The extent and experience of childhood speech impairment

Jane McCormack
Bachelor of Health Science (Speech Pathology) (Hons)

Submitted to Charles Sturt University in fulfilment of the requirements for the degree of Doctor of Philosophy

October 2010
TABLE OF CONTENTS

Certificate of authorship.................................................................4
Certification from supervisor.............................................................5
Abstract ...............................................................................................6
Acknowledgments..................................................................................9
Publications / Conference papers arizing from this doctoral research.........11
Statements from co-authors....................................................................15
List of tables ..........................................................................................24
List of figures ........................................................................................26
GENERAL INTRODUCTION .....................................................................27

PART 1: LITERATURE REVIEWS ..............................................................48
Introduction to Part 1 ............................................................................49

Paper 1: Communication impairment in Australian children:
A review of prevalence studies. .............................................................51

Paper 2: Body Functions and Structures related to communication
and swallowing disorders ......................................................................56

Paper 3: Application of the ICF and ICF-Children and Youth
in children with speech impairment. ......................................................66

PART 2: THE IMPACT OF CHILDHOOD SPEECH IMPAIRMENT ............78
Introduction to Part 2 ............................................................................79

Paper 4: A systematic review of the association between
childhood speech impairment and participation across the lifespan.........82

Paper 5: The impact of speech impairment in early childhood:
Investigating parents’ and speech-language pathologists’ perspectives
using the ICF-CY..................................................................................99
**Paper 6:** A nationally representative study of the association between communication impairment at 4-5 years and children’s life activities at 7-9 years .................................................................119

**Conclusion to Part 2** ...........................................................................................................168

**PART 3: THE EXPERIENCE OF CHILDHOOD SPEECH IMPAIRMENT ........173**

**Introduction to Part 3** ...........................................................................................................174

**Paper 7:** A different view of talking:

*How children with speech impairment picture their speech.* ........................................176

**Paper 8:** My speech problem, your listening problem, and my frustration:

*The experience of living with childhood speech impairment.* ........................................183

**Paper 9:** Knowing, having, doing: The experience of speech impairment from childhood to adulthood .................................................................198

**Conclusion to Part 3** ...........................................................................................................230

**CONCLUSION AND RECOMMENDATIONS.................................................................234**
Certificate of authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Charles Sturt University or any other educational institution, except where due acknowledgment is made in the doctoral research. Any contribution made to the research by colleagues with whom I have worked at Charles Sturt University or elsewhere during my candidature is fully acknowledged.

I agree that this doctoral research be accessible for the purpose of study and research in accordance with the normal conditions established by the Executive Director, Library Services or nominee, for the care, loan and reproduction of theses.

Jane McCormack

Date
Certification from supervisor

I, Professor Sharynne McLeod, certify that the doctoral research entitled “The extent and experience of childhood speech impairment” is in a form ready for examination for the degree of Doctor of Philosophy.

[Signature]

Professor Sharynne McLeod

1st October 2010

Date
ABSTRACT

Communication impairment is a high prevalence condition in preschool children, and speech impairment (also called articulation/phonological/speech sound disorder) is one of the most common forms of communication impairment among this age group. Early intervention is recommended for children with speech impairment due to growing awareness of the potential long-term consequences of unresolved speech impairment (e.g., poorer school achievement, unemployment).

Intervention for speech impairment has traditionally focused on correcting children’s production of sounds/words, which may not address the full extent of difficulties experienced by the child, or the priorities of the child and family. In recent years there has been a shift to consider health (including communication) in a more holistic manner, with the development of the International Classification of Functioning, Disability and Health (ICF; World Health Organization (WHO), 2001) and the ICF-Children and Youth version (ICF-CY; WHO, 2007). There has also been a shift to incorporate the views of clients (children and adults) in health intervention. In particular, the United Nations Convention on the Rights of the Child (UNCROC; UNICEF, 1989) stipulated the rights of children to express their views in all matters affecting them. Both the ICF-CY and the UNCROC have been recommended by speech-language pathology professional associations as important considerations to guide speech-language pathology research and practice.

To date, no studies have investigated the views of individuals with a history of childhood speech impairment regarding their experience of the impairment, and the association between the impairment and life activities. The research undertaken through this doctoral research aimed to develop an understanding of childhood speech impairment as perceived by those who experience speech impairment and their communication partners. Specifically, the research aimed to fulfil two objectives: 1) to
investigate the association between childhood speech impairment and limitations to life activities, and 2) to understand the experience of living with childhood speech impairment. In order to fulfil these objectives, a series of reviews and research studies were conducted, the results of which have been published (or submitted for publication) in Australia and internationally.

This doctoral research contains nine papers which present the reviews and research studies. The three review papers provide information about: (1) the prevalence of communication impairment in Australian children, (2) the theoretical framework used to guide the research (the ICF and ICF-CY), and (3) the application of the ICF-CY to children with speech impairment. The six subsequent research papers have unique aims and methodologies; however, all use the ICF and ICF-CY as a theoretical lens to provide an overarching perspective.

The first three research papers present studies that investigate the association between speech impairment and limitations to life activities: (1) a systematic review of 57 research studies, (2) analysis of parents’ (n=86) and SLPs’ (n=205) responses to questionnaires about the impact of speech impairment on life activities and participation, and (3) analysis of child, parent and teacher reports from the nationally representative Longitudinal Study of Australian Children (n=4,329). In these three research studies, Activities limited by speech impairment extend beyond communication-based activities, and include interpersonal interactions (e.g., relating to persons in authority, informal relationships with friends/peers, parent-child relationships, sibling relationships), learning activities (reading, writing, attention and thinking, calculating), and handling stress and other psychosocial demands. Furthermore, the difficulties associated with childhood speech impairment extend beyond early childhood into the school years and later.
The experience of living with childhood speech impairment is investigated through three additional research studies: (1) a meaning-making analysis of children’s drawings (n=13), (2) a phenomenological analysis of interviews conducted with preschool children (n=13) and their families (n=21), and (3) a phenomenological analysis of two young adults with a history of childhood speech impairment and their mothers. Again, difficulty with speech is not the only difficulty identified. Children and their families recognise difficulties with communication relate to the speech skills of the child, but also to the ability of communication partners to understand the child’s message, and frustration resulting from communication breakdowns. Individuals with speech impairment and their mothers reveal the difficulties associated with speech impairment continue throughout the lifespan, affecting social interactions, academic skills, and career progression for individuals and causing distress, isolation or guilt for parents.

This doctoral research expands current understanding of the extent and experience of childhood speech impairment across the lifespan, and reveals the unique and valuable insights about speech impairment that children and their families provide. As a series of papers, this research forms a body of evidence that could be drawn upon by policy-makers, speech-language pathologists, and educators to provide direction for timely and holistic intervention services for individuals with childhood speech impairment and their families.
ACKNOWLEDGMENTS

A number of people and organisations have contributed to this doctoral research, and for their input and support, I am incredibly grateful.

To the children and adults who participated in the research: thank you for your time, interest and invaluable insights. I hope this doctoral research accurately presents your experiences.

To the Menzies Foundation: thank you for financially supporting my doctoral research through the Sir Robert Menzies Memorial Scholarship for Research in the Allied Health Sciences, and in doing so, recognising the importance of understanding and working to improve the lives of children with speech impairment and their families.

To my wonderfully supportive and always encouraging supervisors, Professor Sharynne McLeod, Associate Professor Linda Harrison and Associate Professor Lindy McAllister: What a trio! Sharynne, thank you for your enthusiasm, your mentoring, your attention to detail, your generosity and for ensuring I had such an amazing “suite of experiences!” Linda, thank you for your perspective and your patience (particularly with statistics!); and Lindy, thank you for sharing your wealth of knowledge (particularly regarding all things qualitative!) and your insights. It has been a pleasure and a privilege to work with you all – across state borders, different time-zones, and various modes of communication! Thank you also for employing and assisting me as project officer for the Sound Effects Study and for enabling me to access data from the study to use in my research.

To the staff and students in the School of Teacher Education: thank you for welcoming me so warmly to Bathurst each time I visited, so I felt I had two research “homes.”

To my other “home,” the School of Community Health in Albury: thank you to the staff in the speech pathology program and Associate Professor Julia Coyle (HOS)
for letting me join you in Albury, for the opportunities to work with you in the speech pathology program and for your encouragement and interest in my work.

To the other PhD students and staff in Albury who have become such great friends, especially Anna O’Callaghan, Lis Brown, and Anna Moran: It was worth starting this journey just to meet you! Thanks so much for sharing the experience and making it so enjoyable.

To my lovely family, all masters in the art of talking (and listening!): as always, thanks for your faith, your ongoing support and your constant encouragement. Now for the next adventure…!
PUBLICATIONS / CONFERENCE PAPERS ARISING FROM DOCTORAL RESEARCH

Papers (listed in the order in which they appear in this doctoral research)


   [Excellence for Research in Australia (ERA) journal ranking – B]


   [ERA journal ranking – A]


   [ERA journal ranking – C]


   [ERA journal ranking – A]


   [ERA journal ranking – C; Impact Factor – 1.639]

impairment at 4-5 years and children’s life activities at 7-9 years. *Journal of Speech, Language, and Hearing Research.*

[ERA journal ranking – B; Impact Factor – 2.347]


[ERA journal ranking – B]


[ERA journal ranking – A; Impact Factor – 1.273]


**Conference papers**


McCormack, J., McLeod, S., McAllister, L. & Harrison, L. (2009, May). *Parental report of the impact of speech impairment on children’s Activities and*
Participation. Speech Pathology Australia, Adelaide.


STATEMENTS FROM AUTHORS
CONFIRMING THE AUTHORSHIP CONTRIBUTION OF THE PHD CANDIDATE

Paper 1

As author of the paper entitled “Communication impairment in Australian children: A review of prevalence studies”, I confirm that I made the following contributions:

- Review and interpretation of studies
- Identifying implications for future research
- Writing the paper

Furthermore, I agree to the inclusion of the paper in this doctoral research submitted for examination.

Jane McCormack  
1st October 2010

Jane McCormack  Date
Paper 2

As co-authors of the paper entitled "Body Functions and Structures related to communication and swallowing disorders", we confirm that Jane McCormack has made the following contributions:

- Initial plan and structure of the paper
- Writing drafts of the paper
- Relating the content of the paper to the existing literature

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

Jane McCormack  
1/10/10  
Date

Linda Worrall  
25/9/10  
Date
Paper 3

As co-authors of the paper entitled “Application of the ICF and ICF-Children and Youth in children with speech impairment”, we confirm that Jane McCormack has made the following contributions:

- Contributing to the structure and content of the paper
- Editing and providing feedback regarding drafts of the paper
- Writing the case study for the paper

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

Sharynne McLeod
1st October 2010
Date

Jane McCormack
1st October 2010
Date
As co-authors of the paper entitled “A systematic review of the association between childhood speech impairment and participation across the lifespan”, we confirm that Jane McCormack has made the following contributions:

**Construction and design of the research**
- Designing and conducting the database search

**Analysis and interpretation of the findings**
- Review and interpretation of studies
- Relating results to the existing literature
- Identifying implications for future research

**Writing the paper and critical appraisal of content**
- Writing the paper with direction and feedback from co-authors

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

Jane McCormack  
1st October 2010
Date

Sharynne McLeod  
1st October 2010
Date

Lindy McAllister  
1st October 2010
Date

Linda J. Harrison  
1st October 2010
Date
Paper 5

As co-authors of the paper entitled “The impact of speech impairment in early childhood: Investigating parents' and speech-language pathologists' perspectives using the ICF-CY”, we confirm that Jane McCormack has made the following contributions:

Construction and design of the research

- Designing the questionnaire item
- Collection of parent data
- Entry and coding of data into the statistical software package

Analysis and interpretation of the findings

- Statistical analysis and interpretation of data under the direction of co-author, Linda Harrison
- Relating results to the existing literature
- Identifying implications for future research

Writing the paper and critical appraisal of content

- Writing the paper with direction and feedback from co-authors

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

Jane McCormack

Sharynne McLeod

Linda J. Harrison

Lindy McAllister

1st October 2010

Date
Paper 6

As co-authors of the paper entitled “A nationally representative study of the association between communication impairment at 4-5 years and children’s life activities at 7-9 years”, we confirm that Jane McCormack has made the following contributions:

Construction and design of the research
- Selection of outcome measures

Analysis and interpretation of the findings
- Statistical analysis and interpretation of data under the direction of co-author, Linda Harrison
- Relating results to the existing literature
- Identifying implications for future research

Writing the paper and critical appraisal of content
- Writing the paper with direction and feedback from co-authors

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

Jane McCormack 1st October 2010
Linda J. Harrison 1st October 2010
Sharynne McLeod 1st October 2010
Lindy McAllister 1st October 2010
As co-authors of the paper entitled “A different view of talking: How children with speech impairment picture their speech”, we confirm that Jane McCormack has made the following contributions:

**Construction and design of the research**
- Conducting and transcribing interviews
- Collection of drawings and other assessment material

**Analysis and interpretation of the findings**
- Thematic analysis of transcripts
- Application of meaning-making approach to children’s drawings
- Relating themes to the existing literature
- Identifying implications for future research

**Writing the paper and critical appraisal of content**
- Writing the paper with direction and feedback from co-authors

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

Jane McCormack  
1st October 2010  
Date

Sharynne McLeod  
1st October 2010  
Date

Linda J. Harrison  
1st October 2010  
Date

Lindy McAllister  
1st October 2010  
Date

Erin Holliday  
1st October 2010  
Date
As co-authors of the paper entitled “My speech problem, your listening problem, and my frustration: The experience of living with childhood speech impairment”, we confirm that Jane McCormack has made the following contributions:

Construction and design of the research
- Wording of adult (significant other) interview questions
- Conducting interviews
- Transcribing interview data

Analysis and interpretation of the findings
- Thematic analysis of transcripts
- Relating themes to the existing literature
- Identifying implications for future research

Writing the paper and critical appraisal of content
- Writing the paper with direction and feedback from co-authors

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

Jane McCormack  
1st October 2010
Date

Sharynne McLeod  
1st October 2010
Date

Lindy McAllister  
1st October 2010
Date

Linda J. Harrison  
1st October 2010
Date
Paper 9

As co-authors of the paper entitled “Knowing, having, doing: The experience of speech impairment from childhood to adulthood,” we confirm that Jane McCormack has made the following contributions:

**Construction and design of the research**

- Wording of interview questions
- Conducting interviews
- Transcribing interview data

**Analysis and interpretation of the findings**

- Thematic analysis of transcripts
- Relating themes to the existing literature
- Identifying implications for future research

**Writing the paper and critical appraisal of content**

- Writing the paper with direction and feedback from co-authors

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

Jane McCormack
Date 1st October 2010

Lindy McAllister
Date 1st October 2010

Sharynne McLeod
Date 1st October 2010

Linda J. Harrison
Date 1st October 2010
LIST OF TABLES

**General Introduction**
Table 1. Aims and methods of the papers presented in this doctoral research.
Table 2. Research objectives and research methods.

**Paper 1**
Table 1. Australian studies of prevalence of communication disorders published since 2000.

**Paper 2**
Table 1. Major classifications of Body Functions and Body Structures.
Table 2. Qualifiers used to indicate nature and extent of impairment.
Table 3. Classification of speech difficulty arising from tongue tie according to the ICF.
Table 4. Common communication and swallowing difficulties with salient ICF codes.

**Paper 3**
Table 1. The components and domains within the ICF relevant to children with speech impairment.

**Paper 4**
Table 1. Databases and terms used in systematic review.
Table 2. Results of the search strategy for each Activity and Participation (ICF) component.
Table 3. Activities and Participation domains associated with speech impairment.

**Paper 5**
Table 1. SLPs’ perceptions of Activities and Participation that may be difficult for children with speech impairment.
Table 2. Comparison of SLPs’ factor means by SLPs’ demographic and clinical characteristics.
Table 3. Parents’ perceptions of Activities and Participation that may be difficult for children with speech impairment.
Table 4. Mean factor scores for SLPs and parents.

**Paper 6**
Table 1. ICF-CY Activities and Participation domains and outcome measures.
Table 2. Distribution of children within (WNL) and outside normal limits on life activities outcomes at 7-9 years according to communication status at 4-5 years.
Table 3. The unique and combined effects of communication impairment and other child and family characteristics on child outcomes at 7-9 years.

**Conclusion to Part 2**
Table 1. Activities and Participation domains associated with speech impairment: findings from the three quantitative research studies.
Paper 7
Table 1. Participant characteristics and results from KiddyCAT, drawing and interviews.

Paper 8
Table 1. Participant characteristics of children with speech impairment.
Table 2. Themes, subthemes and codes generated from analysis of the interview transcripts.

Paper 9
Table 1. Key topics for interviews.

Conclusion to Part 3
Table 1. Activities and Participation domains associated with speech impairment: findings from the three qualitative research studies
LIST OF FIGURES

General Introduction
Figure 1. Interactions between the components of the ICF.

Paper 5
Figure 1. Parts, components and domains of the ICF and their interactions.
Figure 2. Protocol for inclusion in Study 2: Parents’ perceptions of Activities and Participation impacted by speech impairment.

Paper 7
Figure 1. Patrick’s drawing.
Figure 2. Grace’s drawing.
Figure 3. Kara’s drawing.
Figure 4. Wade’s drawing.
Figure 5. Owen’s drawing.
Figure 6. Fenn’s drawing.
Figure 7. Zac’s drawing.
Figure 8. Gus’ drawing.
Figure 9. Ewan’s drawing.
Figure 10. Matt’s drawing.
Figure 11. Evelyn’s drawing.
Figure 12. Jamie’s drawing.

Paper 8
Figure 1. The link between the problems experienced by children with speech impairment and their communication partners (theme 1), and their solutions to the problems (theme 2).
Figure 2a and 2b. Owen’s drawings of himself talking.

Paper 9
Figure 1. The experience of speech impairment from childhood to adulthood, according to individuals with speech impairment and their parents.
Figure 2. Battles in the experience of living with speech impairment.
GENERAL INTRODUCTION
Communication impairment is a high prevalence condition in childhood (Law, Boyle, Harris, Harkness, & Nye, 2000), and may continue to be experienced into adolescence and adulthood (Felsenfeld, Broen & McGue, 1992). Speech impairment (also called articulation/phonological delay, or speech sound disorder) is one of the most common forms of communication impairment identified in young children, and is frequently reported on the caseloads of practicing speech-language pathologists around the world (Broomfield & Dodd, 2004; Joffe & Pring, 2008; McLeod & Baker, 2004; Mullen & Schooling, 2010).

Speech impairment refers to difficulty with the perception, planning and production of speech sounds. The impairment may range from mild difficulty, affecting 1-2 sounds (e.g., an interdental lisp), to severe difficulty, affecting multiple sounds and resulting in unintelligible speech. For some children, speech impairment is associated with a structural impairment such as cleft lip/palate, and for other children, it may be a secondary symptom of an impairment such as hearing loss. For most children who present at clinics with speech impairment, the origin of the impairment is unknown (Campbell et al., 2003; Shriberg, Austin, Lewis, McSweeney & Wilson, 1997); however, the effects may be far-reaching.

The development of speech and language skills is “intimately related to all aspects of educational and social development” (Law, Boyle, Harris, Harkness, & Nye, 1998, p. 2). Consequently, impairment of speech and language skills may affect a child’s education and social development, which may impact on their employment (Ruben, 2000), or vocational choices in adulthood (Felsenfeld, Broen & McGue, 1994). A number of researchers have investigated the immediate and long-term outcomes for individuals with a history of speech impairment (e.g., Felsenfeld et al., 1992, 1994; Glogowska, Roulstone, Peters, & Enderby, 2006; Nathan, Stackhouse, Goulandris, & Snowling, 2004); however, typically this research has focused on a specific set of
outcomes. No previous research has examined the association between childhood speech impairment and a comprehensive range of life activities. Furthermore, no research has described the life experiences of individuals with speech impairment.

Knowledge of the association between life activities and childhood speech impairment and awareness of the life experiences of individuals with speech impairment and their families is essential for the provision of appropriate and timely intervention. Such knowledge could inform the development of policies regarding access to speech-language pathology services, and inform the selection of goals and activities in clinical practice.

Currently in Australia, not all children with speech impairment have access to necessary speech-language pathology services (McAllister, McCormack, McLeod & Harrison, 2010), and for other children, the amount and type of intervention is restricted. This situation contrasts with that in the United States (US) and the United Kingdom (UK), where there is mandated access to speech-language pathology services for children with speech impairment (Bercow, 2008; U.S Department of Education, 2004). Numerous factors contribute to the lack of service provision in Australia, and these include a lack of knowledge about outcomes for individuals with childhood speech impairment, and a lack of understanding of the experience of individuals living with speech impairment. Current Australian government policies fail to recognise the existence of childhood speech impairment, and consequently fail to allocate sufficient resources and funding to those children identified with speech difficulties (McLeod, Press & Phelan, 2010).

For children who do receive speech-language pathology services, they are traditionally assessed and diagnosed based on correspondence to developmental norms, and receive intervention in clinical settings (Gould, 2009; McLeod & Bleile, 2004). This traditional approach is consistent with a medical (or impairment-based) model,
which “views disability as a problem of the person…which requires medical care provided… by professionals” (World Health Organization, 2001, p. 20). However, for intervention to be functional and effective, a holistic, rather than a medical approach to management of speech impairment is required. A holistic approach foregrounds the experience of individuals with speech impairment and their families in order to understand their priorities and goals for intervention and to address their perceived needs. Recently, there has been a growing awareness of the need to consider the views of children in issues that affect them (e.g., Article 12 of the United Nations Convention on the Rights of the Child; UNICEF, 1989), yet previous research has not considered the views of young children with speech impairment, due to their age and their level of intelligibility (Markham, van Laar, Gibbard, & Dean, 2009).

This doctoral research aimed to increase knowledge about the association between childhood speech impairment and a broad range of activities across the lifespan, and to develop better awareness of the experience of living with childhood speech impairment from the perspective of individuals and significant others in their lives. Two research objectives guided the research. It was intended that these objectives, taken together, would enable the most holistic and insightful understanding of childhood speech impairment, life activities, and outcomes for individuals and their families. The objectives of this research were as follows:

**Objective 1**

*To investigate the extent and direction of the association between childhood speech impairment and life activities.*

**Objective 2**

*To understand the experience of childhood speech impairment as described and understood by individuals and significant others.*

A series of reviews and research studies were conducted in order to fulfil these
objectives. The studies have been published, or submitted for publication, in nine papers. In the following doctoral research, each paper is presented as a distinct, stand-alone study. This opening chapter serves as an introduction to the topic of the doctoral research, as well as providing a description of the theoretical framework, research paradigm and methodology guiding the whole of the doctoral research in order to contextualise the individual research studies.


In 1946, the World Health Organization (WHO) defined health in a holistic manner, describing it as “not merely the absence of disease or infirmity,” but rather a “state of complete physical, mental and social well-being” (p. 100). However, for a number of years, health continued to be regarded in terms of medical wellness, and the role of health professionals (including speech-language pathologists) was regarded as making people “better” by reducing or eliminating diseases or impairments. More recently, there has been a shift in health-related research and practice towards thinking about health and the role of health professionals in a manner better aligned with the WHO (1946) definition. The shift towards more holistic health-related research and practice has coincided with the release of the International Classification of Functioning, Disability and Health (ICF) by the WHO in 2001, and the subsequent release of the Children and Youth version (ICF-CY) in 2007.

In the ICF, health is considered to be the result of the inter-relationships that exist between biology (Body Structures and/or Functions) \(^1\), everyday life (Activities and Participation), and other Personal and Environmental Factors (see Figure 1), so that all contribute to an individual’s health, and ability to function (Reed et al., 2005).

---

\(^1\) Capitalization has been used for these terms to be consistent with usage in the ICF and to differentiate between everyday usage of these terms.
The ICF-CY was derived from the ICF to specifically cover the ages from birth to 18 years in order to reflect the differences between children and adults in terms of their development and life activities (Lollar & Simeonsson, 2005). Within the ICF and ICF-CY, an impairment is considered the result of a problem with a Body Structure or Function; however, the relationship between the impairment and health can be seen by examining the way in which an individual’s ability to perform Activities has been limited, or their Participation has been restricted.

The ICF aims to “provide a unified and standard language and framework for the description of health and health-related states” (WHO, 2001, p. 3). It has been recommended as a framework for use within the profession of speech-language pathology (Ma, Threats, Worrall, 2008; Threats, 2006; Threats & Worrall, 2004), due to its applications for research (e.g., measuring outcomes) and clinical practice (e.g., providing intervention appropriate to specific conditions), as well as education, policy design and implementation.

In this doctoral research, the ICF and ICF-CY were used as the theoretical framework (or lens) throughout all phases of the research. The framework enabled an examination of the extent and direction of the association between speech impairment
and life activities (objective 1), and guided the development of questions used in interviews to understand the experience of childhood speech impairment (objective 2).

Speech impairment is an impairment of a Body Function (specifically, the ICF-coded function of articulation). However, to understand the relationship between speech impairment and health, it is necessary to understand the association between speech impairment and everyday life activities. The Activities and Participation component of the ICF and ICF-CY contains a comprehensive list of the tasks and actions of everyday life. Consequently, it is useful for guiding an investigation of the association between speech impairment and everyday life activities, which may then have implications for the ways in which impairments are managed. The first three papers (1-3) in this doctoral research present further information about the prevalence of communication (including speech) impairment and the application of the ICF and ICF-CY in speech-language pathology.

**Research Paradigm: Pragmatism**

Research paradigms are beliefs about the world and the nature of research, which are shaped by factors including past research experiences and the context in which one works, and which in turn, guide the selection of particular strategies of inquiry and research methods (Creswell, 2009; Guba, 1990). The research paradigm which shaped this doctoral research was *pragmatism*, and posits that research should be driven by the problem and the intended consequences, rather than the methodology (Creswell, 2009). That is, pragmatic research arises out of a need to understand problems and to identify solutions. Pragmatists select research methods that will best address the research problem, and therefore may draw on both qualitative and quantitative approaches. Furthermore, they acknowledge that “research always occurs in social, historical, political and other contexts” and so may use a theoretical lens that is reflective of social justice and political aims to guide the study (Creswell, 2009, p. 11).
Positioning of Self in the Research

I am a speech-language pathologist with clinical and research experience working with children with communication impairment and their families. As a clinician, I have worked in community health, early intervention and school settings in Australia and the UK, and a large proportion of my caseload has comprised children with speech impairment. My primary research experience arose through my role as project officer on the Sound Effects Study, part of an Australian Research Council Discovery Project titled, *Children with speech impairment: A population study of prevalence, severity, impact, and service delivery* (DP0773978). Working as both a clinician and project officer, I have spent time talking with individuals with speech impairment and their families. I have observed their communication difficulties, and have been a participant in interactions when communication has broken down. Thus, I know a little of the experience of speech impairment, but do not have the insights of those who live with speech impairment each day.

As a speech-language pathologist, I have delivered intervention to children with speech impairment and information to their families. I have seen children make significant gains in their speech skills, and have observed subsequent improvements in their social interactions with others, their personal confidence, and their progress at school. Thus, I believe in the effectiveness of early intervention in improving outcomes for children, and recognise the link between communication and other areas of development. However, I have also witnessed children who make good clinical progress, but struggle to generalise to the “real-world,” and children who are reluctant to engage in intervention, as well as families who have difficulty participating in services due to other life events. Consequently, I have wondered about the effectiveness, efficiency and family-friendliness of the traditional intervention I provide.

As a service provider, I know what it is like to be constrained by policies
relating to funding and resources. I have worked with children who made good gains, but had not achieved their intervention goals, yet could no longer access speech-language pathology services (particularly once at school) because their difficulties were not considered “severe” enough according to the funding criteria. These were children whom I believe would have benefited from ongoing intervention, and I have been concerned that they were not entitled to receive that help.

As a clinician and researcher, I believe in the holistic nature of health, and see the ability to communicate as being integral to an individual’s health and well-being. I believe that all individuals should have access to health care (including speech-language pathology services) that addresses health in a holistic manner and extends for as long as is required. I also believe the insights provided by children and adults regarding their life experiences can contribute valuable information to improve the health care that is provided to them. I am aware that children often have been excluded from sharing their views in research about them, but that the United Nations has stipulated their inclusion in the Convention of the Rights of the Child (UNICEF, 1989). Article 12 from that Convention recognizes the right of “all children capable of forming their own views to express those views freely in all matters affecting them,” and Article 13 recognizes their right “to seek, receive and impart information and ideas of all kinds…either orally, in writing or in print, in the form of art, or through any other media of the child’s choice.”

My experiences as a speech-language pathologist and my personal beliefs have motivated this doctoral research, which is primarily concerned with increasing our knowledge about individuals with speech impairment and their families in order to provide better services to this population.

**Strategies of Inquiry: Mixed Methods**

There are three strategies of inquiry that may be used to guide the selection of procedures to address research problems/objectives: qualitative, quantitative, and mixed
Typically, quantitative research uses methods such as experiments or large-scale questionnaires in order to examine cause and effect, and qualitative research uses methods such as case studies or phenomenology in order to generate meaning and understand the influence of context. The mixed methods approach incorporates the use of both quantitative and qualitative strategies.

Quantitative methods can provide useful information about the degree to which phenomena are present in a given group and thus are often recommended for generalisation of findings to the larger population (Flyvbjerg, 2007). The breadth of understanding provided by quantitative research is a strength, but the corresponding lack of depth is a weakness of quantitative approaches. In contrast, qualitative methods provide detailed examples of phenomena. While quantitative research values objectivity, qualitative research focuses on interpretation. Liamputtong and Ezzy (2005) suggested that qualitative methods and the interpretative data gained from them are invaluable in research that attempts to understand people’s experience and the meanings they give to those experiences.

In this doctoral research, a mixed methods approach was used to address the research problem of increasing knowledge about childhood speech impairment. The mixed methods approach recognises that “studies that use only one method are more vulnerable to errors linked to that particular method...than studies that use multiple methods” which can neutralise biases and reinforce results (Patton, 2002, p. 556). The choice to use a mixed methods approach was made in recognition that using both quantitative and qualitative strategies of inquiry strengthens a study beyond that possible through using a single strategy.

