complete, results of test use for clinical or research purposes must be viewed with this limitation in mind. Perhaps further psychometric testing is already underway.

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**Page titre :** Cette page doit contenir le titre complet du manuscrit, les noms complets des auteurs, y compris les diplômes et affiliations, et l'adresse complète de l'auteur-contact. Une adresse de courriel est également recommandée.

**Abrégé :** Sur une page distincte, produire un abrégé bref mais informatif ne dépassant pas une page. L'abrégé doit indiquer l'objet du travail ainsi que toute information pertinente portant sur la catégorie du manuscrit.

**Mots clés :** Immédiatement suivant l'abrégé et sur la même page, les auteurs doivent présenter une liste de mots clés aux fins de constitution d'un index.

**Tableaux :** Tous les tableaux compris dans un même manuscrit doivent être dactylographiés à double interligne sur une page distincte. Les tableaux doivent être numérotés consécutivement, en commençant par le Tableau 1. Chaque tableau doit être accompagné d'une légende et doit servir à compléter les renseignements fournis dans le texte du manuscrit plutôt qu'à reprendre l'information contenue dans le texte ou dans les tableaux.

**Illustrations :** Toutes les illustrations faisant partie du manuscrit doivent être incluses avec chaque exemplaire du manuscrit. Chaque manuscrit doit contenir des copies claires de toutes les illustrations pour le processus de révision. Il faut envoyer un fichier électronique pour chaque image et graphique en format JPEG, TIFF, AI, PSD, GIF, EPS ou PDF, compression minimale 300 ppp. Pour les autres types d'illustrations informatisées, il est recommandé de consulter le personnel de production de la RCOA avant la préparation et la présentation du manuscrit et des figures et illustrations s'y rattachant.

**Légendes des illustrations :** Les légendes accompagnant chaque figure et illustration doivent être dactylographiées à double interligne sur une feuille distincte et identifiées à l'aide d'un numéro qui correspond à la séquence de parution des figures et illustrations dans le manuscrit.

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### **Conflits d'intérêts possibles et engagement double**

Dans le processus de présentation, les auteurs doivent déclarer clairement l'existence de tout conflit d'intérêts possibles ou engagement double relativement au manuscrit et des auteurs. Cette déclaration est nécessaire afin d'informer la RCOA que l'auteur ou les auteurs peuvent tirer avantage de la publication du manuscrit. Ces avantages pour les auteurs, directs ou indirects, peuvent être de nature financière ou non financière. La déclaration de conflit d'intérêts possibles ou d'engagement double peut être transmise à des conseillers en matière de publication lorsqu'on estime qu'un tel conflit d'intérêts ou engagement double aurait pu influencer l'information fournie dans la présentation ou compromettre la conception, la conduite, la collecte ou l'analyse des données, ou l'interprétation des données recueillies et présentées dans le manuscrit soumis à l'examen. Si le manuscrit est accepté en vue de sa publication, la rédaction se réserve le droit de reconnaître l'existence possible d'un tel conflit d'intérêts ou engagement double.

### **Participants à la recherche – êtres humains et animaux**

Chaque manuscrit présenté à la RCOA en vue d'un examen par des pairs et qui se fonde sur une recherche effectuée avec la

participation d'être humains ou d'animaux doit faire état d'un agrément déontologique approprié. Dans les cas où des êtres humains ou des animaux ont servi à des fins de recherche, on doit joindre une attestation indiquant que la recherche a été approuvée par un comité d'examen reconnu ou par tout autre organisme d'évaluation déontologique, comportant le nom et l'affiliation de l'éthique de recherche ainsi que le numéro de l'approbation. Le processus d'examen ne sera pas amorcé avant que cette information ne soit formellement fournie au rédacteur en chef.

Tout comme pour la recherche effectuée avec la participation d'êtres humains, la RCOA exige que toute recherche effectuée avec des animaux soit accompagnée d'une attestation à l'effet que cette recherche a été évaluée et approuvée par les autorités déontologiques compétentes. Cela comporte le nom et l'affiliation de l'organisme d'évaluation de l'éthique en recherche ainsi que le numéro de l'approbation correspondante. On exige également une attestation à l'effet que tous les animaux de recherche ont été utilisés et soignés d'une manière reconnue et éthique. Le processus d'examen ne sera pas amorcé avant que cette information ne soit formellement fournie au rédacteur en chef.