In essence, a quantitative approach guided an investigation of the extent and direction of the association between speech impairment and life activities (objective 1), while a qualitative approach guided an understanding of the experience of childhood
speech impairment from the perspective of individuals and significant others (objective 2). Three papers (4-6) of this doctoral research present the results of research studies which investigated associations between speech impairment and life activities, and three papers (7-9) present the results of research studies which investigated the experiences of childhood speech impairment. Table 1 lists the papers, the aims, and data collection methods. Together, they provided the strongest approach for investigating and understanding childhood speech impairment.

The particular strategy of inquiry used in this doctoral research is termed a concurrent transformative approach. Transformative research is conducted with the purpose of advocating for marginalized groups, and this purpose influences all phases of the research process (Mertens, 2003). Consequently, research is conducted for a particular marginalised group (in this research, children with speech impairment and their significant others), and gives voice to participants from that group. Furthermore, the data collection and outcomes of a transformative research study aim to benefit the group being studied through facilitating social change (in this research, increasing knowledge and awareness about speech impairment, and advocating for better service provision for individuals with speech impairment). In a concurrent transformative mixed methods approach, such as that used in this research, both quantitative data and qualitative data are collected at the same time and the data are integrated in the interpretation of the overall results.

Typically, in a transformative mixed methods approach, the researcher uses a theoretical lens as an overarching perspective which guides decision-making regarding the issues to be examined and the participants to be involved, as well as providing a framework for guiding data collection, analysis, and outcomes or changes anticipated by the study (Creswell, 2009). The holistic nature of health, as defined and presented in the ICF and ICF-CY (WHO, 2001; 2007), was the framework used to guide this research.
## Table 1. Aims and Methods of the Papers Presented in this Doctoral Research.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Aims</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Communication impairment in Australian children: A review of prevalence studies</td>
<td>To review the most recent research investigating the prevalence of childhood communication impairment in Australia.</td>
<td>Review</td>
</tr>
<tr>
<td>2) Body Functions and Structures related to communication and swallowing disorders.</td>
<td>To outline the Body Functions and Body Structures codes from the International Classification of Functioning, Disability and Health (ICF) that are most relevant to speech-language pathology, and to discuss the overlap that occurs with the Activities and Participation component of the ICF.</td>
<td>Review</td>
</tr>
<tr>
<td>3) Application of the ICF and ICF-Children and Youth in children with speech impairment.</td>
<td>To describe assessment and intervention for childhood speech impairment using each component from the Children and Youth version of the ICF (the ICF-CY).</td>
<td>Review</td>
</tr>
<tr>
<td>4) A systematic review of the association between childhood speech impairment and participation across the lifespan.</td>
<td>To systematically review research that identified an association between speech impairment and Activity Limitations and/or Participation Restrictions, in order to better understand the social dimensions of childhood speech impairment.</td>
<td>Systematic review of 57 papers guided by ICF (Activities and Participation component).</td>
</tr>
<tr>
<td>5) The impact of speech impairment in early childhood: Investigating parents’ and speech-language pathologists’ perspectives using the ICF-CY.</td>
<td>1) To explore the usefulness of the ICF-CY as a framework for investigating the impact of speech impairment on life activities in early childhood; 2) To examine the range of Activities and Participation that may be difficult for young children as a result of speech impairment from the perspectives of parents and speech-language pathologists (SLPs); 3) To compare parents’ and SLPs’ perceptions.</td>
<td>Questionnaire completed by 86 parents and 205 SLPs. Factor analysis of responses.</td>
</tr>
<tr>
<td>6) A nationally representative study of the association between communication impairment at 4-5 years and children’s life activities at 7-9 years.</td>
<td>To investigate the association between communication (speech and language) impairment in early childhood and Activities and Participation at school-age using parent-, teacher- and child-report, and direct assessment.</td>
<td>Analysis of data collected with 4,329 children in nationally representative study. Descriptive and inferential statistics.</td>
</tr>
<tr>
<td>8) My speech problem, your listening problem, and my frustration: The experience of living with childhood speech impairment.</td>
<td>To explore the different perceptions about speech impairment that may exist, and to understand the experience of living with speech impairment in childhood as described and understood by children with speech impairment, their families and teachers.</td>
<td>Phenomenological analysis of semi-structured interviews with 13 children and 21 significant others.</td>
</tr>
</tbody>
</table>
### Research Methods

Research methods comprise the forms of data collection, analysis and interpretation used in a research project. In a mixed methods approach, research methods may be both pre-determined and emerge throughout the course of the study, and typically incorporate multiple forms of data. Creswell (2009) suggested four key considerations in the planning of research in a mixed methods study: timing, weighting, mixing and theorising. Timing refers to the order in which each form of data (qualitative/quantitative) is collected; weighting refers to the priority given to each form of data; mixing refers to when and how each form of data is combined and theorising refers to whether a theoretical perspective guides the research design.

In a concurrent transformative mixed methods approach, such as that used in this doctoral research, the *theoretical perspective is explicit* and guides all methodological choices, including data sources, modes of analysis, interpretation and reporting. Data is collected *concurrently*, with *equal weight* given to both forms of data, and data is mixed in the interpretation stage.

In this doctoral research, six research studies are presented, which had unique aims and methodologies (see Table 1); however, all used the ICF and ICF-CY as a theoretical framework to provide an overarching perspective. Three research studies (in papers 4-6) investigated the association between speech impairment and life activities. Paper 4 presented the results of a systematic review of 57 research studies, paper 5 presented an analysis of parents’ (n=86) and SLPs’ (n=205) responses to questionnaires about the impact of speech impairment on preschool children’s Activities and

<table>
<thead>
<tr>
<th>Paper</th>
<th>Aims</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>9) <em>Knowing, having, doing: The experience of speech impairment from childhood to adulthood.</em></td>
<td>To describe the experience of living with speech impairment from childhood until early adulthood from the perspective of two individuals with speech impairment and their mothers.</td>
<td>Two case studies, phenomenological analysis of semi-structured interviews.</td>
</tr>
</tbody>
</table>
Participation, and paper 6 presented an analysis of child, parent and teacher reports from the nationally representative Longitudinal Study of Australian Children (n=4,329). The experience of childhood speech impairment was investigated through three additional research studies (in papers 7-9). Paper 7 presented the results of a meaning-making analysis of preschool children’s drawings (n=13), paper 8 presented a phenomenological analysis of interviews conducted with preschool children (n=13) and their families (n=21), and paper 9 presented a phenomenological analysis of two young adults with a history of childhood speech impairment and their mothers.

A combination of descriptive (e.g., frequencies) and inferential statistics (e.g., ANOVAs) was used to measure the association between speech impairment and limitations to life Activities. At the same time, a phenomenological approach was used in the analysis of interview transcripts, and a meaning making approach was used in the analysis of children’s drawings in order to understand the experience of living with speech impairment. Table 2 presents the two objectives and the specific methods used to investigate each. Data collection and analysis procedures are described in more detail in the individual papers.

### Table 2. Research Objectives and Research Methods

<table>
<thead>
<tr>
<th>Objective</th>
<th>Strategy of Inquiry</th>
<th>Data collection</th>
<th>Analysis / Interpretation</th>
<th>Scientific Rigor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To investigate the extent and direction of the association between life activities and childhood speech impairment</td>
<td>Quantitative</td>
<td>Systematic review Questionnaires</td>
<td>Descriptive and inferential statistics</td>
<td>Statistical significance, Reliability, Validity</td>
</tr>
<tr>
<td>2. To understand the experience of childhood speech impairment</td>
<td>Qualitative</td>
<td>Child drawings Semi-structured, in-depth interviews</td>
<td>Meaning-making approach Phenomenology</td>
<td>Trustworthiness (authenticity, transferability, dependability and confirmability), Triangulation</td>
</tr>
</tbody>
</table>
The mixing of the quantitative and qualitative data in the interpretation stage enabled the research objectives to be fulfilled in order to develop the best understanding of childhood speech impairment, and to advocate for changes to service provision for individuals with speech impairment and their families.

**Scientific Rigor**

The rigor of the findings reported in this doctoral research was ensured through consideration of the reliability and validity of quantitative data, and trustworthiness of qualitative data. *Reliability* refers to a study’s dependability or consistency; that is, whether results are accurate (reflect true ability and are free of measurement error) and can be replicated under identical or similar conditions (Neuman, 2006). *Validity* refers to a study’s accuracy and authenticity; that is, whether meaningful and useful inferences can be drawn from the data (Creswell, 2009). The reliability and validity of quantitative data was achieved through: the use of standardised tools and administration procedures, the use of statistical procedures and significance tests to examine the probability of results occurring by chance, the measurement and reporting of the internal reliability (e.g., Cronbach’s alpha) of measurement tools, and by the development of a systematic procedure for analysing research studies for the systematic review. Further information is provided in the individual papers presented in this doctoral research.

The trustworthiness of the qualitative data was established by examining four factors: authenticity, transferability, dependability and confirmability (Minichiello, Sullivan, Greenwood, & Axford, 1999). *Authenticity* refers to the degree to which the voices of participants have been accurately represented and interpreted. *Transferability* refers to the degree to which findings can be transferred to similar situations through the use of detailed description. *Dependability* refers to the transparency of the data collection, analysis and interpretation that was conducted in order to reach the stated conclusions, and *confirmability* refers to the objectivity of the researcher in conducting
the research and interpreting the findings.

The trustworthiness of the qualitative data in this doctoral research was achieved through: explicitly stating the position of the researcher, gaining data from more than one source (e.g., questionnaires and interviews with focus individuals and others), comparing the data sets (triangulation), checking of understanding of the data with participants, and using detailed extracts in research reports to ensure authenticity of the descriptions of participants’ experiences and transferability to other situations. Further information is provided in the individual papers presented in this doctoral research.

**Triangulation**

In the mixing of data, two types of triangulation were used to give rigor to the analysis: methods triangulation and triangulation of sources. Patton (2002) suggested that *methods triangulation* enables the researcher to perform a comparative analysis, to check the consistency of findings generated by different data collection methods. When findings converge, the researcher may have increased confidence in the validity of the results, while divergent findings may lead the researcher to a “better understanding of the multifaceted, complex nature of a phenomenon” (Patton, 2002, p. 559). Thus, the data collected and analysed for this research comprised published studies used for systematic review, questionnaires, standardised assessments, interviews, and child drawings.

According to Patton (2002), *triangulation of data sources* enables the researcher to check the consistency of information collected at different times or with different participants. In this doctoral research, quantitative data collected from different participants were triangulated (e.g., papers 5 and 6). Qualitative data collected from interviews with the focus individuals (i.e. those with a history of childhood speech impairment) were triangulated with each other, with assessment results (paper 7) and with the data collected from interviews with family / significant others (papers 8 and 9).
Orientation to the doctoral research

In this doctoral research, nine papers are presented. Each paper is presented in its entirety. The papers have been published (or submitted for publication) in a number of different journals in Australia, the US and the UK; therefore, the style, terminology, spelling and referencing may vary slightly from one paper to the next. For instance, *speech pathologist* and *speech and language therapist* have both been used to refer to *speech-language pathologists*.

The nine papers have been grouped into three parts according to their objectives. The three review papers in part 1 provide information about: (1) the prevalence of communication impairment in Australian children, (2) the theoretical framework used to guide the research (the ICF and ICF-CY), and (3) the application of the ICF-CY to children with speech impairment. The six research papers presented in parts 2 and 3 investigate the two research objectives. The papers in part 2 examine the association between speech impairment and life activities, while the papers in part 3 describe the experience of childhood speech impairment. Each research paper contains a review and discussion of the relevant literature, a description of the methods employed in the research, and key findings. In the final chapter of the doctoral research, the key findings are summarised, clinical implications are discussed, and future directions for research are suggested.

References


Towards an international framework for communication disorders: Use of the ICF. *Journal of Communication Disorders, 39*, 251-265.

Classifying communication disability using the ICF. *Advances in Speech-Language Pathology, 6*, 53-62.


*Social research methods: Qualitative and quantitative approaches*. Boston, MA: Pearson.


Retrieved from http://www.who.int/about/definition/en/print.html
PART 1: LITERATURE REVIEWS
Introduction to Part 1

In part 1 of this doctoral research, three reviews are presented (papers 1-3) to introduce key information and concepts guiding the development and implementation of subsequent research studies (papers 4-9).

The review in paper 1 examined the prevalence of communication impairment in Australia and issues associated with determining prevalence figures. The findings from five Australian studies published between 2001 and 2007 were presented. Since the publication of paper 1, another study investigating the prevalence of communication impairment in Australia has been published (Jessup, Ward, Cahill, & Keating, 2008).

Jessup et al. (2008) investigated the prevalence of speech and/or language impairment among 286 preschool children using teacher report (at two points of time), then compared teacher identification to direct assessment by speech-language pathologists (SLPs). Speech impairment was frequently identified by teachers (16.4% first administration; 13.6% three months later) as was language impairment (17.8%; 7.0%). However, the SLPs identified more of the 286 children with speech (14.7%) and/or language impairment (31.8%) following the direct assessment than the teachers had reported. This study shows the influence of data collection methods on prevalence figures, but confirms communication (speech and/or language) impairment as a common concern among Australian preschool children.

The reviews in papers 2 and 3 were invited contributions to special editions of journals, aimed at introducing and discussing the application of the International Classification of Functioning, Disability, and Health (ICF; WHO, 2001), and ICY – Children and Youth version (ICF-CY; WHO, 2007) to the field of speech-language pathology. The review in paper 2 described one component of the ICF (Body Function and Structures) and highlighted the importance of considering it in association with other components (particularly Activities and Participation) in order to provide holistic
management of communication and swallowing impairments. The review in paper 3 extended paper 2 by providing an overview of the way in which the ICF and ICF-CY can guide clinical practice with children who have speech impairment. In paper 3, the assessment and management of childhood speech impairment is described using all of the ICF (and ICF-CY) components. Taken together, the reviews presented in papers 1-3 justify the need for research investigating childhood speech impairment, and the need for a holistic framework to guide such research.

References


Paper 1

Communication impairment in Australian children: A review of prevalence studies.

COMMUNICATION IMPAIRMENT IN AUSTRALIAN CHILDREN

A review of recent prevalence studies
Jane McCormack

This article was peer reviewed

Information regarding the prevalence of communication disorders is important for planning and evaluating service delivery. Many studies have investigated the prevalence of communication disorders in Australia and throughout the world, with varying results. This article reviewed the most recent Australian research investigating prevalence rates in children, and found a range of estimates, from 0.12% (voice) to 20.8% (expressive language). Results varied according to the communication disorders being investigated, definition of disorders, mode of identification, age and number of participants.

The impact of communication disorders on the affected individual and significant others has been universally acknowledged. However, the impact at a population level is now receiving greater recognition. People are increasingly expected to be proficient communicators in employment and social activities. Therefore, as Byles (2005) pointed out, the impact of communication disorders will continue to grow and services will need to be more readily available and better equipped to address this. Law, Boyle, Harris, Harkness and Nye (2000) suggest prevalence data are important to enable the planning of service delivery and the evaluation of the impact of intervention. Prevalence refers to "the proportion of people in a defined population who have a particular condition at any one time" (Byles, 2005, p. 2).

Many studies have been conducted that investigated the prevalence of communication disorders in Australia and internationally. Law et al. (2000) provided a systematic review of the prevalence and natural history literature published between 1967 and May 1997. This review covered studies investigating "speech and language delays in children aged 16 years and younger in a general population" (p. 167) and found wide variation in reported rates. Median estimates of prevalence ranged from 2.02% to 19% for language delay only, and from 2.3% to 24.6% for speech delay only, while estimates of prevalence for speech and/or language delay ranged from 4.56% to 19% (Law et al., 2000). McCabe (2001) found similar variance in prevalence rates when she reviewed the literature in an attempt to answer the question "How many Australians have communication disorders?" She proposed that prevalence should be considered as occurring within a range (4%-33%), rather than a specific figure, due to the diversity of figures reported in the reviewed studies. However, the value of this information to assist service-delivery planning may be lessened by the lack of specificity.

Blum-Harasy and Rosenthal (1992) reviewed studies investigating prevalence and concluded that comparisons between studies are difficult due to differences in study design. Therefore, issues of study design need to be considered in further reviews of prevalence literature. This article provides a review of the most recent Australian research into the prevalence of childhood communication impairments in this country. The results vary from one study to the next (see Table 1). They are outlined in the following sections and differences are discussed in terms of the influence of a number of variables.

Table 1 Australian studies of prevalence of communication disorders published since 2000

<table>
<thead>
<tr>
<th>Authors, year</th>
<th>Classification</th>
<th>Prevalence</th>
<th>Age</th>
<th>Study design</th>
<th>No. of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Craig et al., 2002</td>
<td>Stuttering</td>
<td>0.72%; 1.44% for males aged 6-10 yrs</td>
<td>1-99 years</td>
<td>Telephone interview and tape-recording</td>
<td>12,131</td>
</tr>
<tr>
<td>Keating, Turrell</td>
<td>Talking, producing</td>
<td>1.7%; 7.4% for males aged 5 yrs</td>
<td>0-14 years</td>
<td>Parent report in face-to-face interview</td>
<td>12,388</td>
</tr>
<tr>
<td>&amp; Ozanne, 2001</td>
<td>sounds, stuttering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McKinnon, McLeod</td>
<td>Stuttering, voice and</td>
<td>0.33% stuttering, 0.12% voice, 1.06% speech</td>
<td>Kinder - Gr 6</td>
<td>Teacher report</td>
<td>10,425</td>
</tr>
<tr>
<td>&amp; Reilly, 2007</td>
<td>speech</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McLeod &amp;</td>
<td>Communication impairment</td>
<td>Approx 20%</td>
<td>4-5 years</td>
<td>Parent report</td>
<td>4,983</td>
</tr>
<tr>
<td>Harrison, 2006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McLeod &amp;</td>
<td>Communication impairment</td>
<td>20.8% expressive language, 15.7% receptive</td>
<td>4-5 years</td>
<td>Teacher report</td>
<td>3,276</td>
</tr>
<tr>
<td>Harrison, 2006</td>
<td></td>
<td>language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McLeod &amp;</td>
<td>Communication disorders</td>
<td>13.04% (wave 1); 12.40% (wave 2)</td>
<td>5-18 years</td>
<td>Teacher report</td>
<td>14,514 (wave 1);</td>
</tr>
<tr>
<td>McKinnon, 2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14,533 (wave 2)</td>
</tr>
</tbody>
</table>
Prevalence research: 2002–2007

Mode of identification

McLeod and Harrison (2006) analysed data from the Longitudinal Study of Australian Children (LSAC) project, which investigated a range of developmental issues in children aged between 4 and 5 years old (n = 4983). This project aims to examine the development and well-being of children in Australia and the impact of a range of social and cultural factors (Australian Institute of Family Studies, 2007). Data were obtained via parent interviews and teacher questionnaires. Approximately 24.4% of parents reported concerns about how their child talked and made speech sounds. When parents were asked to identify specific subtypes of communication impairment, 11.5% reported that their child’s speech was unclear to others. Parents also expressed concerns regarding other aspects of communication (such as understanding others, putting words together and finding words); however, these responses were not as frequent. Additionally, 20.8% of teachers (n = 3276) had concerns about children’s competency with expressive language, while 15.8% had concerns about competency with receptive language.

Okalidou and Kampanaros (2001) reported similar findings (14.4–18.7%) for teacher identification of communication impairment in kindergarten children in Greece. In contrast, Tomblin, Records, Buckwalter, Zhang, Smith, and O’Brien (1997) estimated a prevalence rate of 7.4% for specific language impairment among kindergarten children in America. This latter study incorporated a comprehensive assessment battery administered by speech-language pathologists.

Blum-Harasti and Rosenthal (1992) reported that questionnaires completed by parents and teachers usually result in lower prevalence being reported when compared with standardised assessments completed by trained examiners. There is little information to date about the consistency of parent/teacher reports with assessment of communication difficulty by a speech pathologist. There is also little information regarding whose identification should be considered the most valid. Wake and Reilly (2001) suggest parents may be “ill-equipped” to identify “more subtle problems” (p. 422). Therefore, results obtained by McLeod and Harrison (2006) are particularly high considering the mode of identification was through parent and teacher report.

However, theirs is not the only study to achieve high results using parent/teacher report as a mode of identification. McLeod and McKinnon (2007) also obtained a high rate when they investigated the prevalence of communication disorders compared with other learning needs, as identified by teachers. Data were collected in two waves, two years apart. The participants were students at all Catholic primary and secondary schools in one Sydney diocese (n = 14,514 in wave 1 and n = 14,533 in wave 2). Teachers were provided with definitions of the various areas of learning need, including information about various subtypes of communication impairment, and asked to identify needs. Direct assessments of the children by relevant professionals including speech pathologists followed these teacher recommendations. McLeod and McKinnon (2007) found “communication disorder” was the second most prevalent identified area of need, with 13.04% of children identified in wave 1 and 12.40% of children identified in wave 2. This was second only to specific learning difficulty (17.93%–1; 19.10% – 2) as an area of “learning need,” and was more prevalent than English as a second language, behavioural/emotional difficulties, early achievers/advanced learners, physical/medical disabilities, intellectual disabilities, hearing and vision impairments. Therefore, variables other than mode of identification may influence results.

Age and number of participants

McLeod and McKinnon (2007) did not provide data regarding the different prevalence rates of specific subtypes of communication impairment. However, they did report differences in prevalence according to grade/year level. They found that the highest prevalence of communication disorders was among children in years K–3 in wave 1, but in years 1, 7, 8 and 10 in wave 2. Blum-Harasti and Rosenthal (1992) suggested that rates of prevalence for communication impairment decrease as age increases. However, Law et al. (2000) reported “there is little evidence to suggest declining prevalence across the 0–16 year age range” (p. 179) and this is supported by findings from McLeod and McKinnon (2007).

Blum-Harasti and Rosenthal (1992) stated that lower prevalence figures are usually reported in large samples (i.e., greater than 3000 participants), and possibly relate to mode of identification. Yet McLeod and McKinnon (2007) reported a significant rate of prevalence with their large sample. It was, however, still well-below the prevalence estimates (ranging from 28.8% to 37.6%) given by Harasti and Reed (1994) for school-aged children with a communication impairment. Other factors that may contribute to findings therefore need to be considered.

Definition and types of communication impairment

McKinnon, McLeod and Reilly (2007) found low rates of prevalence when they asked teachers to report specific communication impairments. The participants in their study were all the children attending 36 primary schools in one Catholic diocese in Sydney (n = 10,425). Again, teachers were provided with definitions to assist their identification of specific subtypes of communication impairment and identified children were assessed by a SLF. They reported prevalence figures ranging from 0.12% for voice disorders and 0.33% for stuttering, through to 1.06% speech-sound disorders.

The relatively low prevalence rate for stuttering supports prior research findings and confirms it as one of the only impairments for which reported prevalence rates have been quite stable. Craig, Hancock, Tran, Craig and Peters (2002) conducted a recent epidemiological study of stuttering across the life-span, and found the prevalence of stuttering over the whole population to be 0.72% (n = 12,131). However, Craig et al. (2002) reported a higher prevalence in younger children – 1.4% among 2–5-year-olds and 1.44% among 6–10-year-old children. This is similar to the prevalence rate for stuttering obtained by McKinnon et al. (2007). It may be that an understanding of how stuttering is defined is relatively standard, and constant across the lifespan, which contributes to the stability of reported prevalence figures. However, Wake and Reilly (2001) identified the lack of clear, consistent definitions as a major flaw in the current prevalence research into communication impairments generally.

Duff, Proctor and Yairi (2004) obtained a higher prevalence rate for voice disorders in their research with a sample of American preschool children (n = 2445). In their study, agreement of two clinicians was required to identify children as having a voice disorder. They found 3.9% of the sample “presented with a voice disorder characterised by hoarseness” (p. 350). It may be that this definition of a voice disorder,
combined with the mode of identification, contributed to the higher prevalence reported.

The low prevalence of speech impairment found in the study by McKinnon et al. (2007) is outside the range (2.3% to 24.6%) found in the systematic review conducted by Law et al. (2001). It is also well below the estimates given by Harasty and Reed (1994) for school-aged children with a communication impairment (28.8% to 37.6%). However, Law et al. (2001) acknowledged the variability of figures provided in prevalence studies of speech delay, as being possibly greater than other communication disorders (i.e., language). This may be due to the different manifestations of speech impairment across the lifespan and dependent on the complexity of the speech task, and whether the definitions used in a study are sensitive enough to measure this. It is possible that McKinnon et al.’s (2007) findings were influenced by different definitions and different modes of identification compared to other studies.

Format/wording of questionnaires

Keating, Turrell and Ozanne (2001) found results similar to McKinnon et al. (2007) in a study utilising data from the 1995 Australian Health Survey for children aged 0-14 years (n = 12,388). This data were collected via face-to-face interviews with a responsible adult (usually a parent) and related to medical conditions that children were experiencing at the time of the interview. Parents were asked about specific conditions, then shown prompt cards with commonly occurring long-term conditions, including “speech impairment”. Those who responded positively were asked for additional information to clarify the nature of the speech difficulty. Results showed 1.7% of children reportedly had a childhood speech disorder, which was defined as “difficulties talking, producing speech sounds, or stammering” (Keating et al. 2001, p. 432). Keating et al. (2001) revealed a peak prevalence of 7.4% was reported for males at 5 years. The heightened prevalence of communication impairment among males is one of the few findings reported quite consistently among prevalence studies (Law et al., 2000).

The influence of mode of identification (parent/teacher report versus standardised assessment) and definition of communication impairment were discussed earlier. The wording of parent/teacher report measures relates to both these issues. Wake and Reilly (2001) show the possible influence of questioning/wording through example – fewer than 2% of parents agreed that their child had a “speech impairment” in the study by Keating et al. (2001). However, a greater percentage of parents may have identified concerns if this had been worded differently. For instance, McLeod and Harrison (2006) reported 24.4% of parents indicated concerns about “how their child talked and made speech sounds”. As Hutchison and Gordon (2004) stated, “The right questions must be asked in the right way” (p. 104).

Prevalence and risk factors

Recently a group of Australian researchers commenced a longitudinal study investigating the communication development of infants (n = 191); Reilly et al., 2006). At present, preliminary results have been released, which suggest early language skills (particularly gestures) may be the best predictors of later language ability. Performance was also linked to gender, twin birth and family history of speech and language difficulties. Thus the population and characteristics of children from which the prevalence data are obtained is another variable that may influence results. The study by Reilly et al. (2006) will undoubtedly contribute to future knowledge regarding prevalence of communication impairment and associated risk factors.

Conclusion

This review of recent research indicates that the investigation of prevalence of communication disorders in Australia is an ongoing study. There is a wealth of prevalence data, but currently no consensus regarding which is the most valid. A study that defines communication impairment in one way cannot be compared to another that uses a different definition. Similarly, generalisation of results cannot be made beyond the sample that is represented in a study. Indeed, “Generalization from any given study must be done in the most conservative way” (Blum-Harasty & Rosenthal, 1992, p. 75). Therefore, it appears that the speech pathology profession needs to arrive at a consensus regarding the definition of communication impairments and the most valid and reliable way of measuring this before any prevalence rates can be considered conclusive.

Acknowledgment

This research was supported by Australian Research Council Discovery Project DP0773978.

References


Jane McCormack is a speech-language pathologist who is currently undertaking her PhD at Charles Sturt University, Albury.

Correspondence to:
Jane McCormack
PhD student and Research Assistant
Charles Sturt University, PO Box 789
Albury, NSW 2640
phone: 02 6051 6835
email: jmccormack@csu.edu.au
The ICF Body Functions and Structures related to speech-language pathology

JANE MCCORMACK¹ & LINDA E. WORRALL²

¹Charles Sturt University, Australia, and ²The University of Queensland, Australia

Abstract

Body Functions and Body Structures form one component of the International Classification of Functioning, Disability and Health (ICF). Coding of items within these ICF chapters can be useful in speech-language pathology to provide a holistic overview of an individual’s condition, but only if this component is considered alongside the other components that make up the ICF. This paper outlines the Body Functions and Body Structures codes that are most relevant to speech-language pathology and discusses the overlap that occurs with the Activities and Participation component. A review of the strengths and limitations of the ICF Body Structures and Body Functions components is also presented.

Keywords: ICF, World Health Organization, Body Functions, Body Structures, speech-language pathology.

Introduction

The definition and measurement of health and disability is a difficult task. The World Health Organization (2001) has provided health professionals and consumers with a system by which they can begin this task with the development of the International Classification of Functioning, Disability and Health (ICF). The ICF allows for the documentation of the impact of health conditions on human functioning from the biological, individual and societal perspectives (Reed et al., 2005). According to the ICF framework, a person may experience difficulty communicating or swallowing due to impairment of body function or body structure, activity limitations or participation restrictions, barriers in the physical, social and attitudinal environment and/or barriers specific to the individual patient (McCoey-O’Halloran, Worrall, & Hickson, 2004). This article focuses on the level of Body Functions and Body Structures. The purpose of this paper is to provide speech-language pathologists with a description of impairment codes relevant to their work with adult clients presenting with a range of communication and/or swallowing disorders.

A review of the Body Functions and Body Structures components

The ICF is arranged in a hierarchy. Body Functions and Body Structures form one component of the Functioning and Disability part of the ICF (the other component being Activities and Participation). In the ICF, Body Functions are defined as “the physiological functions of body systems (including psychological functions)”, while Body Structures are defined as “anatomical parts of the body such as organs, limbs and their components” (WHO, 2001, p. 12).

Body Functions and Body Structures are organized into chapters, according to body systems. There is direct correspondence between the eight chapters covering Body Functions and the eight covering Body Structures (see Table I). These chapters contain domains, which “are further grouped according to common characteristics (such as origin, type, or similarity) and ordered in a meaningful way” (WHO, 2001, p. 21).

A problem in body function or body structure is termed an “impairment”. According to the ICF (WHO, 2001), an impairment can involve anomaly, defect, loss, or other significant deviation (from certain generally accepted population standards). The impairment may be temporary or permanent; progressive, regressive or static; intermittent or continuous. It may be slight or severe and may fluctuate over time.

WHO states that qualifiers must be used whenever assigning ICF codes. Qualifiers are numeric codes that indicate the nature and extent of impairments to body functions and structures. Without these, ICF Body Functions and Body Structures domain codes
have no inherent significance—they merely serve to identify specific structures and systems within the body. Qualifiers for Body Functions and Body Structures are presented in Table II. The generic first qualifier indicates the severity of the impairment, while the second qualifier (for Body Structures only) classifies the nature of the change in the respective body structure. A third qualifier has been proposed to indicate localization of the impairment. An example of classification using the ICF is presented in Table III for speech difficulty arising from ankyloglossia, often referred to as “tongue tie”. In ankyloglossia, the lingual frenulum is attached anteriorly and may also be very short resulting in restricted tongue tip movement.

The hierarchical structure of this classification system enables a speech-language pathologist to choose the level of information they require depending on the purpose and audience. For instance, clinicians may wish to communicate concepts to

Table I. Major classifications of Body Functions and Body Structures (WHO, 2001).

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Body Functions</th>
<th>Body Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mental functions</td>
<td>Structures of the nervous system</td>
</tr>
<tr>
<td>2</td>
<td>Sensory functions and pain</td>
<td>The eye, ear and related structures</td>
</tr>
<tr>
<td>3</td>
<td>Voice and speech functions</td>
<td>Structures involved in voice and speech</td>
</tr>
<tr>
<td>4</td>
<td>Functions of the cardiovascular, haematological, immunological and respiratory systems</td>
<td>Structures of the cardiovascular, immunological and respiratory systems</td>
</tr>
<tr>
<td>5</td>
<td>Functions of the digestive, metabolic and endocrine systems</td>
<td>Structures related to the digestive, metabolic and endocrine systems</td>
</tr>
<tr>
<td>6</td>
<td>Genitourinary and reproductive functions</td>
<td>Structures related to the genitourinary and reproductive systems</td>
</tr>
<tr>
<td>7</td>
<td>Neuromusculoskeletal and movement-related functions</td>
<td>Structures related to movement</td>
</tr>
<tr>
<td>8</td>
<td>Functions of the skin and related structures</td>
<td>Skin and related structures</td>
</tr>
</tbody>
</table>

Table II. Qualifiers used to indicate nature and extent of impairment (WHO, 2001).

<table>
<thead>
<tr>
<th>Qualifier</th>
<th>Body Functions</th>
<th>Body Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Used to indicate the extent or magnitude of impairment</td>
<td>Used to indicate the extent or magnitude of impairment</td>
</tr>
<tr>
<td>0 – no problem</td>
<td>0 – no problem</td>
<td></td>
</tr>
<tr>
<td>1 – mild problem</td>
<td>1 – mild problem</td>
<td></td>
</tr>
<tr>
<td>2 – moderate problem</td>
<td>2 – moderate problem</td>
<td></td>
</tr>
<tr>
<td>3 – severe problem</td>
<td>3 – severe problem</td>
<td></td>
</tr>
<tr>
<td>4 – complete problem</td>
<td>4 – complete problem</td>
<td></td>
</tr>
<tr>
<td>8 – not specified</td>
<td>8 – not specified</td>
<td></td>
</tr>
<tr>
<td>9 – not applicable</td>
<td>9 – not applicable</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd</th>
<th>None</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Used to indicate the nature of change in the respective body structure</td>
<td></td>
</tr>
<tr>
<td>0 – no change in structure</td>
<td>0 – no change in structure</td>
<td></td>
</tr>
<tr>
<td>1 – total absence</td>
<td>1 – total absence</td>
<td></td>
</tr>
<tr>
<td>2 – partial absence</td>
<td>2 – partial absence</td>
<td></td>
</tr>
<tr>
<td>3 – additional part</td>
<td>3 – additional part</td>
<td></td>
</tr>
<tr>
<td>4 – aberrant dimensions</td>
<td>4 – aberrant dimensions</td>
<td></td>
</tr>
<tr>
<td>5 – discontinuity</td>
<td>5 – discontinuity</td>
<td></td>
</tr>
<tr>
<td>6 – deviating position</td>
<td>6 – deviating position</td>
<td></td>
</tr>
<tr>
<td>7 – qualitative change in structure, including accumulation of fluid</td>
<td>7 – qualitative change in structure, including accumulation of fluid</td>
<td></td>
</tr>
<tr>
<td>8 – not specified</td>
<td>8 – not specified</td>
<td></td>
</tr>
<tr>
<td>9 – not applicable</td>
<td>9 – not applicable</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Suggested 3rd</th>
<th>None</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To be developed to indicate localization</td>
<td></td>
</tr>
<tr>
<td>0 – more than one region</td>
<td>0 – more than one region</td>
<td></td>
</tr>
<tr>
<td>1 – right</td>
<td>1 – right</td>
<td></td>
</tr>
<tr>
<td>2 – left</td>
<td>2 – left</td>
<td></td>
</tr>
<tr>
<td>3 – both sides</td>
<td>3 – both sides</td>
<td></td>
</tr>
<tr>
<td>4 – front</td>
<td>4 – front</td>
<td></td>
</tr>
<tr>
<td>5 – back</td>
<td>5 – back</td>
<td></td>
</tr>
<tr>
<td>6 – proximal</td>
<td>6 – proximal</td>
<td></td>
</tr>
<tr>
<td>7 – distal</td>
<td>7 – distal</td>
<td></td>
</tr>
<tr>
<td>8 – not specified</td>
<td>8 – not specified</td>
<td></td>
</tr>
<tr>
<td>9 – not applicable</td>
<td>9 – not applicable</td>
<td></td>
</tr>
</tbody>
</table>
Table III. Classification of speech difficulty arising from ankyloglossia (tongue tie) according to the ICF.

<table>
<thead>
<tr>
<th>Part 1 →</th>
<th>Component →</th>
<th>Chapter →</th>
<th>Domain →</th>
<th>Qualifier →</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functioning and Disability</td>
<td>Body Functions</td>
<td>3. Voice and speech functions</td>
<td>b320 Articulation functions</td>
<td>b320.1 Mild impairment (e.g., speech sound disorder)</td>
</tr>
<tr>
<td></td>
<td>Body Structures</td>
<td>3. Structures involved in voice and speech</td>
<td>b3203 Tongue</td>
<td>b3203.23 Moderate, additional part (e.g., ankyloglossia)</td>
</tr>
</tbody>
</table>

another stakeholder in the therapy group (e.g., another discipline) or to document a baseline condition for comparative purposes when evaluating outcomes.

This paper focuses on the Body Functions and Body Structures component; however it needs to be stated that these should not be used in isolation from the other components that form the ICF. The overlap between these components is addressed in more detail later in the paper.

**Impairment codes relevant to speech-language pathologists**

A reported purpose behind the development of the ICF was the need for holistic consideration of people with disabilities. A number of authors have documented the body functions and body structures that may be affected in clients who present with communication and/or swallowing difficulties (cf. Eadie, 2001; McLeod, 2006; Simeonsson, 2003; Washington, 2007). Further information can also be found in the special issue of *Seminars in Speech and Language* dedicated to use of the ICF in describing the major types of communication and swallowing disorders (Ma, Worrall, & Threats, 2007). These authors suggest speech-language pathologists need to consider domains associated with almost all the body systems in order to consider clients holistically. For instance, in the Body Structures component, “Structures involved in voice and speech” is an obvious consideration. However, structures of the nervous system, eye and ear, cardiovascular and respiratory systems, digestive system, and structures related to movement and to the skin have all been proposed as additional domains to take into account. Many of these other body systems may not have such an obvious connection to speech-language pathology, but are important considerations for a range of communication (e.g., dysphonia, dysphasia, neuromuscular disorders) and swallowing disorders. Additionally, an impairment in any of these body systems and/or structures may correlate with a client’s motivation, access to and success in therapy.

Speech-language pathologists should look beyond what may appear to be the obvious Body Functions and Body Structures codes, those which seem to naturally “belong” to us. For example, a person with aphasia being encouraged to read facial and hand gestures might have difficulty with “Visual perception” (b1561) and thus find this type of non-verbal communication to be difficult. Or an individual being taught to use an augmentative communication device might have difficulty with “Quality of psychomotor functions” (b1471), and consequently would experience great difficulty with this therapy approach. Furthermore, individuals with an impairment of “Sensory functions related to temperature and other stimuli” (b270), “Involuntary movement functions” (b765) or “Structure of the oesophagus” (s520) may experience a restriction in their swallowing ability. The *ICF Children and Youth* (ICF-CY; WHO, 2007) provides additional codes specific to children.

Stucki, Ewert and Cieza (2002) suggest a need for core sets of codes to address the challenge of using the ICF in clinical practice. They suggest the challenge is in determining the least number of domains to be practical, but as many as required to gather adequate information. Furthermore, Stucki et al. (2002) have suggested it might be most practical “to link specific conditions or diseases to salient ICF domains of functioning” (p. 281). A range of common communication and swallowing difficulties are presented in Table IV with the most salient codes from the ICF components of Body Functions and Body Structures. However, it must be noted that this list is not exhaustive, nor has it been subjected to the broader consultation and research that Stucki et al. (2002) intended. As such, the codes in Table IV function as a guide for consideration and further discussion, rather than a “core-set” that has been empirically derived.

There are obviously links between given Body Functions and Body Structures chapters. The Body Structures chapter entitled “Structures involved in voice and speech” (s3) is related to Body Functions chapter “Voice and speech functions” (b3), as well as specific Body Functions codes relating to digestive functions in a disorder such as cleft lip/palate, these structure codes directly cause given impairments in body function. Similarly, impairments in Body Structures chapter “Structures of the eye, ear and related structures” (s2) may be associated with Body Functions chapters “Sensory functions and pain” (b2) and “Voice and speech functions” (b3), as occurs with such disorders as otitis media. Impairments of “Structures of the nervous system” (s1) may be associated with impairments in many Body Functions, but particularly “Mental functions” (b1) such as occurs with aphasia and acquired brain
Table IV. Common communication and swallowing difficulties with salient ICF codes.

<table>
<thead>
<tr>
<th>Presenting difficulty</th>
<th>Impaired body structures</th>
<th>ICF code</th>
<th>Possible impaired body functions</th>
<th>ICF code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleft lip/palate</td>
<td>Structure of nose (external nose, nasal septum)</td>
<td>s310</td>
<td>Quality of voice</td>
<td>b3101</td>
</tr>
<tr>
<td></td>
<td>Structure of mouth (gums, palate, lips)</td>
<td>s320</td>
<td>Articulation functions</td>
<td>b320</td>
</tr>
<tr>
<td></td>
<td>Structure of pharynx (nasal, oral)</td>
<td>s330</td>
<td>Production of notes</td>
<td>b3400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sucking</td>
<td>b5100</td>
</tr>
<tr>
<td>Ankyloglossia (tongue tie)</td>
<td>Structure of the tongue</td>
<td>s3203</td>
<td>Articulation functions</td>
<td>b320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sucking</td>
<td>b5100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Manipulation of food in the mouth</td>
<td>b5103</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Oral swallowing</td>
<td>b5105</td>
</tr>
<tr>
<td>Vocal nodules</td>
<td>Structure of vocal folds</td>
<td>s3400</td>
<td>Voice functions</td>
<td>b310</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respiration functions</td>
<td>b440</td>
</tr>
<tr>
<td>Otitis Media</td>
<td>Structure of the middle ear</td>
<td>s250</td>
<td>Perceptual functions (auditory functions)</td>
<td>b156</td>
</tr>
<tr>
<td></td>
<td>(Eustachian canal, tympanic membrane)</td>
<td></td>
<td>Hearing functions (sound detection, discrimination,</td>
<td>b230</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>localization of sound/source, speech discrimination)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aural pressure</td>
<td>b2405</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Articulation functions</td>
<td>b320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Melody of speech</td>
<td>b3303</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Production of notes</td>
<td>b3400</td>
</tr>
<tr>
<td>Sensorineural hearing loss</td>
<td>Structure of inner ear</td>
<td>s260</td>
<td>Perceptual functions (auditory functions)</td>
<td>b156</td>
</tr>
<tr>
<td></td>
<td>Structure of brain</td>
<td>s110</td>
<td>Hearing functions (sound detection, discrimination,</td>
<td>b230</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>localization of sound/source, speech discrimination)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Articulation functions</td>
<td>b320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Melody of speech</td>
<td>b3303</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Production of notes</td>
<td>b3400</td>
</tr>
<tr>
<td>Multiple Sclerosis</td>
<td>Structure of brain</td>
<td>s110</td>
<td>Higher level cognitive functions</td>
<td>b164</td>
</tr>
<tr>
<td></td>
<td>Structure of spinal cord</td>
<td>s120</td>
<td>Seeing functions</td>
<td>b210</td>
</tr>
<tr>
<td></td>
<td>Structure of meninges</td>
<td>s130</td>
<td>Hearing functions</td>
<td>b230</td>
</tr>
<tr>
<td></td>
<td>Structure of the immune system</td>
<td>s420</td>
<td>Articulation functions</td>
<td>b320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ingestion functions</td>
<td>b510</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control of voluntary movement functions</td>
<td>b760</td>
</tr>
<tr>
<td>Parkinson’s Disease</td>
<td>Structure of brain</td>
<td>s110</td>
<td>Mental functions of language</td>
<td>b167</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Voice functions</td>
<td>b310</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Articulation functions</td>
<td>b320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fluency and rhythm of speech functions</td>
<td>b330</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respiration functions</td>
<td>b440</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respiratory muscle functions</td>
<td>b445</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ingestion functions (sucking, chewing, manipulating food,</td>
<td>b510</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>swallowing)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control of voluntary movement functions</td>
<td>b760</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Involuntary movement functions</td>
<td>b765</td>
</tr>
<tr>
<td>Acquired Brain Injury</td>
<td>Structure of brain</td>
<td>s110</td>
<td>Mental functions (intellectual functions, temperament/</td>
<td>b1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>personality functions, attention, memory, thought</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>functions, attention, memory, thought functions,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>higher level cognitive functions)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hearing functions</td>
<td>b230</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Voice functions</td>
<td>b310</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Articulation functions</td>
<td>b320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respiration functions</td>
<td>b440</td>
</tr>
</tbody>
</table>

(continued)
Table IV. (Continued).

<table>
<thead>
<tr>
<th>Presenting difficulty</th>
<th>Impaired body structures</th>
<th>ICF code</th>
<th>Possible impaired body functions</th>
<th>ICF code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer of the larynx</td>
<td>Structure of larynx</td>
<td>s340</td>
<td>Voice functions</td>
<td>b310</td>
</tr>
<tr>
<td></td>
<td>Structure of the respiratory system</td>
<td>s430</td>
<td>Respiration functions</td>
<td>b440</td>
</tr>
<tr>
<td></td>
<td>Structure of head and neck region (bones, muscles, joints of head and neck)</td>
<td>s710</td>
<td>Fluency and rhythm of speech functions</td>
<td>b330</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alternative vocalization functions</td>
<td>b340</td>
</tr>
<tr>
<td>Aphasia</td>
<td>Structure of the brain</td>
<td>s110</td>
<td>Mental functions of language</td>
<td>b167</td>
</tr>
<tr>
<td>Developmental stuttering</td>
<td>Unknown</td>
<td></td>
<td>Expression of spoken language</td>
<td>b16710</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mental functions of sequencing complex movements</td>
<td>b176</td>
</tr>
<tr>
<td>Speech impairment of unknown origin</td>
<td>Unknown</td>
<td></td>
<td>Fluency and rhythm of speech functions</td>
<td>b330</td>
</tr>
<tr>
<td>Specific Language Impairment</td>
<td>Structure of the brain</td>
<td>s110</td>
<td>Mental functions of language</td>
<td>b167</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>Structure of the brain</td>
<td>s110</td>
<td>Mental functions of sequencing complex movements</td>
<td>b176</td>
</tr>
<tr>
<td></td>
<td>Structure of the sympathetic nervous system</td>
<td>s140</td>
<td>Ingestion functions (sucking, biting, chewing, manipulating food, salivation, swallowing)</td>
<td>b510</td>
</tr>
<tr>
<td></td>
<td>Structure of the parasympathetic nervous system</td>
<td>s150</td>
<td>Sensory functions related to temperature and other stimuli</td>
<td>b270</td>
</tr>
<tr>
<td></td>
<td>Pharynx</td>
<td>s320</td>
<td>Mobility of bone functions</td>
<td>b720</td>
</tr>
<tr>
<td></td>
<td>Larynx</td>
<td>s330</td>
<td>Muscle power functions</td>
<td>b730</td>
</tr>
<tr>
<td></td>
<td>Structure of salivary glands</td>
<td>s340</td>
<td>Muscle tone functions</td>
<td>b735</td>
</tr>
<tr>
<td></td>
<td>Structure of oesophagus</td>
<td>s510</td>
<td>Muscle endurance functions</td>
<td>b740</td>
</tr>
<tr>
<td></td>
<td>Structure of head and neck region (bones, muscles, joints of head and neck)</td>
<td>s710</td>
<td>Motor reflex functions</td>
<td>b750</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Involuntary movement reaction functions</td>
<td>b755</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control of voluntary movement functions</td>
<td>b760</td>
</tr>
<tr>
<td>Autism</td>
<td>Unknown</td>
<td></td>
<td>Global psychosocial functions</td>
<td>b122</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shifting attention</td>
<td>b1401</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Appropriateness of emotion</td>
<td>b1520</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Perceptual functions</td>
<td>b156</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mental functions of language</td>
<td>b167</td>
</tr>
</tbody>
</table>

injury, and “Neuromusculoskeletal and movement-related functions” (b7) such as occurs with dysphagia and dysarthria.

**Interaction between Body Functions/Structures and Activities/Participation**

Speech-language pathologists have traditionally focused assessment and intervention plans at the level of Body Functions and Body Structures because this component is more concrete and easier to test objectively, than other components (Eadie et al., 2006; McCooey et al., 2004; McLeod, 2004). This focus on the level of the “impairment” has its basis in the medical model, which views disability as a problem of the individual, caused by a health condition and requiring treatment by professionals (Reed et al., 2005). In contrast, the ICF recognizes that functioning and disability are multifaceted and result from “an interaction or complex relationship between the health condition and contextual factors (i.e., environmental or personal factors)” (WHO, 2001, p. 19). Consequently, the Body Functions and Body Structures component cannot be considered in isolation from the other components that comprise the ICF.

Body Functions and Body Structures are the building blocks upon which communication is based. To produce spoken communication, oral and laryngeal structures are required and a base level of functioning of the respiratory, laryngeal, and articulatory systems. To produce writing, structures relating to movements are necessary and a degree of functioning to enable specific movements. The language components of syntax, semantics, phonology, and morphology function in association with
these to produce communication. Yet, even with all of these structures and functions present and unimpaired, an individual may not be a successful communicator. Conversely, an impairment of structure (e.g., partial glossectomy) or function (e.g., agrammatism) may exist and yet the individual still be able to communicate.

Individuals with communication and/or swallowing impairments participate in society (McLeod, 2004). However, the type and extent of the impairment may restrict this participation. Thus, according to WHO (2001), “in ICF the Body Functions and Structures classification is intended to be used along with the Activities and Participation categories” (p. 13).

The environment in which individuals participate may act as a barrier or facilitator to participation with Body Functions impairments so need to be considered as well (Threats, 2007). For example, a person with a voice impairment may not be able to communicate at her job if it is a noisy environment. Personal factors that exist before the health condition are also a major influence on the functioning and disability of a person. One person may react to a mild dysarthria with embarrassment and withdraw, while another person with moderate dysarthria may be as sociable as ever. Indeed, Threats (2000) suggests that understanding the relationships between all the ICF components will lead to the most appropriate management of individuals with communication and swallowing disorders.

Clinicians are well aware of the individuality of clients. They understand that each comes from a different background, participates in a different environmental context and engages in different activities within those contexts. Yet this knowledge does not always form an explicit part of planning client management. This may be due to the limited availability of tools relevant to speech-language pathology to explore some of the ICF components, such as Activities and Participation (Eadie et al., 2006) and a lack of understanding about the relationship between all the ICF components. Simeonsson et al. (2003) believe that the ICF can contribute to the development of assessments by specifying variables that could be items on questionnaires and scales to document the type and extent of impairments and their impact on functioning and participation.

Simeonsson (2003) suggested that using the ICF components of Body Functions and Structures as a framework can provide useful diagnostic information. It encourages clinicians to consider communication and swallowing disorders in terms of how they relate to a range of body structures and functions, rather than focus solely on the obvious considerations. But when developing intervention plans and evaluating treatment effects, this information may be most useful when considered in association with functional abilities and limitations (Lollar & Simeonsson, 2005; Reed et al., 2005). Simmons-Mackie (2004) argues that “funding sources and public policy makers will look for practical effects of interventions regardless of the specific target of intervention. Thus reports of outcomes of impairment level intervention... will likely be tied to activity and participation level outcomes” (p. 67).

When determining eligibility for services, impairments of body functions and structures are usually considered alongside restrictions of participation (Simeonsson et al., 2003). It has further been suggested that identifying individuals on the basis of functional profiles rather than diagnosis can be important in order to avoid labels, which have the potential to become barriers to intervention, such as in the education system (Simeonsson, 2003). For example, McLeod (2006) reported on a child with a severe speech impairment who was ineligible for speech pathology services at school, as the criteria for funding required that language skills be also affected. As the child was not language-impaired, he was precluded from further consideration. However, looking at the effect that an impairment of articulation (b320) would have on Activities and Participation codes dealing with conversation, it is clear that a severe speech impairment could have more of an effect than a mild language disorder. Hence, diagnosis or labelling was not useful for this child and acted as a barrier to intervention because only a limited set of Body Functions impairments was used as the criterion for eligibility for speech-language services.

Strengths and limitations of the Body Functions and Body Structures components

Proposed uses versus practicality

Researchers stress that the ICF is not in itself an assessment or intervention tool, but a classification system (Reed et al., 2005; Threats, 2006; Threats & Worrall, 2004). Translating this into a usable clinical system is a challenge (Reed et al., 2005). The WHO (2001) acknowledges that “use of ICF will largely depend on its practical utility” (p. 250).

A range of uses for the ICF within the clinical setting have been proposed including history taking, assessments, treatment plans, rehabilitation, outcome evaluation and transfer (Heerkens et al., 2003; Stucki et al., 2002; Üstün et al., 2003). For instance, the Body Functions and Body Structures component could be useful in guiding clinical assessments; however, before this can occur there is a need for tools and procedures that can assess the characteristics classified by the system. While tools are available to assess domains within Body Functions and Body Structures, at present, no single complete measure is available so clinicians need to administer multiple assessments. There has been discussion regarding the possibility of mapping
existing instruments to the ICF but there is rarely exact correspondence between instruments and the ICF codes (Reed et al., 2005).

Üstün et al. (2003) suggest the use of the ICF in identification and monitoring of effectiveness of intervention will be particularly useful for payers and providers of rehabilitation services. While this is most likely to be at the Activities and Participation level, changes in the qualifiers attached to Body Functions or Body Structures codes from pre- to post-treatment could provide evidence of treatment efficacy, especially if these changes resulted in increased independence and/or quality of life.

Threats (2006) has suggested another potential advantage of the ICF could lie in its capacity as a tool to accurately estimate the prevalence and incidence of communication (and swallowing) disorders. Use of ICF terminology to describe impairments in body functions and structures could also aid prevalence research in increasing the accuracy of identification through improving consistency of definitions for functions such as “Articulation functions” (b320) and “Quality of voice” (b3101). Details of “inclusions” and “exclusions” in the ICF may assist users to apply the appropriate codes.

Hierarchical Structure versus “Sheer Magnitude”

The ICF is a large, detailed system. As Simmons-Mackie (2004) states, “A significant advantage and simultaneously a limitation of the ICF coding system is its sheer magnitude” (p. 68). With codes for 1424 items (WHO, 2001), clinical use of the ICF in its entirety appears to be a daunting and impractical task. Lollar and Simeonsson (2005) state, “Most clinicians . . . clearly do not have the time or resources to carry out such pervasive coding” (p. 329). They suggest clinicians need to prioritize what information to collect, hence the development of “core-sets” (Stucki et al., 2002).

A strength of the ICF lies in its organization, particularly in relation to the Body Functions and Body Structures components. Due to the hierarchical structure, users can determine the level of detail they require depending on the purpose and audience. When prioritizing goals in a multidisciplinary setting, for example, a client’s condition may be best considered in the broad terms afforded by the major classification level such as “Structures involved in voice and speech” (s3). However, when planning discipline-specific goals, a more detailed classification level such as “Structures of the mouth” (s320) or even more specifically, “Structure of the hard palate” (s32020) would be appropriate. Similarly, when reporting outcomes, use of the detailed classifications may result in a more sensitive representation of progress, although Simmons-Mackie (2004) has questioned whether the coding system, particularly the qualifiers, will be sensitive enough to capture these changes in clients.

Universality versus Ambiguity

Researchers acknowledge that the ICF is likely to become an important document in healthcare throughout the world. This is essentially due to the development of its common framework and terminology, that can be used to provide internationally and transdisciplinary comparable information regarding health and disability (Eadie, 2001; Simeonsson, 2003; Threats, 2006; Üstün et al., 2003). For instance, the codes to describe “Structure of the vocal folds” (s340) or “Hearing functions” (b230) remain the same regardless of the country or discipline in which the ICF is used.

However, according to some authors, users of the ICF may experience some difficulty interpreting codes, due to the use of vague or broad terminology or ambiguity and overlap (Reed et al., 2005; Threats & Worrall, 2004). For instance, Threats (2007) suggests there may be confusion about items in Body Functions (Mental Functions chapter) and those in Personal Factors (e.g., “openness to experience”, “optimism”, “confidence”, “extraversion”, “motivation”). He states “These characteristics are only classified as Body Functions impairments when their limitation is considered pathological” (Threats, 2007, p. 69). Hence the same construct may be coded as a Personal Factors code or a Body Functions code depending upon whether it existed prior to the health condition or whether it is pathological. Thus there is a need to determine whether the personality characteristic existed before the onset of the disorder. This is particularly difficult to determine in developmental disability when the occurrence of the health condition was at birth.

Other researchers (Campbell & Skarakis-Doyle, 2007; Reed et al., 2005) report that it may be difficult to distinguish between certain codes in Body Functions and in Activities and Participation, despite conceptual differences (e.g., “attention” and “thought” functions as distinct from activities of “focusing attention” and “thinking”). Although one relates to whether a body part functions correctly and the other to whether an activity can be performed, they would be assessed using the same set of procedures and cannot be distinguished clinically (Reed et al., 2005).

In the case of particular disorders, there is confusion whether “impaired” body functions and structures should be coded as those with which an individual presents or those that underlie the condition. For instance, in the case of communication and swallowing difficulties following stroke, some may argue that the structure of the brain (s110) is impaired and this causes the symptoms. However, others may argue that it is more functional to consider the impaired Body Functions and Body Structures as those associated with the presenting symptoms. In this instance, the impaired functions may be those associated with voice (b310) and
articulation (b320), mental functions of language (b167), respiration (b440), ingestion (b510), and movement (b750). It is this latter definition that is supported in the forthcoming joint publication by the American Psychological Association and the World Health Organization the Procedural Manual and Guide for the Standardized Use of the ICF: A Manual for Health Professionals (forthcoming).

Furthermore, there may be confusion about the ICF component in which an item not currently coded may belong. For example, it could be argued that “intelligibility” be coded as a body function, in a similar way to “quality of voice” (b3101), as an indicator of functioning. Thus, unintelligibility would be considered an impairment of body function. However, others may argue that it be coded in the Activities and Participation component, and unintelligibility would thus be considered an activity limitation. In order to ensure consistent, reliable and valid use of the system across the profession, training and practice will be required (Heerkens et al., 2003; Reed et al., 2005; Threats & Worrall, 2004). The Procedural Manual and Guide for the Standardized Use of the ICF: A Manual for Health Professionals (forthcoming) states that intelligibility be considered a Body Functions rather than an Activity level code.

Holistic consideration versus Individual Participation

Ustün et al. (2003) propose that one strength of the ICF is its movement away from disease-based classification to one that focuses on “health”. However, consideration of the Body Functions and Structures component in isolation does not achieve this shift in focus from the “impairment” level. It is only through consideration and use of the ICF in its entirety, that the functional implications of the impairment are considered according to the environmental and personal context in which an individual participates (Campbell & Skarakis-Doyle, 2007).

Thus the ICF may be valuable in guiding clinicians to consider all body functions and body structures (rather than solely those with the most obvious connection to communication and/or swallowing), but also encourages holistic consideration of individual clients through use of the other components. Furthermore, the ICF stipulates that client’s needs and wishes are considered (Threats, 2006). In the ICF, in Annex 6 entitled “Ethical guidelines for the use of the ICF”, it is recommended that wherever possible the individual whose functioning is being classified should have the opportunity to participate in this classification. Yet, it has been claimed that the codes are “so difficult to understand, they are inaccessible to those not trained in their use” (Duchan, 2004, p. 65). For instance, “Production of voice” (b50100) is defined as “functions of the production of sound made through coordination of the larynx and surrounding muscles with the respiratory system” (WHO, 2001, p. 71).

Basing codes on “sophisticated” “expert” or “professional” ratings and/or definitions (Reed et al., 2005; Simmons-Mackie, 2004) creates another barrier for people with disabilities.

In Annex 6 of the ICF it is recommended that clinicians should explain to clients and/or their advocates the purpose of using the ICF, invite their questions and encourage their input in the classification. Thus, the onus is on the clinician to explain unfamiliar or professional terms, in an attempt to minimize the distance between professional judgement and the persons’ own views.

Summary

The ICF is a classification system, and while it provides speech-language pathologists with a holistic system by which to classify clients, this will only happen if it is used in its entirety. Focusing on the level of the impairment (i.e., considering only Body Functions and Body Structures) fails to acknowledge the full range of difficulties that may be experienced by individuals with communication and or swallowing disorders. However, considering the interactions of Body Functions and Body Structures with Activities and Participation, Environmental Factors, and Personal Factors could result in greater understanding of the many factors that contribute to health and the impact of health on life functioning. This would be an expansion of clinical thinking and an advance for the field. However, there are limitations to the practicality of the ICF in its current form and these limitations need to be addressed in the clinical and research literature and by the professional and advocacy communities.

Acknowledgment

Jane McCormack’s involvement in this research was supported by Australian Research Council Discovery Project DP0773978.

References


Paper 3

Application of the ICF and ICF-CY to children with speech impairment

Application of the ICF and ICF–Children and Youth in Children with Speech Impairment

Sharynne McLeod, Ph.D., and Jane McCormack, B.Hlth.Sc. (Sp.Path) (Hons)

ABSTRACT

Children with speech impairment form a significant part of many speech language pathology caseloads. Traditionally, assessment and intervention with these children has focused on the level of the impairment. However, the World Health Organization’s International Classification of Functioning, Disability and Health (ICF) and ICF– version for Children and Youth provide a framework by which such children can be managed in an holistic manner, with due consideration given to the body structures and functions affected by their impairment, as well as the impact on children’s activities and participation. The ICF acknowledges the individuality of each child with a speech impairment, through consideration of barriers and facilitators stemming from environmental and personal factors. In this article, assessment and intervention for speech impairment is described using each component of the ICF. A case study illustrating the use of the ICF with a child who has a speech impairment is provided.