## **WHAT'S NEW AND EXCITING AT CJSLPA?**

**Online submission module** - An online system for managing submissions to CJSLPA will be launched in the new year. Authors will be able to submit online and the editor, associate editors and reviewers will be able to access manuscripts and send recommendations and decisions through the system. Once the module is fully operational, we expect that time from submission to decision will be reduced and will enable everyone involved to participate from anywhere.

**Indexing** - An agreement has been signed with Thomson Gale and CJSLPA will now be indexed in their databases. There are 80,000 libraries across North America that subscribe to Thomson Gale databases with 2 million viewers per day. We are also pursuing additional indexing services with Ebsco and Google Scholar to ensure the widest possible access for the Journal's articles.

**Database of reviewers** - The operation of a journal requires the assistance of reviewers who contribute their expertise to ensure that fair and timely decisions on manuscripts are made as well as to improving the quality of submissions. Requests have been issued for people who would be interested in reviewing submissions for the Journal and we have had added several names to our database. If you are interested in being a reviewer, visit [www.caslpa.ca/english/resources/jslpa.asp#about](http://www.caslpa.ca/english/resources/jslpa.asp#about) for more information.

**Time of submission to first decision** - We have reduced the average time of submission of a manuscript to first decision from 168 to 85 days. This number is in line with ASHA journals whose range is 68 to 81 days.

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# DTHR CAREERS

## Speech-Language Pathologist - Community Wetaskiwin

Bulletin #07-REH-1170

The David Thompson Health Region is seeking a Speech-Language Pathologist to become an integral part of the Speech-Language Pathology team at the Wetaskiwin Community Health Centre. You will travel to schools in and around Wetaskiwin to provide speech-language assessment and intervention to a wide range of clients.

This challenging role requires strong assessment, communication, organizational and problem-solving skills while working both independently and as part of a team.

The successful candidate must be licensed by the Alberta College of Speech-Language Pathologists and Audiologists (ACSLPA). Work experience in a supervisory role is an asset. You must have a valid driver's licence and access to a reliable vehicle.

**Hours of work:** This is a regular full time position, Monday to Friday from 8:15 a.m. to 4:30 p.m.

## Speech-Language Pathologist - Community Rocky Mountain House

Bulletin #07-REH-1247

The David Thompson Health Region is seeking a Speech-Language Pathologist to become an integral part of the Speech-Language Pathology team based out of Rocky Mountain House Health Centre. You will travel to schools in and around Rocky Mountain House to provide speech-language assessment and intervention to a wide range of clients in a school setting.

This challenging role requires strong assessment, communication, organizational and problem-solving skills while working both independently and as part of a team.

The successful candidate must be licensed by the Alberta College of Speech-Language Pathologists and Audiologists (ACSLPA). Work experience in a supervisory role is an asset. You must have a valid driver's licence and access to a reliable vehicle.

**Hours of work:** This is a regular full-time position, Monday to Friday from 8:30 a.m. to 4:45 p.m.

**Application Procedure:** Please submit one application for each position you are interested in. You may apply online by visiting our website at [www.dthr.ab.ca/careers](http://www.dthr.ab.ca/careers) or send your application to:

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Fax: (403) 704-2580

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Phone: 250-949-8333 Fax: 250-949-8344 Email: [nicctr@island.net](mailto:nicctr@island.net)

## Comox Valley Child Development Association

237 Third Street, Courtenay, BC V9N 1E1  
Phone: 250-338-4288 Fax: 250-338-9326  
Email: [info@cvcda.ca](mailto:info@cvcda.ca) Website: [www.cvcda.ca](http://www.cvcda.ca)

## Port Alberni Association for Children with Developmental Disabilities (at Kiwanis Hilton Centre)

4325 Neill Street, Port Alberni, BC V9Y 1E5  
Phone: 250-723-1117 Fax: 250-723-7349  
Email: [outreachtherap@uniserve.com](mailto:outreachtherap@uniserve.com)

## Nanaimo Child Development Centre

1135 Nelson Street, Nanaimo, BC V9S 2K4  
Phone: 250-753-0251 Fax: 250-753-5614  
Email: [info@cbc.nisa.com](mailto:info@cbc.nisa.com) Website: [www.cdc.nisa.com](http://www.cdc.nisa.com)

## Clements Centre Society

5856 Clements Street, Duncan, BC V9L 3W3  
Phone: 250-746-4135 ext. 4 Fax: 250-746-1636  
Email: [admin@cvacl.org](mailto:admin@cvacl.org) Website: [www.cvacl.org](http://www.cvacl.org)

## Vancouver Island Health Authority, Queen Alexandra Centre for Children's Health

2400 Arbutus Road, Victoria, BC V8N 1V7  
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