KEYWORDS: Articulation, phonology, ICF, ICF-CY, World Health Organization, assessment, intervention, children

Learning Outcomes: As a result of this activity, the reader will be able to describe the application of the components of the ICF and ICF-CY to children with speech impairment (also called articulation/phonology/speech sound disorder).

Speech impairment is a subcategory of communication impairment and includes speech sound impairment, articulation delay, phonological disorder, and childhood apraxia of speech. Children with speech impairment may only have a mild impairment (e.g., an interdental lisp) or they may have completely unintelligible speech. When assessing children to determine whether they have a speech impairment, speech-language pathologists (SLPs)
typically consider the speech sounds the child can produce (phonetic ability); the accuracy of the speech sounds with respect to the language they are speaking (phonological ability); the child's ability to combine sounds (phonotactic ability); and the child's ability to produce appropriate intonation, stress, and rhythm (prosodic ability). In addition, the child's ability to hear and interpret speech sounds as well as his or her ability to store and retrieve phonetic, phonological, and motor programming information is considered.\(^1,2\) Children may have difficulty with some or all of these components to be identified as having a speech impairment. Intervention programs typically aim to increase intelligibility and reduce the occurrence of mismatches with the adult target. Intervention for children with speech impairment has been found to be effective via a range of levels of evidence, including randomized controlled trials.\(^3\)

**DESCRIPTION OF CHILDREN WITH SPEECH IMPAIRMENT**

The World Health Organization's International Classification of Functioning, Disability and Health (ICF) as well as the derived version for Children and Youth (ICF-CY) released in 2007,\(^4\) provide several components to ensure holistic understanding of people in context. Application of the ICF and ICF-CY to children with speech impairment requires consideration of every component: Body Functions, Body Structures, Activities and Participation, Environmental Factors, and Personal Factors.\(^5,6\) Table 1 provides a summary of the components and domains that are most applicable to children with speech impairment. However, it should be noted that communication affects all aspects of a child's life, so codes other than those listed in Table 1 may also be applicable in some cases.

**Speech Impairment**

**BODY STRUCTURES**

SLPs initially consider children with suspected speech impairment at the level of Body Structures. For some children, an impairment in body structures is the origin of their speech difficulties; this may include structures of the ear (e.g., malformed cochlear), structures involved in voice or speech (e.g., cleft palate), or neurological structures (e.g., resulting in cerebral palsy). However, for 70 to 80% of children with speech impairment, their body structures are typically intact and children are classified as having a speech disorder of unknown origin.\(^7,8\)

More recently, these children have been characterized as having speech impairment of currently unknown origin,\(^9\) due to expectations of scientific advances, particularly in the area of genetics research.

**BODY FUNCTIONS**

Following an investigation of Body Structures, the next consideration in identifying children with speech impairment is the Body Functions component. Impairment at the level of Body Functions includes difficulties with the input, organization, and production of speech at both the segmental level (vowels and consonants) and suprasegmental level (timing, intonation).\(^1,2\) Body Functions is the level of classification most widely used by SLPs. Results from a survey conducted by McLeod\(^10\) indicated that the majority of pediatric SLPs based their clinical decisions about a child's speech on body functions, specifically the child's level of intelligibility and inconsistency with normative data (such as age of acquisition of speech sounds, phonemic repertoire, etc.). (Intelligibility was classified under the ICF category of Activities in McLeod; however, continued discussion with colleagues suggests that it is more appropriately classified under Body Functions\(^10\).) There were fewer comments relating to Participation and none relating to Body Structures. Focus on Body Functions component by SLPs is consistent with the observation of Lollar and Simeonsson\(^11\) that “...improvement in function is often the litmus test that society uses to evaluate effectiveness of programs and treatments” (p. 323).

The major ICF domain of relevance to children with speech impairment is Voice and speech functions (b3), and specifically the category Articulation functions (b320). Currently, the ICF does not have subcategories of Articulation functions, nor does it contain a
Table 1  Components and Domains within the ICF Most Relevant to Children with Speech Impairment

<table>
<thead>
<tr>
<th>ICF and ICF-CY Parts</th>
<th>ICF and ICF-CY Components</th>
<th>ICF Domains Relevant to Speech Impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Functioning and Disability</td>
<td>Body Functions</td>
<td>b110–b139. Global mental functions (including temperament and personality functions)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b140–b189. Specific mental functions (including perceptual functions, and mental functions of language)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b230–b249. Hearing and vestibular functions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b3. Voice and speech functions (including voice functions, articulation functions, and fluency and rhythm of speech)</td>
</tr>
<tr>
<td></td>
<td>Body Structures</td>
<td>s1. Structures of the nervous system (including structure of brain)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>s2. Structure of the eye, ear and related structures (including structure of the external, middle, and inner ear)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>s3. Structures involved in voice and speech (including structure of the nose, mouth, pharynx, and larynx)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>s430. Structures of respiratory system</td>
</tr>
<tr>
<td></td>
<td>Activities and Participation</td>
<td>d1. Learning and applying knowledge (including listening, learning to read, thinking)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d3. Communication (including communicating—receiving, communicating—producing, conversation and use of communication devices and techniques)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d6. Domestic life (including assisting others in communication)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d7. Interpersonal interactions and relationships (including family relationships)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d8. Major life areas (including education)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d9. Community, social and civic life</td>
</tr>
<tr>
<td>II. Contextual Factors</td>
<td>Environmental Factors</td>
<td>e1. Products and technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e3. Support and relationships (including immediate and extended family, friends, health professionals)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e4. Attitudes (including societal attitudes, social norms, practices and ideologies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e5. Services, systems and policies (including communication, health, and education)</td>
</tr>
<tr>
<td></td>
<td>Personal Factors</td>
<td>Attributes of the person, and the internal influences on functioning and disability</td>
</tr>
</tbody>
</table>

ICF, World Health Organization's International Classification of Functioning, Disability and Health; C-Y, Children and Youth version.

domain labeled Phonological Functions. However, almost everything that SLPs do with this group of children relates to this large and encompassing category. Additional domains of relevance to speech impairment include difficulty with the domains of mental functions (e.g., Perception, b156; Language, b167; Motivation, b1301; Problem solving, b1646) and sensory functions (e.g., Hearing, b230; including Speech discrimination, b2304). For example, problem solving could include a child's ability to evaluate the accuracy of speech productions and change the speech productions himself or herself.12
SPEECH IMPAIRMENT AND ACTIVITIES AND PARTICIPATION

SLPs are hampered in determining the severity and impact of a child’s speech impairment without considering the component of Activities and Participation. Within this component, the main function that will be affected by speech impairment is Communication (d3). It is probable that children with speech impairment may experience limitations with the activities of speaking (d330) and/or conversation (d350). However, the effects of speech impairment extend well beyond this. A speech impairment may lead to limitations in a child’s ability to sound out words (Learning and applying knowledge, d1), to handle stress and other psychological demands (General tasks and demands, d2), to engage in interpersonal interactions (Domestic life, d6) and to engage in play (Major life areas, d8).

The ICF allows for comparison between performance and capacity. For children with speech impairment, there may be a mismatch between their ability to perform within their daily lives and their communicative capacity on standardized speech assessment tools. Some areas of difference for children with speech impairment include single word versus connected speech; imitated versus spontaneous speech; stimulable versus nonstimulable sounds; and monosyllabic versus polysyllabic words. Consideration of performance versus capacity is an important component within the capability focus model described by Kwiatkowski and Shriberg. The difference between performance and capacity is better understood with a dynamic assessment approach that has recently been applied to children with speech impairment.

Speech Impairment and Contextual Factors

ENVIRONMENTAL FACTORS

During the assessment of a child with speech difficulties, SLPs must also consider environmental factors that may affect their abilities, management, and future outcomes. The Environmental Factors domains within the ICF that most specifically relate to children with speech impairment include Support and relationships (e3); Attitudes (e4); and Services, systems and policies (e5). Each domain will be discussed in turn.

SUPPORT AND RELATIONSHIPS

SLPs will consider how a child with speech impairment interacts with and is supported by family and friends (e310, e320) to determine if the intervention needs to incorporate education, advice, and support to significant others such as siblings and parents (Barr et al; Watts Pappas et al. Parental involvement in speech intervention: a national survey. Clinical Linguistics and Phonetics 2007; In press). SLPs should also consider the level of support available to the child for completing therapy activities to determine whether intervention may occur in other environments (e.g., home). SLPs might also investigate the child’s need for support or assistance to function successfully in other environments (e.g., the kindergarten or school). Speech impairment is known to co-occur with other disorders, so a SLP may determine whether other professionals (e355, e360) are involved in a child’s management, to provide a coordinated service.

ATTITUDES

It is important for the SLP to consider the attitudes of significant others when planning intervention (e410, e415, e420). The SLP may wish to discover how family and friends feel about the child’s speech impairment and about the child’s need for intervention. Again, this may influence the amount of information and counseling provided, or suggest a need for the involvement of other health professionals (e.g., social workers). Within Western society, there is stigma associated with even mild inability to pronounce speech sounds.

SERVICES, SYSTEMS, AND POLICIES

Depending on the work environment of a SLP, the Services, systems, and policies of the health (e580), and Education and training (e585; including special education) may be a consideration. These have an impact on eligibility for service/support, prioritization of services, waiting time, duration of service, type of service provision, and cost of service. Although in the
United States and United Kingdom, services to children with speech impairment are mandated by law (e.g., Individuals with Disabilities Education Act), in nations such as Australia some children with speech impairment receive limited services. McKinnon et al described teachers’ identification of school students with speech impairment from 10,425 students in one Sydney Australian Catholic Diocese. The teachers indicated that more than half of the students with speech impairments required moderate to very high levels of support. In contrast, the teachers indicated that many of the students with speech impairment received no/minimal learning support, and 91.1% of these students did not have an individualized education plan, 84.8% received no/ minor curriculum adaptation, and almost one fourth (24.1%) had no involvement with outside agencies (including speech-language pathology services).

**Personal Factors**

Attached to every speech impairment is a real child. His or her unique makeup must be considered within his or her cultural milieu to determine the most appropriate intervention goals. The ICF recognizes the “large social and cultural variance” (p. 8), including gender, age, other health conditions, coping style, social background, education, profession, past experience, and character style. Currently, research into typically developing children has demonstrated a wide range of individual differences in the acquisition of speech sounds. For children with speech impairments, there are some case studies documenting the effect of personal factors on appropriate goal setting and intervention outcomes. For example, Kamhi describes the impact of personality/character style on the progress of phonological intervention with his daughter, Fran. Fran’s “stubbornness” and desire to communicate with her parents led to delineation between speech sound practice with her SLP and meaningful communication with her parents. He writes, “Fran’s reluctance to practice speech sounds was her way to let us know that we should focus on what she said when she spoke, rather than on how she said it” (p. 183). Consequently, SLPs consider personal factors when planning assessments and intervention.

**Risk Factors**

Although risk factors are not equivalent to personal factors on the ICF, some factors, such as gender, age, and social background, have also been found to be associated with increased likelihood of speech impairment. For instance, the ratio of boys to girls with impaired speech has been documented as ~2:1. The average age of referral for children with speech impairment of unknown origin is 4.5 (years; months). There is strong evidence to suggest that positive family history of speech, language, and/or literacy difficulties are risk factors for speech impairment, and there is moderate evidence to suggest that low maternal education is a risk factor for speech impairment. There is also some inconclusive evidence to indicate that children from low socioeconomic backgrounds are at greater risk for speech impairment. When a combination of these factors is considered, Campbell et al indicated that a child was 7.1 times more likely to have a speech impairment if he were male with a positive family history and low maternal education levels, compared with a child without any of these factors.

**ASSESSMENT AND INTERVENTION TOOLS AVAILABLE FOR CHILDREN WITH SPEECH IMPAIRMENT**

A wide range of assessment and intervention tools are available to SLPs for assessing and targeting Body Functions; fewer tools are available for the other ICF domains.

**Body Structures**

Some impairments in body structures and functions that influence speech production can be detected via oromusculature examination (OME). For example, impaired body structures including tongue-tie and impaired body functions including difficulty on diadochokinesis tasks (rapid speech movement) would be apparent during an OME. SLPs often refer to other medical practitioners such as ear, nose, and
throat specialists, orthodontists, and craniofacial surgeons for assessment and diagnosis of children with impaired body structures. Impairments of body structures and functions relating to hearing impairment (that can coexist with speech impairment) can be detected via audiological examination, such as pure tone hearing tests and tympanometry. It follows that intervention for impairments of body structures such as cleft palate would also require the involvement of other medical specialists.

**Body Functions**

The majority of assessment and intervention tools designed for children with speech impairment can be categorized using the Body Functions domain: Articulation functions (b320). Traditional measures of the speech function of these children include the many available articulation/phonology tests such as the Bankson Bernthal Test of Phonology, Diagnostic Evaluation of Articulation and Phonology (DEAP), Computerized Articulation and Phonology Evaluation System, and the Profiling Elements of Prosodic Systems–Children. The range of speech analyses includes phonological analyses (e.g., Profile of Phonology), nonlinear analyses, and psycholinguistic analyses. In addition, objective measures, including acoustic (e.g., spectrographic) and physiological (e.g., electropalatographic) tools enable more accurate description of speech. Children with speech impairment frequently receive assessment reports concluding with impairment-based goals such as to increase the percent of consonants correct, to decrease the occurrence of various phonological processes, or to produce a list of phonemes expected but not produced correctly by the child. These goals may be targeted through one of several intervention approaches including Core Vocabulary, Metaphon, Parents and Children Together (PACT), and PROMPT. All of these approaches and goals can be categorized under Articulation functions (b320) of the ICF.

**Activities and Participation**

There are few examples of ways in which SLPs assess the component of Activities and Participation among children with speech impairment. Examples include the Therapy Outcomes Measure and the AusTOMS, which include a specific subsection on children’s speech. Because of the paucity of tools for SLPs to explore the Activities and Participation component of children with speech impairment, the Speech Participation and Activity of Children (SPAA-C) was developed. Questions about the daily lives of children and impact of having a speech impairment were included in a semi-structured interview format to be used with any or all of the following: the child with a speech impairment, his or her siblings, parents, friends, teachers, and significant others such as grandparents, sports coach, or neighbors. One component of the SPAA-C is the inclusion of a Likert scale with which children indicate how they feel about different scenarios relating to speaking. The 10-question Likert scale has undergone a trial with 95 preschool children who did not have a communication impairment and was found to be appropriate for use with young children. The SPAA-C has been extended to include drawings of the interviewed children to illustrate further who they are and the impact of speech impairment on their worlds. Research using the SPAA-C has documented the impact of speech impairment on the lives and families of children with speech impairment, and specifically siblings of children with speech impairment. The SPAA-C can be used to gain information to plan assessment, goal setting, and intervention cooperatively so that changes can directly impact the child's whole life.

Furthermore, SLPs can consider interperson interactions and relationships (d7) in their intervention planning for children with speech impairment. Pertinent social assessment practices may consist of a discussion with the child, his or her parents, siblings, friends, grandparents, and other significant people to ascertain social goals and barriers, interests, and hopes. Currently, there is a lack of discussion that targets this component of the ICF for children with speech impairment.

**CASE EXAMPLE**

Joe was a young boy, age 40, who experienced speech difficulties and was referred by his
mother to the outpatient clinic at a regional hospital. The following discussion regarding Joe’s presentation and management illustrates the manner in which the ICF can be used with children who have speech impairments. An additional case study using the ICF and ICF-CY is available in McLeod, and describes Jarrod, a 7-year-old boy who has severely unintelligible speech.

**Referral Process**

The speech-language pathology department at the hospital had a policy whereby children could be referred by parents, general practitioners, maternal and child health nurses, and other health professionals. All new referrals were discussed at a central intake meeting held with other service providers and distributed according to the child’s needs. As a consequence, Joe was placed on a waiting list at the hospital to be contacted by SLPs when time became available. It was the hospital’s policy that parents/guardians would be contacted within 8 weeks. Joe’s referral to speech pathology involved components of the ICF. Environmental Factors, such as Support and relationships (e3) and Attitudes (e4), influenced his mother’s initial decision to refer; Services, systems, and policies (Health, e580) influenced subsequent management.

**Assessment**

When Joe attended the initial assessment, he was accompanied by his mother. The assessment involved completion of a case history, administering of standardized assessments, and informal play/observation. The case history provided information relating to many aspects of the ICF. His mother was able to provide detail about the Personal Factors component, including social background and character style, Body Functions component, including Global mental functions (b110 to b139; e.g., Persistence, b1234; Optimism, b1265; Motivation, b1301; Confidence, b1266 [these codes refer to pathologic state and not just a personality variation]), Specific mental functions (b140 to b189; e.g., Attention, b140; Reception and production of language, b1670 and b1671), Sensory functions (b2; e.g., Hearing, b230), Voice and speech functions (b3; e.g., Articulation, b320), and Functions relating to the digestive, metabolic, and endocrine systems (b5; e.g., Biting, b5101; Chewing, b5102; and Swallowing, b5105). For instance, his mother reported that Joe was a bright and happy child who could be shy around strangers. He had attained most developmental milestones at appropriate ages, except for his production of speech sounds. She reported no concerns with Joe’s attention, production, and understanding of language, and revealed that his hearing had been assessed previously and found to be within normal limits.

His mother was also able to provide information about Activities and Participation component such as Learning and applying knowledge (d1; e.g., Acquiring language, Maintaining attention), General tasks and Demands (d2; e.g., Carrying out daily routines, Handling stress), Communication (d3; e.g., Comprehending spoken messages, Speaking, Conversing), Self-care (d5; e.g., Eating, Drinking), and Interpersonal interactions and relationships (d7; e.g., Forming relationships, Interacting according to social rules, Relating with strangers, parent–child relationships, and sibling relationships). For instance, Joe’s mother revealed that he was able to perform many activities of daily living without assistance (e.g., dressing, feeding), that he had made friends at kindergarten and played with his sister happily at home. However, she reported that Joe had difficulty interacting with unfamiliar people at times due to his unintelligible speech. According to his mother, when Joe was not understood, he would not persevere with the interaction, but instead would “clamp up.” Over time, she had noticed Joe had become more reluctant to attempt conversations with strangers. This information provided the SLP with some glimpse of the impact that Joe’s speech impairment had on his ability to participate in life activities, according to a significant other person in his life.

Joe’s mother was also able to outline the environmental and personal factors that could affect his management. For instance, she revealed that Joe lived at home with his parents and older sister. She also revealed a family history of speech and language difficulties, a
personal factor that could predispose Joe to having a speech impairment. Joe's mother was not worried about his language skills, but reported concerns about his ability to produce speech sounds and be understood by others, especially strangers/unfamiliar listeners.

Following the case history, Joe's speech and language skills were evaluated. An informal OME was conducted to investigate body structures involved in Voice and speech (s3). Joe's voice and speech functions and communication activities were formally assessed using the DEAP41 and the Clinical Evaluation of Language Fundamentals–Preschool,58 whereas other body functions and activities and participation were evaluated informally.

As a result of the OME, it was probable that Joe had a speech impairment of unknown origin. He had no impaired body structures that contributed to his speech difficulty and his hearing had been assessed and found to be within normal limits. Results from the formal assessments revealed Joe's ability to receive/comprehend communication (d310) was impaired. However, his ability to produce communication was moderately impaired (d330) due to his difficulty producing a range of speech sounds (b320).

Observation during the session supported his mother’s report that Joe was a shy child (b126) who was initially reluctant to engage with strangers (d730). However, he appeared to have a good relationship with his mother (d760). Joe’s ability to form relationships with unfamiliar people developed as his confidence increased. He appeared to be a happy child who was able to focus and maintain attention for an extended period of time (b140), when motivated by reinforcement. These observations revealed the involvement of other body functions and personal factors and their interactions with activities and participation. They also informed intervention strategies.

**Intervention**

Given that Joe was found to have unimpaired body structures involved in Voice and speech (s3), intervention was planned to target the components of Body Functions and Activities and Participation. Therapy was based on the PACT approach and incorporated parent education, metalinguistic training, and phonetic production training, 56 with reinforcing activities to help focus attention and increase motivation.

This intervention was conducted with consideration of Joe's personal and environmental context. Joe lived with his parents and his mother accompanied him to therapy. However, both parents were employed; thus, intervention had to consider the availability of his support network. As a result, clinic sessions were held fortnightly, rather than weekly. This arrangement also meant that home activities were not always completed. However, Joe attended kindergarten and so his environmental facilitators extended to the staff who worked there. They were eager to assist Joe’s development and so were informed of therapy goals and activities, and attempted to incorporate these into small group sessions in the kindergarten environment.

The continuation of intervention beyond the clinic was possible due to the supportive attitude of Joe’s family (e410) and kindergarten (e430). Service plan meetings were held to keep everyone informed of Joe’s needs and progress. A communication book was also devised to assist this. However, the book achieved a double purpose in that it provided Joe’s mother with a means of informing kindergarten staff about events in his life that he may wish to talk about. By providing staff with this background information, she was increasing the likelihood of Joe’s successful communication when conversing with the staff (d330). In therapy sessions, production of core vocabulary containing the targeted sounds was a goal to also improve Joe’s ability to converse. 58 Other strategies could have been implemented to assist Joe’s participation in activities at kindergarten, such as developing peer relationships (d750) and starting/sustaining a conversation (d350). These strategies could have included education of peers to request repetition when Joe was not understood (e325), and education of staff to look at Joe and use available contextual cues to assist their understanding (e360).

The discharge policy at the hospital stipulated that children could continue to receive intervention until they were functioning within normal limits or reached school age. As a result, Joe was able to continue receiving...
regular intervention for 18 months. However, when Joe was due to begin school, he was ineligible for ongoing services (McKinnon et al.35). Even though he continued to have difficulty producing polysyllabic words and the presence of a strong link between speech impairment and reading/spelling difficulty is acknowledged (b140 to b189), local governmental policies dictated that his speech impairment was not severe enough to warrant additional intervention. The impact that such policies have on the lives of children with speech impairment is currently under investigation.

SUMMARY
The components of the ICF and the interrelationships among each component are relevant for children with speech impairment. SLPs traditionally focus on Body Functions; however, additional consideration of Activities and Participation, and Environmental and Personal Factors is also important. In most cases, problems with body structures are ruled out as a causative factor. The ICF is beneficial for considering these children holistically in the milieu.

ACKNOWLEDGMENT
This research was supported by an Australian Research Council Discovery Project grant DP0773978. The first author thanks Travis Threats and Rune Simeonsson for discussions that have supported understanding of the application of ICF to children with communication impairment.

REFERENCES


44. Long, SH, Fey, ME, Channell, RW. Computerized Profile (MS-DOS version 9.1). Cleveland, OH: Case Western Reserve University; 2002.


57. McLeod S. A holistic view of a child with a speech impairment: insights from the ICF and ICF-CY. Adv Speech Lang Pathol 2006;8:293–315

PART 2: THE ASSOCIATION BETWEEN
CHILDHOOD SPEECH IMPAIRMENT
AND LIFE ACTIVITIES
Introduction to Part 2

In part 2, three studies (papers 4-6) are presented that investigated the extent and direction of the association between childhood speech impairment and life activities. All studies utilised a quantitative strategy of inquiry, which focused on testing pre-existing hypotheses, using objective methods of data collection and analysis; however, the methods of data collection and analysis differed across the three studies. The ICF and/or ICF-CY were used as a theoretical framework for developing questionnaires, selecting outcome measures and analysing results in order to better understand the broad range of Activities that may be associated with speech impairment.

The study reported in paper 4 was a systematic review of research investigating the association between speech impairment and Activity limitations/Participation restrictions across the lifespan. The review used domains from the Activities and Participation component of the ICF as key words in the database search, and reviewed the findings of the identified studies according to the ICF framework. Findings from the systematic review guided the selection of the Activities and Participation domains used in the subsequent two papers to investigate the association between speech impairment and Activities in different age groups, and from different perspectives. In the studies reported in papers 5 and 6, the ICF-CY was used in place of the ICF to reflect the age of the participants in the studies reported in those papers (all children under the age of 18 years).

The study in paper 5 was an investigation of parents’ and speech-language pathologists’ (SLP) perspectives regarding Activities that may be difficult for preschool children with speech impairment. It incorporated the development and distribution of a questionnaire containing a list of Activities from the ICF-CY to examine the range of Activities that may be associated with speech impairment in early childhood, a comparison of parents’ and SLPs’ perspectives, as well as an investigation of the
usefulness of the ICF-CY framework as a measure of the impact of speech impairment in preschool children.

The study in paper 6 was an investigation of the association between communication impairment identified in preschool and outcomes at school four years later. It utilised data obtained in a longitudinal, nationally representative study of Australian children. The ICF-CY Activities and Participation component guided the selection of outcome measures considered most relevant for school-aged children. The performance of children identified by parents with communication impairment in early childhood on the outcome measures was compared with the performance of children not identified. The outcome measures included tools completed by teachers, parents and the children themselves and so enabled a range of perspectives to be examined. The selection of items (the indicator of impairment, and the outcome measures) was limited to those that had been administered and were available for analysis in the database from which the data was drawn.

In paper 6, the term *communication impairment* rather than *speech impairment* was used since the population study from which the data were drawn identified children via the parent report question: “Are you concerned about your child’s ability to talk and make speech sounds?” While a more specific indicator of *speech* impairment would have been useful within this doctoral research, the term *communication impairment* was used in order to be consistent with other studies which this one built upon (Harrison & McLeod, 2010; Harrison, McLeod, Berthelsen & Walker, 2009; McLeod & Harrison, 2009). Findings from the study in paper 6 need to be viewed in light of the possible inclusion of children with a range of communication impairments, besides speech impairment.

The terms *impact* and *association* have been used to indicate differences in the scope of the research outlined in papers 4-6. In paper 5, the term *impact* was used as the
questionnaire utilised within that study requested parents and SLPs to identify Activities that may be difficult for children as a result of their speech impairment. Thus, the study examined the Activities that parents and SLPs considered to be directly affected by childhood speech impairment. In contrast, the studies presented in papers 4 and 6 examined correlations between speech (or communication) impairment and performance on a range of outcome measures, and it was acknowledged that other factors may have contributed to the findings. Thus, the studies reported in papers 4 and 6 examined the way in which speech impairment might contribute to, rather than directly cause, difficulties with life Activities.
A systematic review of the association between childhood speech impairment and participation across the lifespan

JANE McCORMACK, SHARYNNE McLEOD, LINDY McALLISTER*, & LINDA J. HARRISON

Charles Sturt University, Australia

Abstract
Speech impairment of unknown origin is one of the most common communication impairments in childhood. The purpose of this systematic review was to identify limitations in life activities that may be associated with speech impairment, through analysing the findings of papers published in the past 10 years. Domains from the Activities and Participation component of the International Classification of Functioning, Disability and Health were used as search terms, and resulted in 57 papers being identified. Findings from each paper were reviewed in terms of the association between speech impairment and Activity Limitations and/or Participation Restrictions as defined by the ICF. The systematic review revealed that speech impairment in childhood may be associated with the following Activity Limitations and/or Participation Restrictions: learning to read/reading, learning to write/writing, focusing attention and thinking, calculating, communication, mobility, self-care, relating to persons in authority, informal relationships with friends/peers, parent-child relationships, sibling relationships, school education, and acquiring, keeping and terminating a job.

Keywords: Speech impairment, impact, ICF, systematic review, articulation, phonology.

Introduction
Speech-language pathologists have reported that speech impairments (including articulation and phonology) are one of the most common forms of communication impairment among children presenting at their clinics (e.g., Broomfield & Dodd, 2004; Joffe & Pring, 2008; McLeod & Baker, 2004). In 2000, a systematic review of studies found the estimated prevalence of speech delay ranged from 2.3% to 24.6% in children under 16 years of age (Law, Boyle, Harris, Harkness, & Nye, 2000). Since that time, additional studies have been conducted that support the prevalence of speech impairment among preschool children (e.g., McLeod & Harrison, 2009; Trofari Eccen, Reilly, & Eadie, 2007) and children at school (e.g., Jessup, Ward, Cahill, & Keating, 2008; McKinnon, McLeod, & Reilly, 2007) with similar results.

“Speech and language development is intimately related to all aspects of educational and social development” (Law, Boyle, Harris, Harkness, & Nye, 1998, p. 2). Consequently, a communication impairment that first presents in childhood may be associated with Activity Limitations and/or Participation Restrictions that extend across the lifespan. For example, a systematic review published in 1998 found children who do not receive speech intervention, or who begin speech intervention in the school years, can continue to have difficulties for at least 28 years (Law et al., 1998). Felsenfeld and colleagues reported that childhood phonological (speech) impairment may be associated with difficulties with communication skills, education and employment in adults 28 years after their initial presentation (Felsenfeld, Broen, & McGuire, 1992, 1994; Felsenfeld, McGuire, & Broen, 1995). As people are increasingly expected to be proficient communicators in employment and social activities, the association between such a communication impairment and life activities will become more apparent (Byles, 2005). A framework which promotes a more holistic understanding of the concepts of health and functioning is useful to consider this association.

The International Classification of Functioning, Disability and Health (ICF) released by the World Health Organization (WHO) in 2001 has been recommended as an appropriate framework for use...
within the profession of speech-language pathology (Threats, 2006; Threats & Worrall, 2004) including with children with speech impairment (McLeod & McCormack, 2007). According to the ICF framework, health is not so much the absence of disease as an individual’s ability to function optimally in a given context. The framework recognizes health to be the result of a complex interaction between biological, individual and societal factors (Reed et al., 2005). That is, the ICF recognizes the inter-relationships that exist between impaired Body Structures and/or Functions (e.g., speech impairment), Personal and Environmental Factors and Participation in everyday activities.1

While researchers such as Felsenfeld and colleagues have investigated the immediate and lasting effects of speech impairment (Felsenfeld et al., 1992, 1994, 1995), these effects have not previously been explicitly linked to the Activities and/or Participation of individuals in their lives. This paper presents the results of a systematic review of the literature, published in the past 10 years, which has investigated the association between speech impairment and Activity Limitations and/or Participation Restrictions2 across the lifespan. This time-frame was chosen as it reflects the shift in conceptualizing health that has taken place in speech-language pathology (and other health fields) as an integration of medical and social factors. The purpose was to identify the ways in which participation may be restricted for individuals with a history of speech impairment. These were defined using the Activities and Participation component from the ICF (WHO, 2001). In the ICF, an Activity is defined as “the execution of a task or action by an individual” while Participation is “involvement in a life situation” (WHO, 2001, p. 14). The Activities and Participation component is divided into nine chapters (see Table II), which are further divided into domains that cover “the full range of life areas” (WHO, 2001, p. 14). It has been suggested that such a construct has “significant promise to document the social dimensions of disability” (Simeonsson, Carlson, Huntington, McMillen, & Brent, 2001, p. 61). The aim of this paper was not to suggest speech impairment may cause Participation Restrictions since current research does not allow these cause-effect relationships to be drawn. Therefore, the aim of this paper was to review research that identified an association between the two, in order to better understand the social dimensions of childhood speech impairment.

Method

Search strategy

Computer-based searches were undertaken to locate papers investigating speech impairment during the past 10 years. The databases included in the search are presented in Table I. This selection of databases was designed to capture the publications in which papers relevant to the investigation were most likely to be published. Identical searches were undertaken in each database. Following the computer-based search, references of identified papers were scanned for further papers that might be relevant to the review.

Search terms

A multi-layered search strategy was employed in the computer-based searches to identify relevant papers. Initially, limits were put in place to restrict the search to scholarly papers (i.e., peer-reviewed) published in a 10 year period between January 1998 and August 2008. A combination of terms referring to speech impairment was used in an attempt to capture the most relevant papers. These terms incorporated those most commonly used to refer to speech

<table>
<thead>
<tr>
<th>Databases searched</th>
<th>Terms Included</th>
<th>Terms Excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Search Premier</td>
<td>One of the following:</td>
<td>Not the following:</td>
</tr>
<tr>
<td>CINAHL Plus with Full Text</td>
<td>Speech impair*</td>
<td>Cleft lip</td>
</tr>
<tr>
<td>Education Research Complete</td>
<td>Speech delay*</td>
<td>Cleft palate</td>
</tr>
<tr>
<td>ERIC</td>
<td>Speech disorder*</td>
<td>Down* syndrome</td>
</tr>
<tr>
<td>Health Business Fulltext Elite</td>
<td>Speech difficult*</td>
<td>Cerebral palsy</td>
</tr>
<tr>
<td>Health Source - Consumer Edition</td>
<td>Articulation impairment*</td>
<td>Autism*</td>
</tr>
<tr>
<td>Health Source - Nursing/Academic Edition</td>
<td>Articulation delay*</td>
<td>Cochlear implant</td>
</tr>
<tr>
<td>MEDLINE (1950-present)</td>
<td>Articulation disorder*</td>
<td>Stutter*</td>
</tr>
<tr>
<td>Professional Development Collection</td>
<td>Articulation difficult*</td>
<td>Voice</td>
</tr>
<tr>
<td>Psychology and Behavioral Sciences Collection</td>
<td>Phonological impairment*</td>
<td>Hearing impairment*</td>
</tr>
<tr>
<td>SociNDEX with Full Text</td>
<td>Phonological delay*</td>
<td>Traumatic brain injury*</td>
</tr>
<tr>
<td></td>
<td>Phonological disorder*</td>
<td>Acquired brain injury*</td>
</tr>
<tr>
<td></td>
<td>Phonological difficult*</td>
<td>Aphasia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stroke</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parkinson* disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Epilepsy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dysphagia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multiple Sclerosis</td>
</tr>
</tbody>
</table>

Table I. Databases and terms used in systematic review.
impairment, including articulation and phonology (Shriberg, Tomblin, & McSweeney, 1999). Search terms are presented in Table I. Truncation was used to eliminate the possibility of papers being overlooked due to morphological differences in terms. All fields were searched, and the search result contained 7190 articles.

The first 100 titles were scanned, and papers were found in which speech impairment occurred in association with other conditions. Further limitations were put in place to reduce the likelihood of other conditions influencing reported outcomes. The participants in the articles were required to have speech impairment of unknown origin (i.e., not a result of neurological or other medical conditions), speech impairment as the sole or primary impairment experienced by the participants, and have first presented in childhood (0–6 years). A list of exclusionary terms was developed to refine the search (see Table I). This refined search resulted in 4172 articles, hereafter referred to as the “base search”.

In order to identify the papers within this base search that examined the association between speech impairment and Participation Restrictions, domains and definitions from each chapter of the Activities and Participation component of the ICF (WHO, 2001) were utilized as search terms (see Table II). A separate search was performed for each chapter using the listed terms. Results from these searches were individually combined with the base search to identify potential papers relevant to each chapter. These results are presented in Table II.

Titles and abstracts of papers were examined to exclude papers considered outside the scope of this review. Papers were excluded on the basis of type (e.g., discussion and review papers) or purpose (e.g., tool validation or intervention studies). Additionally, papers were excluded when the participant group had co-occurring conditions that had not been previously excluded, or presented with non-speech-related conditions (such as dysphagia). For the purpose of this review, studies in which the nature and extent of the speech impairment experienced by the participant group was not defined have been excluded. For instance, the database search revealed a number of papers published by Dockrell, Lindsay and colleagues investigating self-esteem and behaviour of children with “speech and language difficulties” and their interactions with peers (e.g., Dockrell & Lindsay, 2001; Lindsay, Dockrell, Letchford, & Mackie, 2002; Lindsay, Dockrell, & Mackie, 2008; Lindsay, Dockrell, & Strand, 2007). These papers were excluded from the review as no information was provided about the speech impairment experienced by participants; yet extensive information was provided about their language skills. Other studies in which the participants had co-occurring impairments were retained, when difficulty with producing sounds (articulation) or the use of phonological processes were listed as characteristics of at least some of the group. It is acknowledged that as a result, the findings reported in these studies cannot be attributed to speech impairment alone, and this issue is further discussed in the Limitations section.

Relevant papers were then obtained and the reference lists were searched manually for additional papers. The final tally of papers reviewed for each chapter of the Activities and Participation component of the ICF (WHO, 2001) is presented in Table II. During the review process, the content of each paper was examined, and codes from the ICF Activities and Participation domains were mapped onto the findings. In this way, the review enabled an examination of the association between speech impairment and Participation Restrictions, guided by the ICF framework (WHO, 2001).

<table>
<thead>
<tr>
<th>ICF Chapter</th>
<th>Chapter title</th>
<th>Search terms</th>
<th>Number from database</th>
<th>Number from title/abstract/paper</th>
<th>Number from manual search</th>
<th>Total*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Learning and applying knowledge</td>
<td>attention or read* or write* or spell * or calculate* or problem solve* or think*</td>
<td>487</td>
<td>27</td>
<td>4</td>
<td>31</td>
</tr>
<tr>
<td>2</td>
<td>General tasks and demands</td>
<td>(undertake) task* or (perform) task or (hand) stress or (manage) stress or routine or coping</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Communication</td>
<td>communication or (receptive language) or (expressive language) or conversation</td>
<td>594</td>
<td>14</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Mobility</td>
<td>mobility or motor skill* or move*</td>
<td>162</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Self care</td>
<td>self care or activities of daily living</td>
<td>10</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Domestic life</td>
<td>household tasks or caring or assisting others</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Interpersonal interactions and relationships</td>
<td>relations* or friend* or interact*</td>
<td>364</td>
<td>12</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Major life areas</td>
<td>education or employment or community or recreation or leisure or religion</td>
<td>355</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>Community, social and civic life</td>
<td>52</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Some of these papers were duplicated (i.e. occurred in searches for more than one chapter).
Results

The search resulted in 57 papers being identified and reviewed as relevant to understanding the association between childhood speech impairment and Participation Restrictions across the lifespan. When the content was examined, domains from six of the nine ICF Activities and Participation chapters (WHO, 2001) could be mapped onto the findings. That is, Activities and Participation as defined in six of the ICF chapters could be found in the reviewed literature investigating speech impairment. A brief summary is provided in Table III and the list of studies is presented in the Appendix. The three areas that were not included were: General tasks and demands, Domestic life and Community, social and civic life. Findings from the 57 eligible studies will be outlined and discussed in greater detail under the relevant domains pertaining to the ICF in the following sections. In each section, the heading is an Activities and Participation chapter from the ICF. When specific domains are discussed, the numbers in brackets correspond to the ICF domain codes.

Learning and applying knowledge (d1)

The first chapter in the Activities and Participation component of the ICF is Learning and applying knowledge, which is defined as: “learning, applying the knowledge that is learned, thinking, solving problems, and making decisions” (WHO, 2001, p. 125). Thirty-one papers were identified which investigated an association between speech impairment and activities related to learning and applying knowledge (see Appendix).

The reviewed papers differed in terms of research design, such as participant recruitment and characteristics, and the specific skills investigated. For instance, some studies relied on parent/self report to identify past history of speech impairment (e.g., DeThorne et al., 2006; Lewis et al., 2007; Tunick & Pennington, 2002) while others utilized clinical diagnoses (e.g., Carroll & Snowling, 2004; Hauner, Shriberg, Kwiatkowski, & Allen, 2005; Lewis, Freebairn, Hanson, Iyengar & Taylor, 2004). Some employed control groups with a history of typical speech acquisition (e.g., DeThorne et al., 2006; Gernand & Moran, 2007; Larrivee & Catts, 1999; McGrath et al., 2008; Ozcoban & Belgin, 2005; Pershey & Clickner, 2007; Preston & Edwards, 2007; Sutherland & Gillon, 2007), others compared subgroups of children with speech impairment (e.g., Hauner et al., 2005; Leitao & Fletcher, 2004; Lewis, Freebairn & Taylor, 2000; Lewis et al., 2004; Raitano et al., 2004), while some reported results from control groups and subgroups (e.g., Bishop & Clarkson, 2003; Holm, Farrier & Dodd, 2008; Nathan, Stackhouse, Goulardis & Snowling, 2004b; Rvachew, 2007). Many of the studies investigated reading, or reading related skills (such as phonological awareness). A small number investigated spelling and/or writing, thinking and attention, and calculation (maths) skills. Results from these investigations are briefly outlined below.

Learning to read (d140) and Reading (d166)

Learning to read is preceded by the development of decoding or phonological awareness skills (such as the ability to think about and manipulate sounds in words). Comprehension of written material requires efficient decoding skills (Leitao, 2002). Findings from the systematic review indicated that individuals with a speech impairment may have associated difficulties with phonological awareness/processing skills and reading (Carroll & Snowling, 2004; Gernand & Moran, 2007; Holm et al., 2008; Pershey & Clickner, 2007; Rvachew, Ohberg, Grawburg, & Heyding, 2003), and these skills may continue to be affected into adulthood (Lewis et al., 2007; Preston

<table>
<thead>
<tr>
<th>Chapter/Component</th>
<th>Specific Domains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning and applying knowledge (d1)</td>
<td>Learning to read (d140)/Reading (d166)</td>
</tr>
<tr>
<td></td>
<td>Learning to write (d145)/Writing (d170)</td>
</tr>
<tr>
<td></td>
<td>Focussing attention (d160)/Thinking (d163)</td>
</tr>
<tr>
<td></td>
<td>Calculating (d172)</td>
</tr>
<tr>
<td>Communication (d3)</td>
<td>Speaking (d330)</td>
</tr>
<tr>
<td></td>
<td>Writing messages (d345)</td>
</tr>
<tr>
<td>Mobility (d4)</td>
<td>Conversation (d350)</td>
</tr>
<tr>
<td>Self care (d5)</td>
<td></td>
</tr>
<tr>
<td>Interpersonal interactions and relationships (d7)</td>
<td>Relating with persons in authority (d7400)</td>
</tr>
<tr>
<td></td>
<td>Informal relationships with friends (d7500)</td>
</tr>
<tr>
<td></td>
<td>Informal relationships with peers (d7504)</td>
</tr>
<tr>
<td></td>
<td>Parent-child relationships (d7508)</td>
</tr>
<tr>
<td></td>
<td>Sibling relationships (d7602)</td>
</tr>
<tr>
<td>Major life areas (d8)</td>
<td>School education (d820)</td>
</tr>
<tr>
<td></td>
<td>Acquiring, keeping and terminating a job (d845)</td>
</tr>
</tbody>
</table>
& Edwards, 2007). However, the difficulties appeared to be related to the particular phonological processing skills being assessed, and varied according to individual profiles (Hesketh, 2004; Hesketh, Adams & Nightingale, 2000; Holm et al., 2008).

A range of factors appeared to influence the risk of developing such difficulties. Individuals with speech impairment may be at increased risk of reading difficulties when the speech impairment co-occurs with a language impairment (Larrivee & Catts, 1999; Lewis et al., 2007; Lewis et al., 2000; Nathan, Stackhouse, Goulandris, & Snowling, 2004a; Raitano et al., 2004; Sices, Taylor, Freebairn, Hansen & Lewis, 2007; Young et al., 2002), or poor phonological awareness/processing skills (Hesketh, 2004; Larrivee & Catts, 1999; Nathan et al., 2004b; Ryachew, 2007). Individuals with speech impairment were also at greater risk if their speech impairment persisted into school-age (Nathan et al., 2004a; Preston & Edwards, 2007; Young et al., 2002) and/or was characterized by non-developmental speech errors (Leitão & Fletcher, 2004). Children with apraxia of speech were also at increased risk (Lewis et al., 2004). Larrivee and Catts (1999) reported that increased severity of speech impairment was a risk factor; however, Sices et al. (2007) found language status, rather than severity, related to reading and writing skills.

Learning to write (d145) and Writing (d170)

Learning to write involves the development of adequate spelling and grammatical knowledge as well as fine motor skills. Results from this systematic review indicated that difficulties with spelling and writing may be associated with speech impairment in childhood (Lewis, Freebairn, & Taylor, 2002). However, the risk of developing such difficulties again appeared to be influenced by factors such as the persistence of the speech impairment (Nathan et al., 2004b), the type of speech impairment (Holm, et al., 2008; Leitão & Fletcher, 2004), and the co-occurrence of language impairment (Bishop & Clarkson, 2003; Lewis et al., 2000). For instance, Bishop and Clarkson (2003) found that “children with pure speech difficulties did not have any evidence of written language problems”, but most children (aged 7–13 years) with combined speech and language difficulties were “functionally illiterate” (p. 231).

Teverovsky, Bickel and Feldman (2009) reported the results of a survey distributed among parents of children with childhood apraxia of speech. They asked parents to identify functional difficulties that their children experienced from a given list, which corresponded to items from the Body Functions and Structures, and Activities and Participation components of the ICF-Children and Youth (ICF-CY; World Health Organization, 2007). Learning to write was one of the most commonly reported areas of difficulty with almost half (49%) of the parents reporting that their child had difficulty with this Activity (Teverovsky et al., 2009).

Focusing attention (d160) and Thinking (d163)

Results from this systematic review indicated that children with speech impairment may also experience difficulty with attention and thinking, although the relationship between the two is unclear. McGrath et al. (2008) reported attention deficits were higher when participants had co-occurring speech and language impairment, even when the speech impairment had resolved. In contrast, Snowling, Bishop, Stothard, Chipchase and Kaplan (2006) found attention difficulties did not persist in children with resolved speech impairment. Ozcce and Belgin (2005) found information processing skills, thinking, reasoning, and memory appeared to be most affected when the speech impairment was characterised by multiple speech sound errors. In contrast, Hauner et al. (2005) suggested that decreased task persistence/attention, when combined with negative affect and negative emotionality/mood, “may act to increase the severity of speech delay as well as to impede normalization rates” (p. 645).

Calculating (d172)

Mathematical computational skills have been found to be associated with mastery of phonological processing skills, including phonological memory and phonological awareness (Hecht, Torgesen, Wagner, & Rashotte, 2001). Calculating may be associated with speech impairment given the link between speech impairment and phonological processing skills. Nathan et al. (2004b) found children with persisting speech difficulties were significantly different to matched controls in maths skills at age 7 years, although there was no statistical difference between children with resolved speech and the control group. This impact may be due to an underlying difficulty with symbol representation (affecting both numerals and letters), storage and retrieval (Hecht et al., 2001).

Communication (d3)

The third chapter in the Activities and Participation component of the ICF is communication, which is defined as “general and specific features of communicating by language, signs and symbols, including receiving and producing messages, carrying on conversations, and using communication devices and techniques” (WHO, 2001, p. 133). There were 14 studies that investigated the association between speech impairment and other communication skills. These were studies by Bishop and Clarkson (2003), Głogowska, Roudstone, Peters and Enderby (2006), Hansson, Nettelbladt and Nilholm (2000), Haskill
and Tyler (2007), Hauner et al. (2005), Leitão, Fletcher and Hogben (2000), Lewis et al. (2002, 2004, 2007), Nathan (2002), Nathan, Stackhouse and Goulardris (1998), Pershey and Clickner (2007), Teverovsky et al. (2009), and Yont, Hewitt and Miccio (2002). Many of the communication skills investigated in the reviewed papers are covered in other Activities and Participation chapters (e.g., Interpersonal interactions and relationships) (see Appendix).

A speech impairment, affecting the production of sounds, may be associated with other communication impairments. These impairments may persist beyond early childhood, as evidenced by studies of individuals (Glogowska et al., 2006) and family members (Lewis et al., 2007). Findings from this review indicated that speech impairment may be associated with language production difficulties, including the development of morphosyntactic skills (Haskill & Tyler, 2007). However, language output (number of utterances and vocabulary) appeared to be influenced by the conversational partner (Hansson et al., 2000). Conversation and discussion were reported to be difficult for children with apraxia (Teverovsky et al., in press), and for children with speech impairment with psychosocial involvement (Hauner et al., 2005). Speech impairment may be associated with breakdowns in conversation due to phonological errors and reduced intelligibility (Yont et al., 2002), and may be associated with social communication difficulties (e.g., communicative coherence, use of conversational context) according to teacher/speech-language pathologist report (Nathan, 2002). Furthermore, children with speech and language impairment appeared to have greater difficulties with speech processing (Nathan et al., 1998).

Mobility (d4)

The fourth chapter in the Activities and Participation component of the ICF is mobility, which is defined as: “moving by changing body position or location or by transferring from one place to another, by carrying, moving or manipulating objects, by walking, running or climbing, and by using various forms of transportation” (WHO, 2001, p. 138). Five studies were identified that investigated an association between speech impairment and activities related to mobility. These were studies by Gaines and Missiuna (2006), McCabe, Rosenthal and McLeod (1998), Newmeyer et al. (2007), Teverovsky et al. (2009) and Visscher, Houwen, Scherder, Moolenaar and Hartman (2007).

These studies differed in terms of the type of speech impairment experienced by participants (e.g., childhood apraxia of speech, speech impairment) and the research design (e.g., file audit, parent questionnaire). Results indicated that childhood apraxia of speech may be associated with limb apraxia/ clumsiness/awkwardness (McCabe et al., 1998), difficulty with fine motor skills (Newmeyer et al., 2007; Teverovsky et al., 2009), and difficulty walking (Teverovsky et al., 2009). There is an association between children with speech and/or language difficulties and motor difficulties affecting manual dexterity, ball skills and balance (Gaines & Missiuna, 2006; Visscher, et al., 2007). These studies indicate that the skills of children with speech impairment may be affected to a greater extent than those with language impairment (Visscher et al., 2007). However, comparison to a control group was not made in these studies, which limits the possibility of making claims about causation. Visscher and colleagues (2007) made an interesting observation by stating that communication difficulties may impact on social acceptance and play with peers, which in turn may affect learning and practice of motor skills during play activities.

Self care (d5)

The fifth chapter in the Activities and Participation component of the ICF is Self care, which is defined as: “caring for one’s self, washing and drying oneself, caring for one’s body and body parts, dressing, eating and drinking, and looking after one’s health” (WHO, 2001, p. 149). One study was identified that investigated the association between speech impairment and activities related to self care (Gaines & Missiuna, 2006). Findings of this study suggested an association between speech (and/or language) impairment and parental report of self-care skills, but the specific skills were not discussed. However, the study utilized a small, convenience sample and lacked a control group; thus further investigation of the co-occurrence of both impairments is needed to investigate the relationship between the two.

Interpersonal interactions and relationships (d7)

The seventh chapter in the Activities and Participation component of the ICF is interpersonal interactions and relationships, which is defined as: “carrying out the actions and tasks required for basic and complex interactions with people (strangers, friends, relatives, family members and lovers) in a contextually and socially appropriate manner” (WHO, 2001, p. 159). Fifteen papers were identified which investigated the association between speech impairment and activities related to interpersonal interactions and relationships (see Appendix).

These papers differed in terms of the types of speech impairment (and co-occurrence with language impairment), and relationships being investigated. Data collection methods also varied across studies as some examined conversational transcripts (e.g., Hansson et al., 2000), others employed parent and/or teacher questionnaires (e.g., Marshall, Ralph, & Palmer, 2002; Overby, Carrell, & Bernthal, 2007;
Teverovsky et al., in press), others used rating scales (e.g., McCabe, 2005; Perry-Carson, Carson, Klee & Jackman-Brown, 2007; Wink, Rosanowski, Hoppe, Eysholdt & Grässel, 2007), and some conducted interviews and/or focus groups (e.g., Barr, McLeod, & Daniel, 2008; Glogowska & Campbell, 2000; Markham & Dean, 2006; McLeod & Daniel, 2005). However, they all indicated that a speech impairment may be associated with limitations in forming and maintaining interpersonal relationships as outlined below.

**Relating with persons in authority (d7400)**

Findings from this systematic review indicated that speech impairment may be associated with limitations in formal relationships, specifically teacher-child relationships. This may be in terms of teacher expectations regarding the children’s skills (Overby et al., 2007) or in terms of teacher’s feelings about teaching these children (Marshall et al., 2002). Overby et al. (2007) found “recurring descriptive statements by 31.1% of the teachers directly attributed the child’s academic, social, and/or behavioral difficulties to the child’s speech skills” (Overby et al., 2007, p. 334). They reported teachers expected children with moderately intelligible speech to struggle at school, especially in relation to literacy (major delays) and social skills (shyness/timidity). Marshall and colleagues (2002) found trainee teachers did not feel positive or competent teaching children with speech and/or language difficulty, although this depended on the severity of the difficulty. It may be that such attitudes and expectations influence the interactions between teachers and these children.

**Informal relationships with friends/peers (d7500/d7504)**

Speech impairment may be associated with difficulties interacting with, and developing relationships with peers. However, it is not possible to make conclusive statements regarding the impact of speech impairment in isolation as much of the research in this area investigates children with co-occurring speech and language difficulties. Children with a history of speech and language impairment were reported to experience higher rates of social difficulties at follow-up and lower social competence ratings compared to a control group (Glogowska et al., 2006; McCabe, 2005). Additionally, individuals with speech and language difficulties rated themselves with low peer self-concept, which related to their self-perceptions of their ability to make friends and their popularity with peers (Robertson, Harding & Morrison, 1998). However, participants in this sample were bilingual, and the authors suggested that language, rather than speech, may have been the greater area of concern.

Hansson et al. (2000) found dialogues between children with speech and language difficulties and their peers were more symmetrical than those with adults (parents or clinicians). That is, in conversations with peers, both participants contributed equally to the dialogue. However, the children were more productive in their interactions with adults. The authors suggest that this may be due to adults encouraging the children’s attempts at communication and making more effort to understand these attempts (Hansson et al., 2000).

**Parent-child relationships (d7600)**

A number of studies have reported the association between speech and language impairments and parent-child relationships. Firstly, the association between speech and language impairments and parent-child interactions was reported in a study by Perry-Carson et al. (2007). They found that parents of young children with speech and language impairments characterised themselves as being less nurturing, and their children as being more detached and underreactive (Perry-Carson et al., 2007). Children with speech impairment in isolation were excluded from the study due to limited numbers, so it is only possible to conclude that co-occurring speech and language impairment appeared to influence the parenting behaviour and quality of interactions among parents and their children.

The association between speech impairment and parent-child interactions may also be expressed in terms of parental concern and anxiety for their children’s social and academic success (Glogowska & Campbell, 2000; Markham & Dean, 2006), or parental feelings of frustration at associated behaviour problems, and subsequent guilt at this frustration (McLeod & Daniel, 2005). Additionally, the impact may be reflected in parental health status, as mothers of children with speech impairment have been found to have lower scores on Health-related Quality of Life (including physical functioning, general health, vitality, and social functioning) in comparison to a control group (Rudolph, Kummer, Eysholdt & Rosanowski, 2005), and were significantly more likely to meet criteria for emotional disorders (namely anxiety and depression) (Rudolph, Rosanowski, Eysholdt & Kummer, 2003; Wink et al., 2007). Furthermore, Wink and colleagues (2007) found a high correlation between the presence of these emotional disorders and the perception of subjective burden of being a caregiver. However, they acknowledged difficulty associated with interpreting such results as it is unclear whether the child’s speech impairment may have influenced the well-being of the mother, or the mother’s well-being may have affected the speech development of the child (Rudolph et al., 2005). Recent research has found maternal well-being to be a protective factor in relation to speech and language concerns.
among preschool children (Harrison & McLeod, 2009).

Sibling relationships (d7602)

Speech impairment may also be associated with demands on sibling relationships (Barr et al., 2008; McLeod & Daniel, 2005). For instance, Barr et al. (2008) found siblings reported a need to protect the child with the speech impairment from potential bullying and to interpret their needs when others could not understand their speech. In contrast, siblings also reported feelings of jealousy and resentment, possibly due to the reduced parental attention they received in comparison to the child with the speech impairment.

Major life areas (d8)

The eighth chapter in the Activities and Participation component of the ICF is Major life areas, which is defined as: “carrying out the tasks and actions required to engage in education, work and employment and to conduct economic transactions” (WHO, 2001, p. 164). Six studies were identified which investigated the association between speech impairment and activities associated with major life areas, specifically, school education and acquiring, keeping and terminating a job (Allard & Williams, 2008; Marshall et al., 2002; Mitchell, McMahon & McKee, 2005; Robertson et al., 1998; Ross, Neeley & Baggs, 2007; Snowling, Adams, Bishop & Stothard, 2001).

School education (d820)

For most children living in Western countries, school forms a major life area for a number of years. Education is seen by many to be essential for future success and thus achievement at school is highly desirable. However, parents and teachers of children with speech impairment (with or without co-occurring language impairment) have expressed concern about the training provided to teachers and the resources available to assist the education of these children (Marshall et al., 2002). Consequently, there is concern that these children may experience some difficulty with academic achievement.

It has already been shown in this paper that children who enter school with persisting speech difficulties (moderate-severe) are at increased risk of literacy problems (e.g., Leitão et al., 2000). It is also clear that these children may have difficulty with peer and formal (teacher) interactions at school (e.g., McCabe, 2005; Overby et al., 2007). Other studies have investigated the association between children with speech and language impairment and behaviours requiring discipline infractions (e.g., Ross et al., 2007) and the individual's resilience (Robertson et al., 1998). This review found no evidence that speech impairment (in the absence of language impairment) is associated with discipline/conduct disorders; however, students with speech and/or language impairment are reportedly at risk for school drop-out as they reported feeling less connected to school (Robertson et al., 1998). Snowling et al. (2001) reported the majority of adolescents with a history of speech and/or language impairment remained in full-time education, although they were more likely to complete vocational and employment training than complete higher years of schooling (Snowling et al., 2001).

Acquiring, keeping and terminating a job (d845)

Communication disorders have been associated with high rates of unemployment (Ruben, 2000; Allard and Williams (2008) found a speaker with an articulation disorder was rated less employable than a speaker without a disorder by a group of 455 adults. They concluded that “negative stereotypes exist toward individuals with speech and language disorders” (Allard & Williams, 2008, p. 118). Mitchell et al. (2005) examined allegations of workplace discrimination related to speech impairment in comparison to allegations related to orthopaedic or visual impairments. They found the most frequent allegation issues for people with speech impairment related to discharge (25%), harassment (12%) and hiring (12%). The comparative percentages for harassment and hiring were significantly less for people with orthopaedic or visual impairments (Mitchell et al., 2005).

Limitations

There were two major limitations to this systematic review that warrant further discussion. Firstly, the terminology used in the reviewed studies was inconsistent. For instance, some studies referred to articulation delay, some to speech impairment, and some to phonological impairment. It is unclear if these terms refer to identical, similar or different phenomenon. The lack of consistent definitions is a major issue within the speech-language pathology profession (Walsh, 2005). Until the definitions become standardized, it is difficult to make comparisons between studies, and to make conclusions about the association between specific communication impairments (e.g., speech impairment) and participation in life activities.

In this review, efforts were made to ensure that speech impairment was one of the main phenomena under investigation in the reviewed studies. That is, studies were included when at least some of the participants were explicitly described as having difficulty with producing sounds (articulation) or the use of phonological processes. In most of the cited studies, a distinction between articulation and phonological-based impairments was not made. It is
acknowledged that phonology is often considered a part of language, and therefore participants with phonological-based impairments may experience speech and language impairments. In such instances, it is not possible to isolate the association between the presenting speech impairment and the identified Participation Restrictions. The same is true when participants presented with identified, co-occurring speech and language impairments. In this review, a decision was made to include studies investigating different participant groups—some with speech impairment in isolation and others with co-occurring speech and language impairment—when the speech impairment was explicitly described (as above). It is recognized that the inclusion of both groups of participants is a second limitation of this review. However, it is also recognized that individuals with speech impairment are a heterogenous group. In some instances, the speech impairment experienced by participants may be associated with a yet undiagnosed cause. In other cases, Environmental Factors (e.g., support/attitudes of their significant others, access to services) or Personal Factors (e.g., temperament, age) may also contribute to the Participation Restrictions experienced.

Due to the unique factors that contribute to each participant’s life and the variable nature of speech impairment itself, it will never be possible to remove all confounding variables in order to research a group with identical characteristics—individual variation will always exist. However, future research could investigate some of the factors that may contribute to this individual variation. The ICF (WHO, 2001) provides a starting point for such research. For instance, researchers could develop a system to classify severity of speech impairment (e.g., mild, moderate, etc.) using the quantifiers from the Body Functions and Structures component, and investigate the association between severity and Participation Restrictions; researchers could develop assessment tools incorporating the domains from the Activity and Participation component and administer these with participants and/or their significant others to investigate their perceptions of Participation Restrictions associated with speech impairment, or to investigate the three domains not identified in previous research (General tasks and demands, Domestic life and Community, social and civic life); alternatively, researchers could investigate specific Environmental Factors such as the perceptions and attitudes of others towards individuals with speech impairment, or Personal Factors such as social upbringing and family history of speech impairment, to examine the association between these variables and participation in life activities.

Conclusion

The preceding review indicated that speech impairment may be associated with limitations and restrictions defined in at least 6 of the 9 Activities and Participation chapters of the ICF (WHO, 2001). These include: Learning to read/reading, Learning to write/writing, Attention and thinking, Calculating, Communication, Mobility, Relating to persons in authority, Informal relationships with friends/peers, Parent-child relationships, Sibling relationships, School education and Acquiring, keeping and terminating a job. The three ICF chapters that were not associated with speech impairment were: General tasks and demands, Domestic life and Community, social and civic life; however, this may be due to the fact that to date no-one has studied potential associations. It is not possible to make conclusions about the nature of the association between speech impairment and these activities. That is, it is unclear whether experiencing a speech impairment causes or increases the likelihood of these Participation Restrictions. Furthermore, it is unclear what role other factors (Environmental and Personal Factors) play in facilitating or acting as barriers to success in these activities. Ongoing research will continue to inform speech-language pathologists of the nature of the association between speech impairment and life activities, and the contribution of other factors. However, the findings of this review show the need for holistic consideration of individuals with speech impairment, and support the use of a framework such as the ICF (WHO, 2001) as a means to do this.

Notes

1. Capitalization has been used for these terms to be consistent with usage in the ICF and to differentiate between everyday usage of these terms.
2. Hereafter referred to as Participation Restrictions.

References


## Appendix. Reviewed studies and the reported areas of difficulty.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants</th>
<th>Age at first testing</th>
<th>Age at follow-up</th>
<th>Description of communication impairment</th>
<th>ICF areas of difficulty*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chapter 1: Learning and applying knowledge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bishop &amp; Clarkson (2003)</td>
<td>75 (+161 in control group)</td>
<td>7–13 years</td>
<td>N/A</td>
<td>Specific speech and/or language impairment</td>
<td>Learning to write (spelling)/Writing/ Writing messages³</td>
</tr>
<tr>
<td>Carroll &amp; Snowling (2004)</td>
<td>34 (+17 in control group)</td>
<td>Approximately 4–6 years</td>
<td>N/A</td>
<td>Speech impairment</td>
<td>Learning to read (speech processing, phonological learning, phonological awareness)</td>
</tr>
<tr>
<td>De Thorne et al. (2006)</td>
<td>248 twin pairs</td>
<td>Mean 6;08 years</td>
<td>N/A</td>
<td>Speech impairment (+/– language impairment)</td>
<td>Learning to read (inc. phonological awareness, word identification)</td>
</tr>
<tr>
<td>Gernand &amp; Moran (2007)</td>
<td>12 (+12 in control group)</td>
<td>5;11–7;2 years</td>
<td>N/A</td>
<td>Mild-moderate phonological impairment</td>
<td>Learning to read (phonological awareness)</td>
</tr>
<tr>
<td>Hauner, Shirberg, Kwiatkowski &amp; Chad (2005)</td>
<td>29 (+87 in control group)</td>
<td>3–6 years</td>
<td>N/A</td>
<td>Speech delay (+/– developmental psychosocial involvement)</td>
<td>Attention/Conversation⁷ (conversational competence)</td>
</tr>
<tr>
<td>Hesketh (2004)</td>
<td>35</td>
<td>3½–5 years</td>
<td>Approximately 6½–7½ years</td>
<td>Moderate-severe speech disorder</td>
<td>Learning to read (phonological awareness)</td>
</tr>
<tr>
<td>Hesketh, Adams &amp; Nightingale (2000)</td>
<td>61 (+59 in control group)</td>
<td>3½–5 years</td>
<td>N/A</td>
<td>Phonological disorder</td>
<td>Learning to read (phonological awareness)</td>
</tr>
<tr>
<td>Holm, Farrier &amp; Dodd (2008) [Experiment 1]</td>
<td>46 (+15 in control group)</td>
<td>Mean age 5–5½ years</td>
<td>N/A</td>
<td>Speech disorder (delayed/consistent errors/inconsistent)</td>
<td>Learning to read (phonological awareness)</td>
</tr>
<tr>
<td>Holm, Farrier &amp; Dodd (2008) [Experiment 2]</td>
<td>9 (+9 in control group)</td>
<td>3–5 years</td>
<td>Approximately 7½–8½ years</td>
<td>Speech disorder (inconsistent)</td>
<td>Learning to write (spelling)</td>
</tr>
<tr>
<td>Larriée &amp; Catts</td>
<td>30 (+27 in control group)</td>
<td>5;8–7;3 years</td>
<td>N/A</td>
<td>Expressive phonological disorders (speech +/- language impairment)</td>
<td>Reading</td>
</tr>
<tr>
<td>Leitão &amp; Fletcher (2004)</td>
<td>14</td>
<td>5–6 years</td>
<td>12–13 years</td>
<td>Specific speech impairment (developmental/non-developmental)</td>
<td>Learning to read (phonological awareness)/ Spelling/Reading (comprehension)</td>
</tr>
<tr>
<td>Leitão, Fletcher &amp; Hogben (2000)</td>
<td>21</td>
<td>Approximately 5–6 years</td>
<td>Approximately 7–8 years</td>
<td>Specific speech impairment (delayed/non-developmental)</td>
<td>Reading/Spelling/Speaking⁴ (residual speech errors)</td>
</tr>
<tr>
<td>Lewis, Freebairn, Hansen, Iyengar &amp; Taylor (2004)</td>
<td>39</td>
<td>4–6 years</td>
<td>8–10 years</td>
<td>Speech sound disorder (+/- language impairment) Childhood apraxia of speech</td>
<td>Reading/Spelling/Speaking⁵ (residual speech errors, expressive language)/Receiving spoken messages³ (receptive language skills)</td>
</tr>
<tr>
<td>Lewis et al. (2007)</td>
<td>147 parents of children with speech sound disorder</td>
<td>N/A</td>
<td>N/A</td>
<td>Speech sound disorder (+/- language impairment)</td>
<td>Reading/Spelling/Speech⁷ Receptive language Skills³</td>
</tr>
<tr>
<td>Lewis, Freebairn &amp; Taylor (2002)</td>
<td>52</td>
<td>4–6 years</td>
<td>8–11 years</td>
<td>Phonological disorder (+/- language impairment)</td>
<td>Spelling/Reading (decoding and comprehension)/Speaking⁰ Reading/Spelling</td>
</tr>
<tr>
<td>Lewis, Freebairn &amp; Taylor (2000)</td>
<td>52</td>
<td>4–6 years</td>
<td>8–11 years</td>
<td>Phonological disorder (+/- language impairment)</td>
<td></td>
</tr>
<tr>
<td>McGrath et al. (2008)</td>
<td>108 (+41 in control group)</td>
<td>4–7 years</td>
<td>N/A</td>
<td>Speech sound disorder (+/- language impairment)</td>
<td>Attention</td>
</tr>
<tr>
<td>Nathan, Stackhouse, Goulandris &amp; Snowling (2004a)</td>
<td>28 (+19 in control group)</td>
<td>4 years</td>
<td>7 years</td>
<td>Speech difficulty (+/- language impairment)</td>
<td>Learning to read (e.g. phoneme awareness)</td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants</th>
<th>Age at first testing</th>
<th>Age at follow-up</th>
<th>Description of communication impairment</th>
<th>ICF areas of difficulty*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nathan, Stackhouse, Goulandris &amp; Snowling (2004b)</td>
<td>39 (+ 35 in control group)</td>
<td>4–5 years</td>
<td>Mean 6.71 years</td>
<td>Speech difficulty/disorder</td>
<td>Spelling/Reading/Reading (comprehension)/Calculating (maths)</td>
</tr>
<tr>
<td>Ozzebe &amp; Belgin (2005)</td>
<td>33 (+ 160 in control group)</td>
<td>6–10 years</td>
<td>N/A</td>
<td>Functional articulation disorder</td>
<td>Thinking (memory, thinking, reasoning and information processing)</td>
</tr>
<tr>
<td>Pershey &amp; Glicker (2007)</td>
<td>23 (+ 23 in control group)</td>
<td>6–9 years</td>
<td>N/A</td>
<td>Phonological impairment</td>
<td>Learning to read/Reading/Spelling/Communication†</td>
</tr>
<tr>
<td>Preston &amp; Edwards (2007)</td>
<td>13 (+ 14 in control group)</td>
<td>10–14 years</td>
<td>N/A</td>
<td>Speech sound difficulty</td>
<td>Learning to read (phonological awareness/processing)</td>
</tr>
<tr>
<td>Raitano et al. (2004)</td>
<td>101 (+ 41 in control group)</td>
<td>5–6 years</td>
<td>N/A</td>
<td>Speech sound disorder</td>
<td>Learning to read (phonological awareness and letter knowledge)</td>
</tr>
<tr>
<td>Rivachew (2007)</td>
<td>33 (+ 35 in control group)</td>
<td>4½–5½ years</td>
<td>6–7½ years</td>
<td>Speech sound disorder</td>
<td>Learning to read (phonological awareness)/Reading</td>
</tr>
<tr>
<td>Rivachew &amp; Grawburg (2006)</td>
<td>95</td>
<td>Approximately 4–5 ½ years</td>
<td>N/A</td>
<td>Speech sound disorder</td>
<td>Learning to read (phonological awareness)</td>
</tr>
<tr>
<td>Rivachew, Oberg &amp; Grawburg (2003)</td>
<td>13 (+ 13 in control group)</td>
<td>4–5 years</td>
<td>N/A</td>
<td>Severe expressive phonological delay</td>
<td>Learning to read (phonological awareness, phoneme perception)</td>
</tr>
<tr>
<td>Sikes, Taylor, Freebairn, Hansen &amp; Lewis (2007)</td>
<td>125</td>
<td>3–6 years</td>
<td>N/A</td>
<td>Speech sound disorder</td>
<td>Reading/Writing</td>
</tr>
<tr>
<td>Snowling, Bishop, Stothard, Chipchase &amp; Kaplan (2006)</td>
<td>71</td>
<td>Approximately 4 years</td>
<td>15–16 years</td>
<td>Speech impairment</td>
<td>Attention</td>
</tr>
<tr>
<td>Sutherland &amp; Gillon (2005)</td>
<td>11 (+ 17 in control group)</td>
<td>4–5 years</td>
<td>N/A</td>
<td>Speech difficulty</td>
<td>Learning to read (phonological awareness, phonological representation)</td>
</tr>
<tr>
<td>Teeverovsky, Bickel &amp; Feldman (2009)</td>
<td>192 parents</td>
<td>Children 2–15 years</td>
<td>N/A</td>
<td>Childhood apraxia of speech</td>
<td>Learning to write/Conversation†/Discussion†/Fine hand use†/Relating with strangers†/Informal relationships†</td>
</tr>
<tr>
<td>Tunick &amp; Pennington (2002)</td>
<td>172 (86 twins)</td>
<td>Approximately 11 years</td>
<td>N/A</td>
<td>Reading disorder</td>
<td>Reading</td>
</tr>
<tr>
<td>Young et al. (2002)</td>
<td>109 (+ 120 in control group)</td>
<td>5 years</td>
<td>18–19 years</td>
<td>Speech impairment</td>
<td>Reading</td>
</tr>
</tbody>
</table>

**Chapter 3: Communication**

Communication is also mentioned in papers indicated by a superscript 3 in the final column of this appendix.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants</th>
<th>Age at first testing</th>
<th>Age at follow-up</th>
<th>Description of communication impairment</th>
<th>ICF areas of difficulty*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glogowska, Roulstone, Peters &amp; Enderby (2006)†</td>
<td>196 (+ 94 in control group)</td>
<td>Pre-school</td>
<td>7–10 years</td>
<td>Speech and/or language impairment</td>
<td>Speaking/Informal social relationships†/Family relationships (parents, siblings)†</td>
</tr>
<tr>
<td>Hannson, Nettelbladt &amp; Nilholm (2000)</td>
<td>10 children, parents, clinicians and peers</td>
<td>4–6 years</td>
<td>N/A</td>
<td>Phonological impairment</td>
<td>Speaking (language output)/Informal social relationships† (peer interactions)/Formal/family relationships (adult interactions)†</td>
</tr>
</tbody>
</table>

*(continued)*
## Appendix. (Continued)

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants</th>
<th>Age at first testing</th>
<th>Age at follow-up</th>
<th>Description of communication impairment</th>
<th>ICF areas of difficulty*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haskill &amp; Tyler (2007)</td>
<td>63 (+ 20 in control group)</td>
<td>3–5;11 years</td>
<td>N/A</td>
<td>Phonological and language impairment</td>
<td>Speaking (morphosyntactic skills)</td>
</tr>
<tr>
<td>Nathan (2002)</td>
<td>10 (+ 10 in control group)</td>
<td>4;66–7;75 years</td>
<td>N/A</td>
<td>Speech difficulty/disorder</td>
<td>Speaking (including language skills)/Conversation</td>
</tr>
<tr>
<td>Nathan, Stackhouse &amp; Goulandris (1998)</td>
<td>47 (+ 47 in control group)</td>
<td>4–5 years</td>
<td>N/A</td>
<td>Specific speech impairment (+/– language impairment)</td>
<td>Speaking/Receiving spoken messages (speech processing)</td>
</tr>
<tr>
<td>Yont, Hewitt &amp; Miccio (2002)</td>
<td>12 (+ 12 in control group)</td>
<td>Mean age 4; 1 year</td>
<td>N/A</td>
<td>Specific language impairment: Phonological disorder</td>
<td>Conversation</td>
</tr>
</tbody>
</table>

### Chapter 4: Mobility

Mobility is also mentioned in papers indicated by a superscript 4 in the final column of this appendix.

| Gaines & Masuina (2006) | 40 | 2–5 years | 5–7 years | Speech/language impairment | Mobility/Self help* |
| McCabe, Rosenthal & McLovd (1998) | 50 | 2–4–8;8 years | N/A | Articulation and/or phonological impairment | Mobility (limb apraxia, clumsiness) |
| Newmeyer et al. (2007) | 32 | 2–6 years | N/A | Severe speech sound disorder | Mobility (fine motor skills) |
| Visscher et al. (2007) | 125 | 6–9 years | N/A | Developmental speech and language disorder | Mobility (fine and gross motor skills) |

### Chapter 5: Selfcare

Selfcare is mentioned in papers indicated by a superscript 5 in the final column of this appendix.

### Chapter 7: Interpersonal interactions and relationships

Interpersonal interactions and relationships is also indicated by a superscript 7 in the final column of this appendix.

| Barr, McLeod & Daniel (2008) | 6 siblings 15 ‘significant others’ | Pre-school/school | N/A | Speech impairment | Sibling relationships |
| Glogowska & Campbell (2000) | 16 parents | Children were pre-school aged | N/A | Speech/language delay | Parent-child relationships |
| Markham & Dean (2006) | 12 SLPs 12 professionals 11 parents | Parents of children aged 2–9 years | N/A | Speech and language difficulty | Parent-child relationships |
| Marshall, Ralph & Palmer (2002) | 268 trainee teachers | – | N/A | Speech and language difficulty | Informal interactions (teachers)/School education* |
| McCabe (2005) | 131 (+ 39 in control group) | Approximately 3 ½–5 years | N/A | Speech and/or language impairment | Informal relationships with peers (social skills and behaviour) |
| McLeod & Daniel (2005) | Reported data from 2 (subsample of larger research study) | Pre-school/ school | N/A | Speech impairment | Parent-child relationships |
| Overby, Carrell & Bernthal (2007) | 48 2nd grade teachers | Median age of teachers 41;2 years | N/A | Speech impairment (moderate) | Formal interactions (teachers) |

(continued)
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants</th>
<th>Age at first testing</th>
<th>Age at follow-up</th>
<th>Description of communication impairment</th>
<th>ICF areas of difficulty*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perry-Carson, Canon, Klee &amp; Jackman-Brown</td>
<td>17 (+ 30 in control group)</td>
<td>Mean approximately 2½ years</td>
<td>N/A</td>
<td>Speech and language delay</td>
<td>Parent-child relationships</td>
</tr>
<tr>
<td>(2007)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robertson, Harding &amp; Morrison (1998)</td>
<td>103 (+ 66 in control group)</td>
<td>School-aged (5th and 6th grade)</td>
<td>N/A</td>
<td>Difficulties in articulation, abnormal voice, fluency or language disorder</td>
<td>Informal relationships with peers/ School education (resilience)*</td>
</tr>
<tr>
<td>Rudolph, Kummer, Eysholdt &amp; Rosanowski (2005)</td>
<td>91</td>
<td>Mothers (22-40 yrs)</td>
<td>N/A</td>
<td>Speech (dyslalia) and/or language delay</td>
<td>Parent-child relationships</td>
</tr>
<tr>
<td>Rudolph, Rosanowski, Eysholdt &amp; Kummer (2003)</td>
<td>100</td>
<td>Children (1-7 yrs)</td>
<td>N/A</td>
<td></td>
<td>Parent-child relationships (maternal quality of life)</td>
</tr>
<tr>
<td>Wink, Rosanowski, Hoppe, Eysholdt &amp; Gräsel (2007)</td>
<td>89</td>
<td>Children (1-8 yrs)</td>
<td>N/A</td>
<td>Speech impairment (not otherwise defined)</td>
<td>Parent-child relationships (maternal depression)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Children (1-7 yrs)</td>
<td></td>
<td>Speech and/or language impairment</td>
<td>Parent-child relationships (maternal depression and anxiety)</td>
</tr>
</tbody>
</table>

**Chapter 8: Major life areas**

Major life areas is also mentioned in papers indicated by a superscript 8 in the final column of this appendix.

| Allard & Williams (2008)                      | 455 adults          | 18–49 years         | N/A              | Articulation (lisp), language, fluency, voice disorders                                                | Acquiring, keeping and terminating a job (employability) |
|                                               |                     |                      |                  |                                                                                                           |                          |
| Mitchell, McMahon & McKee (2005)              | 1637 allegations of discrimination | Mean age approximately 41 yrs | N/A              | Speech impairment (not otherwise defined)                                                            | Acquiring, keeping and terminating a job (employment discrimination) |
| Ross, Neeley & Bagg (2007)                    | 123 (+ 47 in control group) | 2nd grade (US)     | N/A              |                                                                                                           | School education (discipline infractions) |
| Snowling, Adams, Bishop & Stothard (2001)     | 71 (+ 49 in control group) | Approximately 4 years | 16–17 years | Language impairment                                                                                      | School education |

**Note:** *Numbers indicate the other ICF Activities and Participation chapters to which the paper relates. Abbreviations: SLP – Speech-language pathologist.*
Paper 5

The impact of speech impairment in early childhood:

Investigating parents’ and speech-language pathologists’ perspectives using the ICF-CY

The impact of speech impairment in early childhood: Investigating parents’ and speech-language pathologists’ perspectives using the ICF-CY

Jane McCormack a,*, Sharynne McLeod a, Linda J. Harrison a, Lindy McAllister b

a Charles Sturt University, Australia
b The University of Queensland, Australia

Received 17 February 2010; received in revised form 12 April 2010; accepted 16 April 2010

Abstract

Purpose: To explore the application of the Activities and Participation component of the International Classification of Functioning, Disability and Health – Children and Youth (ICF-CY, World Health Organization, 2007) as a framework for investigating the perceived impact of speech impairment in childhood.

Method: A 32-item questionnaire based on six ICF-CY domains was distributed to (a) a national sample of speech-language pathologists (SLPs; n = 205), and (b) parents (n = 86) of preschool children identified with speech impairment.

Results: Factor analysis of the SLP data revealed six coherent factors with moderate-high internal reliability: Verbal communication (e.g., Conversation, Speaking), Advanced learning (e.g., Learning to read/write), Interpersonal interactions (e.g., Relating with strangers, Informal social relationships), Basic learning (e.g., Copying, Rehearsing), Applied learning and general tasks (e.g., Focussing attention, Handling stress), and Non-verbal communication. The first five factors were also confirmed by the parent data. Both SLPs and parents rated the first two factors, Verbal communication and Interpersonal interactions, as the most difficult activities for children with speech impairment.

Conclusion: The ICF-CY Activities and Participation component is a useful framework for considering the breadth of activities that may be impacted by speech impairment in childhood.

Learning outcomes: (1) Discuss the potential use of the ICF-CY in speech-language pathology; (2) Describe the breadth of activities that may be difficult for children as a result of speech impairment; and (3) Recognize that SLPs and parents may have different perspectives regarding the impact of speech impairment on children’s activities and participation.

© 2010 Elsevier Inc. All rights reserved.

1. Introduction

Speech impairment, which includes articulatory, phonological, and motor speech disorders, has been identified as the most common communication concern among parents and teachers of preschool children (McLeod & Harrison, 2009). In addition, speech impairment is the most common diagnostic category among referrals received by paediatric

* Corresponding author at: School of Teacher Education, Charles Sturt University, P.O. Box 789, Albury, NSW, 2640, Australia.
Tel.: +61 2 50616835; fax: +61 2 50616772.
E-mail address: jmccormack@csu.edu.au (J. McCormack).
speech-language pathologists (SLPs) (Broomfield & Dodd, 2004; Mullen & Schooling, 2010). Speech impairment may continue beyond childhood (Law, Boyle, Harris, Harkness, & Nye, 2000), and there is a growing awareness that difficulties associated with speech impairment may extend beyond unclear speech (cf. McCormack, McLeod, McAllister, & Harrison, 2009). Consequently, SLPs working with children with speech impairment and their families need a holistic framework to guide their assessment and service provision for these clients and to ensure they address all their clients’ needs.

1.1. The ICF and ICF-CY

The International Classification of Functioning, Disability and Health (ICF) was proposed by the World Health Organization in 2001 as a framework for considering health in a holistic sense. It has been recommended as applicable to the field of speech-language pathology (e.g., Threats, 2006; Threats & Worrall, 2004), and together with the ICF-Children and Youth (ICF-CY; WHO, 2007), has been recommended as applicable specifically to children with speech impairment (e.g., McLeod & McCormack, 2007; McLeod & Threats, 2008).

The ICF and ICF-CY classify health and wellbeing by describing features of health (e.g., speaking, seeing, hearing) and health-related domains (e.g., social interactions) in a structured, inter-related way. Both are organised in a hierarchy, with two parts, each with two components (see Fig. 1). Part 1 relates to Functioning and Disability, and is comprised of the Body Functions and Structures component, and the Activities and Participation component. The Body Functions and Structures component is further divided into eight domains, which are organised according to body structures and systems. The Activities and Participation component is further divided into nine domains which include the tasks and actions in which an individual engages in everyday life. Part 2 is labelled Contextual Factors, and comprises the Environmental Factors component, and Personal Factors component. These components are also further divided into domains which cover the external (Environmental) and internal (Personal) influences on functioning and disability.

The ICF-CY was derived from the ICF to specifically cover the ages from birth to 17 years. The development of the Children and Youth version was deemed necessary to take into account the differences between children and adults, and the constantly changing nature of children’s health and development (McLeod & Threats, 2008). In the ICF-CY, the main structure of the ICF was maintained; however, new content (e.g., new Activities and Participation items) was added and inclusion/exclusion criteria for codes were expanded.

The WHO (2001, 2007) has recognised the range of possible applications of the ICF and ICF-CY; specifically as a statistical tool, a research tool, a clinical tool, a social policy tool and an educational tool. In the application of the ICF to speech-language pathology research, Worrall and Hickson (2008) identified the need to focus on the effect of impairment on the range of Activities and Participation (rather than only the severity or extent of the impairment), as an important consideration for professional practice. At present, there is a lack of empirical data regarding the use of the ICF and ICF-CY (particularly the Activities and Participation component) as a framework for researching effects of impairment. This paper focuses on use of the Activities and Participation component of the ICF-CY in identifying the impact of speech impairment in childhood.

1.2. Activities and Participation

In the ICF and ICF-CY, Activity\(^1\) is defined as “the execution of a task or action by an individual” and Participation is defined as “involvement in a life situation” (WHO, 2001, p. 14). The domains in this component are intended to cover “the full range of life areas” with “no overlap or redundancy” (WHO, 2001, p. 14). Consequently, domains from the ICF and ICF-CY components of Activities and Participation are useful when assessing the impact of a health condition to ensure consideration is given to the full range of areas that may be affected. Nine domains are identified: Learning and applying knowledge, General tasks and demands, Communication, Mobility, Self care, Domestic life, Interpersonal interactions and relationships, Major life areas, and Community, social and civic life. Each domain is described by specific items (total number of two-level items in the ICF-CY = 132).

\(^1\) Capitalization has been used for Activities and Participation terms to be consistent with usage in the ICF and to differentiate between everyday usage of these terms.
Simeonsson (2003) identified a core set of 11 items from the Activities and Participation component of the ICF that could be applied to children with communication impairment. However, the recommended items all came from the Communication domain. Since then, researchers have suggested other domains are also relevant to considering communication skills (McLeod & Threats, 2008; Worrall & Hickson, 2008). Indeed, Worrall and Hickson (2008) have suggested that consideration of the full range of domains should occur in order to avoid “ignoring the effect that a communication disability may have on all areas of life” (p. 76).

In the ICF and ICF-CY, when individuals have difficulty executing activities, it is termed “Activity Limitations” and when individuals experience problems in involvement in life situations, it is termed “Participation Restrictions” (WHO, 2001, p. 10). The potential breadth of Activities and Participation that may be difficult for children with speech impairment may have implications for the ways in which impairments are managed.
1.3. The impact of speech impairment: research using the ICF and ICF-CY

McCormack et al. (2009) conducted a systematic review of 57 papers investigating the association between childhood speech impairment and Activity Limitations and Participation Restrictions across the lifespan. The systematic review used the ICF as its framework to consider the range of Activities and Participation that may be difficult for children with speech impairment. The results of this review showed that speech impairment had been associated with limitations in Activities and Participation related to Learning and applying knowledge (e.g., Reading, Writing, Focussing attention, Thinking), Communication, Mobility, Interpersonal interactions and relationships (e.g., Informal social relationships, Parent–child relationships, Sibling relationships), and Major life areas (e.g., School education and Acquiring, keeping and terminating a job). However, in concluding, McCormack et al. (2009) acknowledged that other factors, including other impairments (e.g., concomitant language impairment), and personal factors could have contributed to the results reported in some of the studies.

Only one of the 57 studies reviewed by McCormack et al. (2009) had used the ICF as a framework to inform their research (Teverovsky, Bickel, & Feldman, 2009), demonstrating the current lack of empirical research investigating the ICF. Teverovsky et al. (2009) used the ICF framework to guide the development of a questionnaire distributed to parents of children (2–15 years) with childhood apraxia of speech (CAS), requesting identification of Activities and Participation that may be difficult for their children. Parents reported the following to be difficult: Communication (e.g., Conversation and Discussion), Mobility (e.g., Fine motor skills), General tasks and demands (e.g., Managing behaviour), Learning and applying knowledge (e.g., Learning to write), and Interpersonal interactions and relationships (e.g., Relating with strangers and peers). The study by Teverovsky et al. (2009) provides valuable information about the potential impact of speech impairment on children’s life activities. However, some of the children were reported to have co-existing medical conditions (e.g., otitis media) so it is possible that the presence of other communication impairments and medical conditions contributed to the problems they experienced. Furthermore, no assessment results were provided to outline the speech skills of the children.

Since publication of the systematic review, Thomas-Stonell, Oddson, Robertson, and Rosenbaum (2009) have drawn on the ICF-CY to analyse the results of a questionnaire distributed to (a) parents of children (2–5;7 years) with a range of communication needs (including 41% with developmental speech disorders) and (b) the SLPs working with them. The questionnaire included three open-ended questions examining the concerns about difficulties experienced by the children and expectations for therapy. Thomas-Stonell et al. (2009) reported that difficulties described by parents and SLPs were aligned with components of the ICF-CY (WHO, 2007). Consequently, they used the ICF-CY to categorise the concerns raised by the parents and SLPs and to enable a comparison between the two groups. Half the parents (48%) and SLPs (50%) were concerned prior to therapy that the children experienced Activity Limitations, and most (85% of SLPs and 63% of parents) expected this to change as a result of intervention. Concerns about Activity Limitations and expectations about improvements to Activities were the most frequent responses.

These two studies provide initial evidence of the usefulness of the ICF and ICF-CY in the field of childhood speech impairment and the importance of considering the Activities and Participation that may be affected by speech impairment (as well as the functional difficulties). However, the type and range of Activities and Participation SLPs and parents perceive as being difficult for children with speech impairment is unknown.

1.4. Incorporating parent perceptions

SLPs have traditionally managed speech impairment on the basis of functional difficulties (McLeod, 2004; Skahan, Watson, & Lof, 2007; Williams, McLeod, & McCauley, 2010). That is, children are diagnosed with speech impairment when unable to articulate particular sounds or words, and intervention then typically targets those sounds and words. While parents and significant others are encouraged to be involved in the management process, SLPs typically make the final decision regarding intervention goals (Watts Pappas, McLeod, McAllister, & McKinnon, 2008). McLeod and Baker (2004) reported that stimulability and normative data more commonly influence SLPs’ decision-making than sounds the parent/child would like to say. Knowledge of parents’ perceptions of the impact of having speech impairment and their preferences for management is necessary for practice to become more family-friendly. It is currently unclear whether SLPs’ perceptions are consistent with parental perceptions regarding the activities that may be affected by childhood speech impairment.
1.5. Aims of this research

The research reported in this paper used the Activities and Participation component from the ICF-CY (WHO, 2007) as a framework for investigating the impact of speech impairment on young children’s life activities. The aims of the research were (1) to explore the usefulness of the ICF-CY as a framework for investigating the impact of speech impairment on life activities in early childhood; (2) to examine the range of Activities and Participation that may be difficult for young children as a result of speech impairment from the perspectives of parents and SLPs; and (3) to compare Activities and Participation identified by parents and by SLPs in order to consider the emphasis and priorities of intervention for those who seek intervention (parents) and those who provide intervention (SLPs) for children with speech impairment.

2. The development of the ICF-CY questionnaire for early childhood

Simeonsson et al. (2003) suggested the ICF could contribute to the development of assessments by guiding the selection of items on questionnaires and scales that document the type and extent of impairments and their impact on functioning and participation. Thus, in order to determine the impact of speech impairment on life activities in early childhood, a questionnaire was developed, based on the Activities and Participation component of the ICF-CY. The list of Activities and Participation items selected for the questionnaire was informed by previous research by McCormack et al. (2009) and Teverovsky et al. (2009). That is, items were selected that previously have been found to be associated with speech impairment. In addition, items were chosen to reflect the tasks and activities relevant to 4–5-year-old children. Consideration was given to all domains of the component, as recommended by Worrall and Hickson (2008). The resulting questionnaire listed 32 items, taken from the ICF-CY Activities and Participation component (see Table 1; Column 1, Domain and Activity). Items were selected from six domains: Learning and applying knowledge (n = 10), General tasks and demands (n = 5), Communication (n = 8), Domestic life (n = 1), Interpersonal interactions and relationships (n = 6), and Community, social and civic life (n = 2). Items from the three other domains were not included: Mobility, Self care, and Major life areas. Items from the Mobility and Self care domains were excluded due to lack of relevance to the population of interest. Most items from the Major life areas were excluded due to lack of relevance to the age group of interest. Two items (Informal education and Preschool education) were appropriate for the age-group, but were omitted because it was likely that some SLPs would not be familiar with this aspect of the children’s experience.

The 32-item ICF-CY questionnaire for early childhood was used in two research studies. Ethical approval for both studies was obtained from the Charles Sturt University Ethics on Human Research Committee.

3. Study one: SLPs’ perceptions of Activities and Participation impacted by speech impairment

3.1. Method

3.1.1. Participants

A total of 240 Australian SLPs were invited to participate in this study during two workshops about children with speech impairment presented as part of Speech Pathology Australia’s professional development program (Baker, 2008; McLeod, 2008). Of these, 231 SLPs returned their questionnaires, with 205 responding to the ICF-CY items.

Participants were asked to provide information about their experience as an SLP (years working in the profession), their caseload (percentage of children with articulation and phonological delay/disorder, or childhood apraxia of speech (CAS)), and their area of specialisation (phonological delay/disorder or CAS). Approximately half of the SLPs (51.5%) had been working for 10 years or less (less than 1 year: 8.0%, 1–3 years: 15.9%, 4–6 years: 16.9%, and 7–10 years: 10.4%). The rest (48.5%) had been working for more than 10 years. Half of the SLPs (50.0%) had caseloads in which at least 40% were children with speech impairment and most (81.7%) had smaller caseloads of children with CAS (e.g., fewer than 10% of the caseload). The majority of SLPs (62.0%) identified that they specialised in the area of phonological delay/disorder, but fewer (21.8%) specialised in CAS. Further information about specialisation was not obtained, thus the extent of participants’ specialised knowledge and skills is unclear.
3.1.2. ICF-CY questionnaire.

SLPs completed a 6-page questionnaire about their assessment and management of children with speech impairment. Only their responses to the 32 ICF-CY questions (listed in Table 1, column 1) were used in the present study. Participants were asked to: “Think of typical 4–5-year-old children with moderate-severe speech impairment and no concomitant language impairment. Please identify any activities that these children may have difficulty

Table 1
SLPs’ perceptions of Activities and Participation that may be difficult for children with speech impairment.

<table>
<thead>
<tr>
<th>Domain and Activity</th>
<th>SLPs (n = 205)</th>
<th>Factor² (loading)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Often</td>
<td>Sometimes</td>
</tr>
<tr>
<td><strong>Learning and applying knowledge (d1)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copying (d130)</td>
<td>55 (27.8%)</td>
<td>135 (68.2%)</td>
</tr>
<tr>
<td>Acquiring information (d132)</td>
<td>31 (16.2%)</td>
<td>129 (67.5%)</td>
</tr>
<tr>
<td>Rehearsing (d135)</td>
<td>61 (31.0%)</td>
<td>129 (65.5%)</td>
</tr>
<tr>
<td>Learning to read (d140)</td>
<td>95 (47.0%)</td>
<td>103 (51.0%)</td>
</tr>
<tr>
<td>Learning to write (d145)</td>
<td>87 (42.6%)</td>
<td>105 (51.5%)</td>
</tr>
<tr>
<td>Acquiring skills (d155)</td>
<td>27 (13.9%)</td>
<td>153 (78.9%)</td>
</tr>
<tr>
<td>Focusing attention (d160)</td>
<td>15 (7.7%)</td>
<td>149 (76.8%)</td>
</tr>
<tr>
<td>Thinking (d163)</td>
<td>5 (2.6%)</td>
<td>105 (55.3%)</td>
</tr>
<tr>
<td>Solving problems (d175)</td>
<td>3 (1.6%)</td>
<td>124 (64.9%)</td>
</tr>
<tr>
<td>Making decisions (d177)</td>
<td>8 (4.2%)</td>
<td>110 (57.6%)</td>
</tr>
<tr>
<td><strong>General tasks and demands (d2)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undertaking a single task (d210)</td>
<td>2 (1.1%)</td>
<td>101 (53.4%)</td>
</tr>
<tr>
<td>Undertaking multiple tasks (d220)</td>
<td>17 (9.0%)</td>
<td>130 (68.8%)</td>
</tr>
<tr>
<td>Carrying out daily routine (d230)</td>
<td>17 (8.9%)</td>
<td>100 (52.1%)</td>
</tr>
<tr>
<td>Managing one’s own behaviour (d235)</td>
<td>15 (7.8%)</td>
<td>149 (77.6%)</td>
</tr>
<tr>
<td>Handling stress and other psychological demands (d240)</td>
<td>31 (16.1%)</td>
<td>151 (78.6%)</td>
</tr>
<tr>
<td><strong>Communication (d3)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receiving – spoken messages (d310)</td>
<td>9 (4.7%)</td>
<td>104 (53.9%)</td>
</tr>
<tr>
<td>Receiving – non-verbal messages (d315)</td>
<td>7 (3.7%)</td>
<td>77 (40.3%)</td>
</tr>
<tr>
<td>Speaking (d330)</td>
<td>160 (79.2%)</td>
<td>38 (18.8%)</td>
</tr>
<tr>
<td>Singing (d330)</td>
<td>81 (42.0%)</td>
<td>102 (52.8%)</td>
</tr>
<tr>
<td>Producing non-verbal messages (d335)</td>
<td>7 (3.6%)</td>
<td>97 (50.5%)</td>
</tr>
<tr>
<td>Conversation (d350)</td>
<td>157 (80.1%)</td>
<td>38 (19.4%)</td>
</tr>
<tr>
<td>Discussion (d355)</td>
<td>155 (78.7%)</td>
<td>40 (20.3%)</td>
</tr>
<tr>
<td>Using communication devices and techniques (d360)</td>
<td>123 (61.5%)</td>
<td>67 (33.5%)</td>
</tr>
<tr>
<td><strong>Domestic Life (d6)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assisting others (d660)</td>
<td>50 (26.3%)</td>
<td>120 (63.2%)</td>
</tr>
<tr>
<td><strong>Interpersonal interactions and relationships (d7)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic interpersonal interactions (d710)</td>
<td>40 (20.8%)</td>
<td>105 (54.7%)</td>
</tr>
<tr>
<td>Complex interpersonal interactions (d720)</td>
<td>53 (27.9%)</td>
<td>109 (57.4%)</td>
</tr>
<tr>
<td>Relating with strangers (d730)</td>
<td>110 (57.0%)</td>
<td>74 (38.3%)</td>
</tr>
<tr>
<td>Formal relationships (d740)</td>
<td>71 (36.2%)</td>
<td>120 (61.2%)</td>
</tr>
<tr>
<td>Informal social relationships (d750)</td>
<td>73 (37.4%)</td>
<td>118 (60.5%)</td>
</tr>
<tr>
<td>Family relationships (d760)</td>
<td>41 (20.9%)</td>
<td>143 (73.0%)</td>
</tr>
<tr>
<td><strong>Community, social and civic life (d9)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreation and leisure (d920)</td>
<td>31 (15.8%)</td>
<td>132 (67.3%)</td>
</tr>
<tr>
<td>Play (d9200)</td>
<td>45 (23.1%)</td>
<td>127 (65.1%)</td>
</tr>
</tbody>
</table>

¹ The code in brackets (e.g., d740) refers to the code in the ICF-CY (WHO, 2007).
² The names of the factors have been created by the researchers. Factor numbers refer to the following: 1 = Applied learning and general tasks, 2 = Interpersonal interactions, 3 = Verbal communication, 4 = Basic learning, 5 = Advanced learning, 6 = Non-verbal communication.
participating in, as a result of his/her speech (communication) difficulty (tick all that apply).” They were asked to rate the frequency of difficulty on a 3-point scale: 0 = never, 1 = sometimes, 2 = often.

3.1.3. Data analysis

Responses to the questionnaire item and demographic data from the SLPs were entered into the Statistical Program for the Social Sciences (SPSS) Version 17.0.2 computer program (PASW Statistics, 2009). Descriptive statistics were used to determine the frequency and perceived level of impact that having a speech impairment had on ICF-CY Activities and Participation. Factor analysis was conducted to examine the coherence of the ICF-CY Activities and Participation domains and to inform the identification and computation of higher order constructs. Participant characteristics (experience, caseload, and specialisation) were tested as a function of ICF-CY ratings in a series of analysis of variance (ANOVA) tests.

3.2. Results

3.2.1. Descriptive statistics: Activities and Participation perceived by SLPs as impacted by speech impairment

A list of all the Activities and Participation items included on the questionnaire is presented in Table 1, with the corresponding number of SLPs who identified each item as “often,” “sometimes” or “never” being difficult for children with speech impairment (Columns 2–4). Not all SLPs responded to each item being analysed for this study, therefore the total number of responses for each item is also given in Table 1 (Column 5). The SLPs identified that all of the 32 listed items could “sometimes” or “often” be difficult for children with moderate-severe speech impairment. Of these, there were five items that were perceived by the majority as “often” being difficult for children with speech impairment: Conversation (80.1%), Speaking (79.2%), Discussion (78.7%), Using communication devices and techniques (61.5%), and Relating with strangers (57.0%). Other items that were frequently identified as often being difficult were: Learning to read (47.0%), Learning to write (42.6%), Singing (42.0%), Informal social relationships (37.4%) and Formal relationships (36.2%). In contrast, Activities and Participation that were frequently identified as “never” being difficult included: Receiving non-verbal messages (56.0%), Producing non-verbal messages (45.8%), Undertaking a single task, (45.5%), Thinking (42.1%), Receiving – spoken messages (41.5%), Carrying out daily routine (39.1%), and Making decisions (38.2%).

3.2.2. Exploratory factor analysis of ICF-CY items

The underlying structure of the 32 ICF-CY items was analysed using Pearson product moment correlations as input in a principal components analysis. Results revealed six factors accounting for 60.19% of the common factor variance. Column 5 of Table 1 shows the Factor number (1–6) and the factor loading coefficient for each of the 32 items. Each of these six factors was given a unique title that drew on the ICF-CY domains and the features of the Activities and Participation items that loaded onto each. The six factors were labelled as: 1 = Applied learning and general tasks (Eigenvalue = 6.95), 2 = Interpersonal interactions (Eigenvalue = 5.78), 3 = Verbal communication (Eigenvalue = 2.07), 4 = Basic learning (Eigenvalue = 1.73), 5 = Advanced learning (Eigenvalue = 1.50), and 6 = Non-verbal communication (Eigenvalue = 1.23).

The 6-factor structure showed coherence with the structure of the ICF-CY, in that the way items loaded onto factors was similar to the groupings of items in the Activities and Participation domains. Factor 1, Applied learning and general tasks, comprised nine items from two of the ICF-CY Activities and Participation domains. All of the items from the General tasks and demands domain loaded on this factor (Undertaking a single task: 0.662, Undertaking multiple tasks: 0.731, Carrying out daily routine: 0.536, Managing one’s own behaviour: 0.623, and Handling stress and other psychological demands: 0.462), along with four items from the Learning and applying knowledge domain (Focusing attention: 0.587, Thinking: 0.738, Solving problems: 0.795, and Making decisions: 0.800).

Factor 2, Interpersonal interactions, related to engaging with others and comprised nine items from three ICF-CY domains. All of the items from the Interpersonal interactions and relationships domain loaded on this factor (Basic interpersonal interactions: 0.652, Complex interpersonal interactions: 0.672, Relating with strangers: 0.599, Formal relationships: 0.678, Informal social relationships: 0.728, and Family relationships: 0.679), along with the two items from the Community, social and civic life domain (Recreation and leisure: 0.664, and Play: 0.643) and the single item from the Domestic life domain (Assisting others: 0.460).
Table 2
Comparison of SLPs’ factor means by SLPs’ demographic and clinical characteristics.

<table>
<thead>
<tr>
<th>SLP characteristics</th>
<th>Factor 1 Applied learning and general tasks Mean (SD)</th>
<th>Factor 2 Interpersonal interactions Mean (SD)</th>
<th>Factor 3 Verbal communication Mean (SD)</th>
<th>Factor 4 Basic learning Mean (SD)</th>
<th>Factor 5 Advanced learning Mean (SD)</th>
<th>Factor 6 Non-verbal communication Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of children with speech impairment on caseload Less than 40% (n = 96)</td>
<td>0.86 (0.35)</td>
<td>1.20 (0.44)</td>
<td>1.65 (0.37)</td>
<td>1.19 (0.42)</td>
<td>1.30 (0.46)</td>
<td>0.55 (0.45)</td>
</tr>
<tr>
<td>40% or more (n = 98)</td>
<td>0.94 (0.34)</td>
<td>1.17 (0.37)</td>
<td>1.62 (0.43)</td>
<td>1.18 (0.38)</td>
<td>1.27 (0.42)</td>
<td>0.60 (0.47)</td>
</tr>
<tr>
<td>Total (n = 194)</td>
<td>0.90 (0.35)</td>
<td>1.19 (0.41)</td>
<td>1.64 (0.40)</td>
<td>1.19 (0.40)</td>
<td>1.29 (0.44)</td>
<td>0.57 (0.46)</td>
</tr>
<tr>
<td>F ratio (significance) 2.218 (p = .138)</td>
<td>0.244 (p = .622)</td>
<td>0.394 (p = .531)</td>
<td>0.009 (p = .926)</td>
<td>0.249 (p = .618)</td>
<td>0.512 (p = .475)</td>
<td></td>
</tr>
<tr>
<td>Percentage of children with childhood apraxia on caseload Less than 10% (n = 160)</td>
<td>0.87 (0.35)</td>
<td>1.20 (0.41)</td>
<td>1.63 (0.41)</td>
<td>1.16 (0.40)</td>
<td>1.26 (0.43)</td>
<td>0.53 (0.46)</td>
</tr>
<tr>
<td>10% or more (n = 37)</td>
<td>0.98 (0.37)</td>
<td>1.19 (0.40)</td>
<td>1.68 (0.36)</td>
<td>1.25 (0.47)</td>
<td>1.41 (0.48)</td>
<td>0.72 (0.37)</td>
</tr>
<tr>
<td>Total (n = 201)</td>
<td>0.90 (0.35)</td>
<td>1.19 (0.41)</td>
<td>1.64 (0.40)</td>
<td>1.17 (0.41)</td>
<td>1.29 (0.44)</td>
<td>0.56 (0.45)</td>
</tr>
<tr>
<td>F ratio (significance) 2.814 (p = .095)</td>
<td>0.018 (p = .893)</td>
<td>0.390 (p = .533)</td>
<td>1.529 (p = .218)</td>
<td>3.291 (p = .071)</td>
<td>5.623 (p = .019)*</td>
<td></td>
</tr>
<tr>
<td>Length of time working as a speech-language pathologist 10 years or less (n = 103)</td>
<td>0.88 (0.38)</td>
<td>1.17 (0.43)</td>
<td>1.61 (0.44)</td>
<td>1.14 (0.40)</td>
<td>1.30 (0.46)</td>
<td>0.55 (0.48)</td>
</tr>
<tr>
<td>More than 10 years (n = 98)</td>
<td>0.92 (0.33)</td>
<td>1.21 (0.37)</td>
<td>1.68 (0.35)</td>
<td>1.22 (0.42)</td>
<td>1.29 (0.42)</td>
<td>0.58 (0.43)</td>
</tr>
<tr>
<td>Total (n = 201)</td>
<td>0.90 (0.35)</td>
<td>1.19 (0.40)</td>
<td>1.65 (0.40)</td>
<td>1.18 (0.41)</td>
<td>1.29 (0.44)</td>
<td>0.57 (0.46)</td>
</tr>
<tr>
<td>F ratio (significance) 0.476 (p = .491)</td>
<td>0.470 (p = .494)</td>
<td>1.474 (p = .226)</td>
<td>2.287 (p = .132)</td>
<td>0.003 (p = .954)</td>
<td>0.262 (p = .609)</td>
<td></td>
</tr>
<tr>
<td>Specialise in phonological delays/disorders Yes (n = 117)</td>
<td>0.93 (0.34)</td>
<td>1.17 (0.37)</td>
<td>1.61 (0.41)</td>
<td>1.19 (0.42)</td>
<td>1.33 (0.46)</td>
<td>0.56 (0.41)</td>
</tr>
<tr>
<td>No (n = 87)</td>
<td>0.89 (0.37)</td>
<td>1.22 (0.42)</td>
<td>1.69 (0.38)</td>
<td>1.19 (0.41)</td>
<td>1.28 (0.43)</td>
<td>0.58 (0.49)</td>
</tr>
<tr>
<td>Total (n = 192)</td>
<td>0.90 (0.36)</td>
<td>1.20 (0.40)</td>
<td>1.66 (0.39)</td>
<td>1.19 (0.42)</td>
<td>1.30 (0.44)</td>
<td>0.57 (0.46)</td>
</tr>
<tr>
<td>F ratio (significance) 0.657 (p = .418)</td>
<td>0.581 (p = .447)</td>
<td>1.773 (p = .185)</td>
<td>0.008 (p = .930)</td>
<td>0.575 (p = .449)</td>
<td>0.124 (p = .725)</td>
<td></td>
</tr>
<tr>
<td>Specialise in childhood apraxia Yes (n = 43)</td>
<td>0.92 (0.35)</td>
<td>1.19 (0.40)</td>
<td>1.65 (0.40)</td>
<td>1.18 (0.41)</td>
<td>1.29 (0.45)</td>
<td>0.57 (0.44)</td>
</tr>
<tr>
<td>No (n = 149)</td>
<td>0.87 (0.38)</td>
<td>1.25 (0.41)</td>
<td>1.69 (0.36)</td>
<td>1.21 (0.45)</td>
<td>1.31 (0.42)</td>
<td>0.57 (0.51)</td>
</tr>
<tr>
<td>Total (n = 192)</td>
<td>0.90 (0.36)</td>
<td>1.20 (0.40)</td>
<td>1.66 (0.39)</td>
<td>1.1887 (0.42)</td>
<td>1.30 (0.44)</td>
<td>0.57 (0.46)</td>
</tr>
<tr>
<td>F ratio (significance) 0.567 (p = .452)</td>
<td>0.700 (p = .404)</td>
<td>0.334 (p = .564)</td>
<td>0.145 (p = .704)</td>
<td>0.056 (p = .813)</td>
<td>0.007 (p = .932)</td>
<td></td>
</tr>
</tbody>
</table>

*aSignificant at p < 0.05 level.

The names of the factors have been created by the researchers and summarise the items that load onto the factors.
Factor 3, Verbal communication, related to producing verbal language and comprised five items, all of which were taken from the ICF-CY domain of Communication (Speaking: 0.789, Singing: 0.515, Conversation: 0.879, Discussion: 0.875, and Using communication devices and techniques: 0.588).

Factor 4, Basic learning, and Factor 5, Advanced learning, were both related to learning and comprised items taken from the Learning and applying knowledge domain. Factor 4 was comprised of the three items that related to skills required for basic learning (Copying: 0.696, Acquiring information: 0.647, and Rehearsing: 0.688). Factor 5 was comprised of three items that related to more advanced learning skills (Learning to read: 0.856, Learning to write: 0.825, and Acquiring skills: 0.512).

Factor 6, Non-verbal communication, related to receptive/non-verbal language and comprised three items from the ICF-CY domain of Communication (Receiving – spoken messages: 0.760, Receiving – non-verbal messages: 0.695, and Producing non-verbal messages: 0.573).

Internal reliability for all factors was tested using Cronbach’s alpha (α) and each was assessed to be within the acceptable range: Factor 1 α = 0.86, Factor 2 α = 0.87, Factor 3 α = 0.81, Factor 4 α = 0.66, Factor 5 α = 0.73 and Factor 6 α = 0.72. Therefore, composite scores were computed by taking the average of the scores for the items that loaded onto the factor to generate six new variables, each with a possible range of 0 (never difficult) to 2.0 (often difficult).

Results showed that SLPs rated Verbal communication (Factor 3) as the most difficult area for children with speech impairment with the highest mean score (M = 1.65, SD = 0.40). Advanced learning (Factor 5) was the second most difficult area (M = 1.30, SD = 0.44). Interpersonal interactions (Factor 2) had a mean score of 1.19 (SD = 0.40) and Basic learning (Factor 4) had a similar rating (M = 1.17, SD = 0.41). Lower ratings were given for Applied learning and general tasks (Factor 1) (M = 0.90, SD = 0.35) and Non-verbal communication (Factor 6) (M = 0.57, SD = 0.45) suggesting that these were perceived as least difficult for children.

3.2.3. Comparison of means (ANOVAs) between SLPs’ perceptions and demographic variables

The six factors were tested using analysis of variance (ANOVA) to determine whether the ratings provided by the SLPs were influenced by the demographic and clinical characteristics of the participants: years of experience (10 or less vs. more than 10); caseload characteristics (percent of children with speech impairment, percent with CAS); specialisation (phonological delay/disorder, CAS). A series of 30 one-way ANOVAs were conducted (six factors by five demographic characteristics). Results (presented in Table 2) were non-significant for 29 tests. Only one achieved significance: SLPs who had a higher percentage of children with CAS on their caseload rated items relating to Non-verbal communication (Factor 6) as more difficult for children with speech impairment than SLPs with a lower percentage of children with CAS. Overwhelmingly, however, the Factor scores did not differ by the demographic characteristics of the SLPs.

4. Study two: parents’ perceptions of Activities and Participation impacted by speech impairment

4.1. Method

4.1.1. Participants

There were 86 parents who participated in this study. All parents had children (aged 3:11–5:8 years; months) who were participating in the Sound Effects Study investigating the prevalence, severity and impact of speech impairment in a community-based sample of children (McLeod, Harrison, & McAllister, 2007-2009). All parents had reported that they were concerned about how their children “talk and make speech sounds.” However, parents were included as participants only when their concern was confirmed by a formal speech assessment (the Diagnostic Evaluation of Articulation and Phonology (DEAP); Dodd, Hua, Crobie, Holm, & Ozanne, 2002), and when they returned their questionnaires. Fig. 2 presents the protocol for inclusion of participants.

Children were identified as having speech impairment when their percentage of consonants correct (PCC) on the DEAP was more than one standard deviation below the normal range for their age (equivalent to a standard score of 6 or below). The children’s PCC on the DEAP ranged from 33.6% to 90.6% (mean = 66.7%). Most of the children were identified as having mild-moderate (57.0%) or moderate-severe (27.9%) speech impairment, according to the Severity Index (Shriberg & Kwiatkowski, 1982). Fewer were identified with mild (4.7%) or severe (10.5%) speech impairment. Only 30.2% of the children had been assessed previously and only 27.9% had received intervention with an SLP in the past. At the time of this study only 15.1% of children were receiving intervention.
4.1.2. ICF-CY questionnaire

Parents were provided with an 18-page questionnaire containing information about their child’s birth and development, current functioning, and lifestyle. One section of the questionnaire was the same as that given to the SLPs in Study 1 and was analysed for this study. Parents were asked, “Please identify any (of the following 32) activities that your child has difficulty participating in, as a result of his/her speech (communication) difficulty (tick all that apply).” Response options were yes (1) or no (0).

4.1.3. Data analysis

Responses to the questionnaire item and assessment results from the 86 children were entered into the Statistical Program for the Social Sciences (SPSS) Version 17.0.2 computer program (PASW Statistics, 2009). Descriptive statistics were used to determine the frequency with which the 32 ICF-CY Activities and Participation items were perceived by parents as difficult for children as a result of speech impairment. The six higher order constructs, based on the factor structure identified in Study 1, were tested for internal consistency and where appropriate, factor composite scores were computed.

4.2. Results

4.2.1. Descriptive statistics: Activities and Participation perceived by parents as impacted by speech impairment

The ICF-CY Activities and Participation items are presented in Table 3, with the corresponding number of parents who identified each item as being difficult (yes) or not difficult (no) for their children. All 32 items were identified as being difficult by at least one parent. The Activities and Participation items most commonly identified as difficult were: Conversation (29.1% of parents), Speaking (27.9%), Learning to write (25.6%), Focusing attention (22.1%), Discussion (18.6%), Handling stress (17.4%), and Managing one’s own behaviour (17.4%). In contrast, the items identified by parents as not being difficult for children were: Carrying out daily routine, Receiving – non-verbal messages, and Recreation and leisure (all 98.8%), and Acquiring skills and Producing non-verbal messages (both identified by 97.7%).

4.2.2. Factor computation

The factor structure identified in Study 1 was applied to Study 2, and the internal reliability was checked. Internal reliability for five of the six factors was within the acceptable range: Factor 1 $\alpha = 0.76$, Factor 2 $\alpha = 0.78$, Factor 3 $\alpha = 0.71$, Factor 4 $\alpha = 0.76$, and Factor 5 $\alpha = 0.68$. The reliability for Factor 6 (Non-verbal communication) was outside the acceptable range ($\alpha = 0.13$) and so was not included in further analyses. Composite scores were computed by averaging the relevant items, to generate five new variables each with a possible range of 0 (not difficult) to 1.0 (difficult).
Results are presented in Table 4 (columns 4–6) and show that Verbal communication (Factor 3) was rated by parents as the most difficult area for children, with the highest mean score ($M = 0.19, SD = 0.26$). Advanced learning (Factor 5) ($M = 0.15, SD = 0.27$) was the second most difficult area and Applied learning and general tasks (Factor 1) ($M = 0.10, SD = 0.17$) was rated the third most difficult. Interpersonal interactions (Factor 2) ($M = 0.07, SD = 0.16$) and Basic learning (Factor 4) ($M = 0.09, SD = 0.23$) were rated the least difficult areas for children.

5. Comparing parent and SLP perceptions

SLPs were asked to base their responses to the questionnaire on their knowledge of a child with “moderate-severe” speech impairment, whereas parents were asked to base their responses on their own child (over half of whom were
assessed as having “mild-moderate” speech impairment). This difference in the severity of speech impairment in the Study 1 and 2 samples prevents direct comparisons being made between the responses of participants. Furthermore, the response options on the ICF-CY questionnaire distributed to parents (yes/no) and SLPs (never/sometimes/often) were different. However, the items on both questionnaires were the same, and the same factor structure was able to be applied to results for both groups in the computation of composite factor scores. Consequently, preliminary comparisons can be made based on results from Study 1 and Study 2, in an attempt to identify similarities and differences in the perceptions of SLPs and parents about the impact of speech impairment on children’s Activities and Participation.

For all the ICF-CY domains and their contributing items (Tables 2 and 3), SLPs were more likely to identify 4–5-year-old children with speech impairment as experiencing some degree of difficulty than were parents of children with speech impairment. Table 4 summarises the factor scores and items within each factor for SLPs and parents. Mean scores were consistently higher for SLPs (means up to 1.65 on a 0–2.0 scale) than for parents (means up to 0.19 on a 0–1.0 scale). However, whilst the mean scores cannot be directly compared, there was similarity in the order of impact. Both groups of participants rated Verbal communication (Factor 3; including Conversation, Speaking, and Discussion) as the area of greatest difficulty for children with speech impairment, followed by Advanced learning (Factor 5; including Learning to read, and Learning to write). For SLPs, Interpersonal interactions (Factor 2; including Relating with strangers, Informal social relationships, and Formal relationships) and Basic learning (Factor 4; including Rehearsing, and Copying) were rated as the next most difficult. Applied learning and general tasks (Factor 1; including Focussing attention, Handling stress, Managing one’s own behaviour, Undertaking multiple tasks) was seen by SLPs to be moderately difficult for children with speech impairment, and Non-verbal communication (Factor 6; including Producing non-verbal messages) was seen as the least difficult.

In contrast, parents’ ratings placed Applied learning and general tasks as an area of greater difficulty than Interpersonal interactions and Basic learning. This suggests that parents and SLPs may have different perceptions regarding the Activities and Participation that are commonly difficult for their children as a result of their speech impairment. Specifically, parents may be more likely to identify Applied learning and general tasks as being problematic in comparison to SLPs.

---

**Table 4**

Mean factor scores for SLPs and parents.

<table>
<thead>
<tr>
<th>Rating</th>
<th>SLPs Factor</th>
<th>Parents Factor</th>
<th>Mean ± SD</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Factor 3 Verbal communication (e.g., Conversation, Speaking, Discussion, Using communication devices, Singing)</td>
<td>Factor 3 Verbal communication (e.g., Conversation, Speaking, Discussion)</td>
<td>1.65 (0.40)</td>
<td>0.19 (0.26)</td>
</tr>
<tr>
<td>2</td>
<td>Factor 5 Advanced learning (e.g., Learning to read, Learning to write)</td>
<td>Factor 5 Advanced learning (e.g., Learning to write, Learning to read)</td>
<td>1.30 (0.44)</td>
<td>0.15 (0.27)</td>
</tr>
<tr>
<td>3</td>
<td>Factor 2 Interpersonal interactions (e.g., Relating with strangers, Informal social relationships, Formal relationships)</td>
<td>Factor 1 Applied learning and general tasks (e.g., Focussing attention, Managing one’s own behaviour, Handling stress, Undertaking multiple tasks)</td>
<td>1.19 (0.40)</td>
<td>0.10 (0.17)</td>
</tr>
<tr>
<td>4</td>
<td>Factor 4 Basic learning and general tasks</td>
<td>Factor 4 Basic learning</td>
<td>1.17 (0.41)</td>
<td>0.09 (0.23)</td>
</tr>
<tr>
<td>5</td>
<td>Factor 1 Applied learning (e.g., Relating with strangers)</td>
<td>Factor 2 Interpersonal interactions (e.g., Relating with strangers)</td>
<td>0.90 (0.35)</td>
<td>0.07 (0.16)</td>
</tr>
<tr>
<td>6</td>
<td>Factor 6 Non-verbal communication</td>
<td></td>
<td>0.57 (0.45)</td>
<td></td>
</tr>
</tbody>
</table>

*a* Items with frequent responses for each factor are listed. The names of the factors have been created by the researchers. The examples are ICF domains.

*b* The possible mean score for SLPs ranged from 0 to 2.0; the possible mean for parents ranged from 0 to 1.0.
6. Discussion

6.1. Use of the ICF-CY (Activities and Participation) as a measure of impact

The first aim of this research was to evaluate the use of the ICF-CY Activities and Participation component as a framework for investigating the impact of speech impairment in childhood. Results from the factor analysis revealed Activities and Participation items were predominantly grouped in factors that were similar in organisation to the ICF-CY Activity and Participation domains, although there were some new groupings that appeared in the factor structure. It is likely that the population under investigation influenced the groupings. For instance, items from the Communication domain loaded onto two separate Factors (3 and 6) which separated verbal versus non-verbal Activities and Participation. Given that this study focussed on children identified with verbal communication difficulties (i.e., speech impairment), the distinction between non-verbal and verbal communication skills (and the difference between SLPs’ ratings of impact for both of these factors) is not unexpected.

Similarly, items from the Learning and applying knowledge domain loaded onto more than one factor, but again there were distinguishing features among the Activities and Participation items identified for each factor. For instance, items loading onto Factor 4 related to skills required for learning, items loading onto Factor 1 related to application of learning/knowledge, and those loading onto Factor 5 related to outcomes of learning. Given that this study focused on preschool children, who are in a rapid period of learning and developing, the distinction between these three separate stages in the acquisition and application of knowledge is particularly relevant.

Finally, Activities and Participation items from three different domains (Interpersonal interactions and relationships, Community, social and civic life domain, Domestic life) combined to form Factor 2, Interpersonal interactions, which related to engaging with others. This reflects the way in which communication and social interactions pervade many other activities of daily life, and thus supports the recommendation by Worrall and Hickson (2008) to consider more than just two ICF Activities and Participation domains (Communication and Interpersonal interactions and relationships) when investigating the effect of communication impairment.

The internal reliability of the groupings identified through factor analysis was examined using Cronbach’s alpha, and all were found to be within an acceptable range. The coherence of the six factors was confirmed in a series of one-way ANOVAs which showed that the demographic and caseload characteristics of the SLPs did not influence their scores, in 29 of 30 tests. That is, using the questionnaire as a measure of impact worked equally effectively regardless of the experience or specialisation of the participant. Only one difference was noted: SLPs who had more children with CAS on their caseload rated Non-verbal communication as more difficult for children with speech impairment than did SLPs with fewer children with CAS. The significance of this one ANOVA may be due to a Type 1 error, given the number of tests that were conducted. However, the significance may also be evidence of child-driven differences rather than participant-driven differences. CAS may be associated with an underlying motor impairment that could contribute to a range of difficulties (including difficulties with skills required for Non-verbal communication such as gesture), not typically associated with speech impairment (Hall, 2000; McCabe, Rosenthal, & McLeod, 1998). In this study, SLPs were asked to think about “typical 4–5-year-old children with a moderate-severe speech impairment” so those with a higher number of children with CAS on their caseload might have been thinking about these children with CAS when responding to items.

A further test of the coherence of the factors was conducted by applying the factor structure identified with the SLPs to the parent findings and re-checking the internal reliability. Five of the six factors achieved an acceptable level of reliability. Only Non-verbal communication (Factor 6) had low internal reliability. Notably, two of the three Activities and Participation items (Receiving – non-verbal messages, and Producing non-verbal messages) in this factor were the least frequently identified by parents (n = 1 and n = 2 respectively), suggesting that the low number of responses to these items affected the reliability of this factor. The otherwise consistent reliability of the factor structure when applied to different participants (both SLPs and parents) is further evidence of the effectiveness of the questionnaire as a measure of impact.

The ICF-CY Activities and Participation component has not been tested previously in this empirical way, and so the results of the present research, which are based on close to 300 participants, make an important contribution to research investigating the application of the ICF-CY as a clinical tool in the field of speech-language pathology.
6.2. Activities and Participation impacted by speech impairment as perceived by parents and SLPs

The secondary aim of this research was to examine the range of Activities and Participation that may be difficult for children as a result of speech impairment and to compare the perspectives of SLPs and parents. Such comparison enables evaluation of the degree to which the two groups view the impairment from similar or different perspectives. Both groups perceived that children with speech impairments experienced difficulties with a range of activities as a result of their speech impairment. Indeed there were no Activities and Participation items that SLPs and parents identified as not being impacted.

The questionnaire completed by SLPs allowed them to distinguish between Activities and Participation that were “often” versus “sometimes” impacted by speech impairment. The majority of SLPs identified most Activities and Participation as being “sometimes” affected, which likely reflects their awareness that the experience of difficulty is dependant both on individuals and their environment. The impact of speech impairment on participation in life activities will not be the same for each child, nor will it be the same for a single child in different contexts. The ICF and ICF-CY recognise that functioning and disability are multifaceted and result from “an interaction or complex relationship between the health condition and contextual factors (i.e., environmental or personal factors)” (WHO, 2001, p. 19). Parent responses also reflected this individuality. Awareness of the possible range of Activities and Participation that may be impacted by speech impairment, and of the variability that exists among individual children, is important for SLPs to ensure appropriate clinical management. The Activities and Participation items identified by parents and SLPs as being impacted by speech impairment are grouped according to the factors to which they contributed and discussed in the following sections.

6.2.1. Factor 1: Applied learning and general tasks

Parents rated difficulties with Applied learning and general tasks as the third most impacted area for their children with speech impairment ($M = 0.10$ on a 0–1.0 scale), compared with SLPs ($M = 0.90$ on a 0–2.0 scale) who rated it fifth. The factor scores for both parents and SLPs suggest neither group identified this area as being difficult for children with speech impairment. However, investigation of individual item scores showed four of the Activities and Participation items most frequently identified by parents as being impacted by their child’s speech impairment fall with this factor—Focusing attention (22.1%), Managing one’s own behaviour (17.4%), Handling stress and other psychosocial demands (17.4%), and Undertaking multiple tasks (15.1%). A similar percentage of SLPs as parents identified Handling stress as an area that might be difficult for children with speech impairment (16.1%), but fewer identified Managing behaviour. Focusing attention, and Undertaking multiple tasks as “often” being an area of difficulty. None of the Activities and Participation items was among the most commonly identified by SLPs, as most indicated that they could be impacted “sometimes.”

The findings of the present study are consistent with findings by Teverovsky et al. (2009) who identified that parents of children with speech impairment (or CAS) are concerned about their child’s ability to participate in activities related to Applying knowledge and general tasks. For instance, Teverovsky and colleagues reported Managing behaviour to be one of the most common areas of Activities and Participation with which children with CAS have difficulty. Half the parents who participated in their study identified Managing behaviour as a functional problem experienced by their children.

It is possible that the parent’s identification of difficulty Handling stress and Managing behaviour is due to their awareness of their child’s frustration with communication breakdowns associated with their speech impairment. Families of children with speech impairment have reported children may withdraw from communication interactions, or alternatively become frustrated when their attempts to communicate are not understood (McCormack, McLeod, McAllister, & Harrison, 2010). Parents’ identification of the difficulty that children with speech impairment may have with general tasks and demands is evidence of the different knowledge they have about the impact of speech impairment in other contexts. This supports the finding of Thomas-Stonell et al. (2009, p. 39) that “parents were more aware of their child’s participation restrictions than clinicians.” SLPs may be less aware of a client’s difficulty with Handling stress and Managing behaviour due to the limited contexts in which they observe and interact with children. Thus, parents provide a unique and valuable perspective that is not otherwise available to SLPs.

6.2.2. Factor 2: Interpersonal interactions

The area of Interpersonal interactions was rated by SLPs as the third most impacted for children with speech impairment ($M = 1.19$ on a 0–2.0 scale), compared to parents, whose scores rated it fifth ($M = 0.07$ on a 0–1.0 scale).
The SLPs’ mean score indicates that they perceive Interpersonal interactions are “sometimes-often” difficult for children as a result of their speech impairment; however, the parents’ mean score suggests they perceive this area is rarely difficult.

Inspection of parents’ and SLPs’ responses to individual Activities and Participation items in this factor revealed both groups recognised that Relating with strangers commonly caused difficulties for children with speech impairment. Previous research has found perceptions of intelligibility to be associated with familiarity (Flipsen, 1995), with “strangers” rated as the group most likely to be have difficulty understanding children with speech impairment (McLeod, 2009; McLeod, Harrison, & McCormack, 2010). Consequently, it would be expected that children with speech impairment would experience greater difficulty when communicating with strangers than with others.

SLPs also identified children with speech impairment had difficulties with Formal relationships and Informal social relationships; however, this was less commonly reported by parents. It may be that parents often observe their children interacting with others who are familiar with their speech and so difficulties with the interaction are not encountered. Alternatively, it may be that their children with speech impairment have other strategies for making themselves understood that prevent their speech impairment from impacting significantly on interactions. Teverovsky et al. (2009) reported both Relating with strangers and Informal social relationships were commonly identified by parents of children with CAS as being areas of difficulty.

6.2.3. Factor 3: Verbal communication

As would be expected, SLPs and parents both rated Verbal communication as the most difficult area for children with speech impairment (M = 1.65 on a 0–2.0 scale and M = 0.19 on a 0–1.0 scale, respectively). However, the mean scores were considerably lower for parents, suggesting a difference in the degree of impact perceived by the two groups. It is possible that the difference was related to the instructions given to both sets of participants. For instance, SLPs were asked to base their responses on a past or current client with moderate-severe speech difficulty. In contrast, parents based their responses on their own child; for some parents, their child’s speech impairment was not diagnosed as moderate-severe. Other parents may not have perceived their child’s speech impairment as severe due to their own ability to understand their child’s speech. Thus, they may have been less likely to identify the impact of speech impairment compared to the SLPs.

The Verbal communication factor comprised four of the five Activities and Participation items that were identified by SLPs as “often” difficult for children with speech impairment (Conversation, Speaking, Discussion, and Using communication devices), and the two most common Activities identified by parents as being difficult (Conversation and Speaking). These findings are consistent with those of Teverovsky et al. (2009), who reported difficulties with verbal communication-based skills (Conversation and Discussion) as being the most common difficulties identified by parents of children with CAS.

6.2.4. Factor 4: Basic learning

The Factor scores for Basic learning revealed this area to be one of the less difficult for children with speech impairment, as rated by SLPs (M = 1.17) and parents (M = 0.09). For both groups of participants, the scores computed for this factor were similar to those computed for Interpersonal interactions. Inspection of the frequencies for individual items showed most SLPs perceive Activities and Participation items that loaded onto this factor were “sometimes-often” difficult for children as a result of their speech impairment. In contrast, most parents “never” perceived this impact.

6.2.5. Factor 5: Advanced learning

Both SLPs and parents rated Advanced learning as the second most difficult area for children with speech impairment (M = 1.30 and M = 0.15, respectively). Inspection of individual item responses showed the literacy activities (Learning to read and Learning to write) which loaded onto this factor were identified by almost half the SLPs as “often” being impacted by speech impairment. Learning to write was also a skill that parents frequently identified as being difficult for their children as a result of their speech impairment (25.6%). However, fewer parents (16.3%) identified Learning to read as a skill that was difficult.

The responses from parents in this study are again consistent with findings reported by Teverovsky et al. (2009), who found Learning to write was more commonly identified as a difficulty by parents of children with CAS, than was Learning to read. The link between speech impairment (especially when unresolved at the commencement of formal
schooling) and ongoing literacy difficulties is well-established (e.g., Leitão & Fletcher, 2004; Lewis, Freebairn, & Taylor, 2002; Nathan, Stackhouse, Goulandris, & Snowling, 2004; Rvachew, 2007).

6.2.6. Factor 6: Non-verbal communication

Computation of factor scores for Non-verbal communication was only possible for the SLPs, and the mean factor score \((M = 0.57)\) was the lowest of all factors, indicating that Non-verbal communication was rated the least difficult area for children with speech impairment. Inspection of individual item responses from SLPs and parents supports this finding. Activities and Participation items related to receptive language and/or non-verbal communication were among the least frequently identified by both groups of participants. Indeed, over half the SLPs perceived Receiving non-verbal messages to “never” be impacted. In the review by McCormack et al. (2009), 14 papers were found that investigated the association between speech impairment and other communication skills. However, only one paper (Nathan, Stackhouse, & Goulandris, 1998) investigated the link between speech impairment and Receiving spoken messages. Nathan et al. (1998) found children with speech and language impairment had greater difficulties with speech processing. No papers had examined the link between speech impairment and non-verbal language when there was no evidence of co-occurring language impairment. The link between childhood speech impairment and receptive language or non-verbal communication skills may as yet be under-researched; however, the present study indicates that SLPs and parents are more concerned about the impact of speech impairment on verbal communication.

6.3. Limitations

One limitation affecting the comparability of the two studies reported here has already been identified: that is, the possibility that the SLPs and the parents were basing their responses on different levels of severity of speech impairment when answering the questionnaire. A further limitation is that the questionnaires distributed to SLPs and parents had different scales. As the parent questionnaire was only one of a number of demands placed on participating parents in the larger Sound Effects Study, a decision was made to reduce the response burden in a lengthy questionnaire by requesting only a yes/no response, rather than the 3 item Likert scale (often/sometimes/never) that was used in the SLP questionnaire.

In an ideal situation, the parents and SLPs would be asked to complete the same questionnaire and to report on the same children. In the Sound Effects Study, all of the children whose parents participated were recruited from a community sample, rather than through an SLP service. Indeed, only 15% of children were currently receiving intervention with an SLP. Consequently, a separate recruitment procedure was used to investigate the perceptions of SLPs. Therefore, it is not possible to form conclusions about the consistency (or otherwise) of parent and SLP perceptions of Activities and Participation that may be difficult for children with speech impairment. However, the results of this study provide preliminary information regarding the perceptions of both groups, and it is possible to draw some inferences from them.

It may also be considered a limitation that the items selected for the questionnaire were not evenly distributed across the nine Activities and Participation domains, with a greater number taken from the domains relating to Communication and Interpersonal interactions and relationships, and some domains lacking any representation. Non-verbal communication items were included and these did not yield the same robust findings as other questionnaire items. This, with the fact that items that were selected were not chosen by all participants, suggests that respondents did not simply check off all options provided to them and justifies the lack of non-related items in the questionnaire.

The items that were selected for this study aimed to reflect the most relevant and appropriate items for inclusion in a questionnaire about speech impairment in children. It is acknowledged that other items excluded from the questionnaire developed in this research (particularly those related to Major life areas such as preschool education) may be appropriate to incorporate in future research. Thus, the development of the questionnaire for this study may be regarded as a preliminary step in designing a clinical tool to investigate the full range of Activities and Participation that may be impacted by speech impairment in early childhood.

6.4. Conclusion

There is an existing body of literature that provides evidence of the impact that speech impairment may have on children’s lives. This paper is unique in considering the impact of speech impairment using the ICF-CY Activities and
Participation component as a framework. The breadth of Activities and Participation identified shows the value of the ICF and ICF-CY as frameworks for considering health conditions (including speech impairment) in a more holistic manner.

This study found Activities and Participation that may be difficult for children as a result of speech impairment extend beyond communication and include interpersonal interactions, learning (especially writing/spelling), and handling stress and other psychosocial demands. Further research should seek to determine whether SLPs’ knowledge of the breadth of difficulties caused by speech impairment corresponds to the provision of interventions that aim to lessen the difficulties.

Results from the research also provide further evidence of the value of including parents in the assessment and intervention process. Parents have expert knowledge of the impact that speech impairment has on their children’s participation in other activities and this knowledge should be a factor, if not a priority, when selecting intervention goals. A valuable extension to the present research would be to compare parents’ priorities for intervention with SLPs’ goal selection. Through developing a greater understanding of the way in which speech impairment may limit life activities, and through including the views of family members in clinical decision-making, SLPs may be able to address the needs of children with speech impairment and their families in a more holistic manner.

Acknowledgements

The authors wish to thank the children, parents and speech-language pathologists who participated in this research and Speech Pathology Australia for enabling the SLPs’ participation in Study 1. This research was supported by Australian Research Council Discovery Project Grant DP0773978, and The Sir Robert Menzies Memorial Research Scholarship in the Allied Health Sciences. The research comprises a portion of the first author’s PhD, supervised by the subsequent authors.

Appendix A. Continuing education

1. What Activity was the most frequently identified by both parents and SLPs as being impacted by speech impairment in childhood?
   a. speaking
   b. conversation
   c. play
   d. informal social relationships

2. What was the area (Factor) that SLPs rated as least likely to be impacted by speech impairment?
   a. non-verbal communication
   b. basic learning
   c. applied learning
   d. interpersonal interactions

3. What was the area (Factor) that parents rated as least likely to be impacted by speech impairment?
   a. communication
   b. basic learning
   c. applied learning
   d. interpersonal interactions

4. True or False: An SLP’s area of specialisation and years of experience influence the effectiveness of the ICF-CY questionnaire as a measure of impact?

5. True or False: The ICF-CY provides a useful and effective framework for considering the range of activities that may be impacted by speech impairment in early childhood?

References


A nationally representative study of the association between communication impairment at 4-5 years and children’s life activities at 7-9 years

Abstract

Purpose: To examine the longitudinal association between communication impairment (primary or secondary diagnosis) and children’s Activities and Participation (International Classification of Functioning, Disability and Health – Children and Youth, ICF-CY; WHO, 2007).

Method: Participants were 4,329 children in the Longitudinal Study of Australian Children (LSAC): 1,041 (24.0%) were identified with communication impairment at 4-5 years and 3,288 (76.0%) were not identified. At age 7-9 years, Activities and Participation outcomes across five ICF-CY domains were provided by teachers (Academic Rating Scales, Approaches to Learning, Strengths and Difficulties Questionnaire (SDQ), Student-Teacher Relationship Scale), parents (School-Age Inventory of Temperament, SDQ), children (Marsh Self-Description Questionnaire, School Liking, Bullying), and child assessment (Peabody Picture Vocabulary Test–III).

Results: Children identified with communication impairment at 4-5 years performed significantly less well at 7-9 years on all outcomes. Parents and teachers reported slower progression in reading, writing, and overall school achievement than peers. Children reported more bullying, poorer peer relationships, and less enjoyment of school than peers. ANCOVA tests confirmed the significant associations between communication impairment and outcomes, over and above the effects of sex, age, Indigenous status, and socioeconomic status.

Conclusion: Considering the breadth and longevity of Activities and Participation outcomes reveals the potential extent and severity of communication impairment, and directs future research and practice.
Introduction

Communication impairment (including speech sound disorders and/or language impairment) is prevalent in preschool children (e.g., Beitchman, Nair, Clegg & Patel, 1986; McLeod & Harrison, 2009; Tomblin, Records, Buckwalter, Zhang, Smith, & O’Brien, 1997) and continues to be prevalent throughout the school years (Harrison, McLeod, Berthelsen, & Walker, 2009; Law, Boyle, Harris, Harkness, & Nye, 2000). Indeed, data from the National Centre for Education Statistics (NCES, 2009) revealed for US children enrolled in schools “speech or language impairments” were the second most common disability, after specific learning disability. Similar findings were reported by McLeod and McKinnon (2007) for Australian primary and secondary school students: “communication disorder” was the second most prevalent identified area of learning need, after specific learning needs, and was more prevalent than behavioral/emotional difficulties, physical/medical disabilities, intellectual disabilities, hearing or vision impairments. Clearly these reports underline the need for speech and language intervention in school. However, to provide appropriate and holistic intervention programs requires an understanding of the breadth and extent to which communication impairment may limit children’s life activities, including an understanding of the activities that may be most limited.

The ICF-CY

In the current paper, the International Classification of Functioning, Disability and Health – Children and Youth version (ICF-CY; World Health Organization, WHO, 2007) has been used as a framework to enable the association between communication impairment and the life activities of school-aged children to be examined in a holistic manner (McCormack, McLeod, McAllister, & Harrison, 2009).

According to the ICF-CY (WHO, 2007), health and wellbeing result from the
interaction between biology (Body Structures and Functions) and everyday life activities (Activities and Participation), that are influenced by Personal and Environmental Factors. Impairment may be diagnosed when there is a problem with a Body Structure or Function.

Communication (specifically, speech and/or language) impairment results from problems with communication functions (e.g., articulation, producing/receiving messages). For some children, communication impairment presents co-morbidly with another diagnosis such as Down syndrome, or autism spectrum disorder. For other children, communication impairment is a secondary symptom of a structural or functional impairment such as profound hearing loss or neurological damage. However, for many children with communication impairment, their difficulties occur independently of another diagnosis, and present clinically as diagnoses such as specific language impairment, or speech sound disorders of unknown origin (Shriberg, 2004; Shriberg & Kwiatkowski, 1988). For all children with communication impairment, regardless of whether the cause or contributing factors are known, examining the way in which the impairment limits everyday life activities enables the extent and severity of the impairment to be determined, and goals for intervention to be identified.

The ICF-CY provides a comprehensive list of the tasks and actions of everyday life, that is divided into nine domains: Learning and applying knowledge, General tasks and demands, Communication, Mobility, Self care, Domestic life, Interpersonal interactions and relationships, Major life areas, and Community, social and civic life. The nine domains are described by a total of 132 specific items (see for example, Table 1, columns 1 and 2) that form the Activities and Participation component of the ICF-CY. A problem performing any of the activities listed in these domains is termed an

---

2 Capitalization has been used to be consistent with usage in the ICF-CY and to differentiate between everyday usage of these terms.
3 There are 132 items at two-level classification in the ICF-CY, which is the level used in the present study.
“Activity limitation” or “Participation restriction.” According to the ICF-CY (2007), such limitations are recognised when there is discordance between the performance of an individual with an impairment (such as communication impairment) compared to an individual without the impairment (expected performance). Previous research with small and/or clinical samples has demonstrated the association between communication impairment and Activity limitations across multiple domains (McCormack et al., 2009, 2010; Thomas-Stonnell et al., 2009; Teverovsky et al., 2008).

In the following sections, research is reviewed for five of the nine ICF-CY Activities and Participation domains (Learning and applying knowledge, General tasks and demands, Communication, Interpersonal interactions and relationships, Major life areas). The association between communication impairment and Activities and Participation within the other four domains (Mobility, Domestic life, Self care, Community, social and civic life) was not included due to the content of those domains being less appropriate to the school-age group and communication focus of the current study.

**Learning and applying knowledge.**

Learning and applying knowledge covers the actions necessary for acquiring new information and skills or the actions of putting those skills into practice, including attention, early literacy, and calculation skills. Children with communication impairment have been found to have greater difficulty with literacy than their typically developing peers, including difficulties with phonological awareness skills (e.g., Gernand & Moran, 2007), reading (e.g., Harrison et al., 2009; Nathan, Stackhouse, Goulandris & Snowling, 2004a; Tomblin et al., 2000), and spelling (e.g., Nathan et al., 2004a), particularly if the communication impairment is still present when formal literacy instruction commences (Nathan et al., 2004b; Young et al., 2002). School-aged children with communication impairment have also been found to have difficulty with
mathematical skills (Fazio, 1996, 1999; Harrison et al., 2009; Nathan, Stackhouse, Goulardris & Snowling, 2004b), attention (Hauner, Shriberg, Kwiatkowski, & Allen, 2005; McGrath et al., 2008) and approaches to learning (Harrison et al., 2009).

**General tasks and demands.**

General tasks and demands cover the actions necessary for completing everyday tasks and for dealing with problems when task performance breaks down. Children with communication impairment often experience communication breakdowns in their interactions with others (Yont, Hewitt, & Miccio, 2002), and may have difficulty negotiating and resolving issues due to their impairment. For instance, families have reported young children with communication impairment become frustrated when communication breakdowns occur and may withdraw from communication interactions, or become angry/upset when their attempts to communicate are not understood (McCormack et al., 2010; Thomas-Stonell, Oddson, Robertson, & Rosenbaum, 2009). Additionally, researchers have reported that children with identified communication impairment commonly have difficulty with managing behavior (Teverovsky, Bickel & Feldman, 2009: childhood apraxia of speech), and show more problem behaviors (Lindsay & Dockrell, 2000: specific speech and language difficulties). However, other research suggests that associations between communication impairment and behavior in the school classroom may not be direct (Tomblin et al., 2000: language impairment) or straightforward (Redmond & Rice, 1998: specific language impairment). In particular, these studies draw attention to the possible influence of context (i.e., classroom requirements and/or teacher expectations for academic performance) on behavior problems.

**Communication.**

Communication covers the skills necessary for producing and comprehending verbal and non-verbal messages, and for using communication strategies or devices.
Communication impairment may persist into the school years and may be associated with a range of problems producing and understanding language, including difficulties with speech sound production (Roulstone, Miller, Wren, & Peters, 2009), syntactic development (Nippold, Mansfield, Billow & Tomblin, 2009), and speech processing (Nathan, Stackhouse, & Goulandris, 1998). Communication impairment may affect conversation and discussion (Teverovsky et al., 2009), sometimes due to lack of coherence and context (Nathan, 2002).

**Interpersonal interactions and relationships.**

The area of interpersonal interactions and relationships includes the actions of engaging with peers, teachers, family members, strangers, or others. There is a vast body of literature investigating the way in which speech and/or language difficulties influence children’s behavior and socialization. This research has shown that individuals identified with communication impairment in early childhood may experience difficulty with social interactions with peers at school (Fujiki, Brinton, Isaacson & Summers, 2001; Glogowska, Roulstone, Peters, & Enderby, 2006; Lindsay & Dockrell, 2000), and report poorer friendship quality than children without communication impairment (Durkin & Conti-Ramsden, 2007; Fujiki, Brinton, & Todd, 1996). In addition, they may be perceived more negatively than typically developing children by peers at school (e.g., Crowe-Hall, 1991; Silverman & Paulus, 1989) and may experience more bullying (Conti-Ramsden & Botting, 2004; Knox & Conti-Ramsden, 2003; Savage, 2005); however, some researchers have suggested the degree of bullying is no greater than for typically developing children (Lindsay, Dockrell, & Mackie, 2008). Communication impairment in early childhood has also been reported to be associated with changes in the type and/or quality of relationships between children and parents (Perry-Carson, Carson, Klee, & Jackman-Brown, 2007), children and siblings (Barr, McLeod, & Daniel, 2008) and children and teachers (Marshall, Ralph &
Major life areas.

Major life areas covers the activities required for education and/or employment. For school-aged children, education forms a major part of their everyday life, and communication forms a major part of their education. Speaking and listening, reading and writing, are the main modes through which information at school is imparted and skills are taught. Not surprisingly, therefore, individuals with a history of childhood communication impairment require more remedial assistance at school and may complete fewer years of formal education than their peers (Felsenfeld et al., 1994). Robertson, Harding and Morrison (1998) found that students with communication impairment were at risk for school drop-out as they reported feeling less connected to school. Other researchers have suggested students might choose vocational/employment training instead of remaining in the mainstream school system (Snowling, Adams, Bishop & Stothard, 2001) and may undertake less skilled employment than typically developing peers (Clegg, Hollis, Mawhood, & Rutter, 2005; Felsenfeld et al., 1994).

Methods of Studying Communication Impairment

Two types of research studies have been used to examine the association between communication impairment and life activities: 1) those incorporating clinical samples (e.g., Hauner, Shriberg, Kwiatkowski & Allen, 2005; Nathan, 2002; Silverman & Paulus, 1989; Yont, Hewitt & Miccio, 2002); and 2) those incorporating large, population-based samples. In the appendix, a summary is provided of studies that have utilized population samples of children and considered speech and language development as part of the research design. Studies were excluded when the population had a pre-existing condition related to communication impairment (e.g., hearing impairment, or dyslexia).

Studies drawing on clinical samples typically include children with
communication impairment as a primary diagnosis, and exclude children whose communication impairment is related to other structural or functional impairments. Thus, they provide evidence of the links between communication impairment and limitations to life activities that controls for other potentially confounding variables. However, generalization from clinical samples to a wider population of school-age children is limited by factors including the small sample size.

In contrast, studies drawing on non-clinical, nationally representative samples (community and population studies) identify communication impairment in very large samples (as shown in column 4 of the appendix), that enable generalization of results to the larger population. Furthermore, many of these studies incorporate longitudinal data collection which provides a means of examining the factors associated with developing communication impairment (e.g., Harrison & McLeod, 2009; Reilly et al., 2009), the natural history of communication impairment (e.g., Johnson et al., 2010; Law, Tomblin, & Zhang, 2008), and the direct and indirect associations between communication impairment and difficulties with life activities over time (e.g., Tomblin, Zhang, Buckwalter, & Catts, 2000). However, when the outcomes measured in these studies are considered in terms of ICF-CY Activities and Participation domains, a focus on literacy or ongoing communication concerns is indicated (column 6). To date, no population studies have examined the associations between communication impairment and a comprehensive, broad set of life activities in school-aged children.

**Context and Aims of the Current Study**

This study is the fourth in a series of studies that have examined speech and language development of children within the Longitudinal Study of Australian Children (LSAC; Australian Institute of Family Studies, AIFS, 2009) Kindergarten cohort, recruited at age 4-5 years (Harrison & McLeod, 2010; Harrison et al., 2009; McLeod & Harrison, 2009). The LSAC data set documents the development of a large, nationally
representative sample of Australian children and the contexts in which they are raised. Communication development is one of the many areas for which data are available for analysis, and these data have been accessed by McLeod, Harrison and colleagues to investigate the following objectives: First, McLeod and Harrison (2009) reported the prevalence of: (1) expressive speech and language impairment, based on parental concern (25.2%) and teacher concern (22.3%), and (2) receptive language impairment based on parental concern (9.5%), teacher concern (16.9%), and direct assessment (14.7%). Next, Harrison and McLeod (2010) identified risk factors (being male, having ongoing hearing problems, and a more reactive temperament), protective factors (having a more persistent and sociable temperament, and higher levels of maternal wellbeing), and risk/protective factors (having an older sibling, parents speaking a language other than English (LOTE), and parental support for children’s learning at home) for speech and language impairment. Third, Harrison et al. (2009) used longitudinal data to examine the academic progress (literacy and numeracy tasks, and approach to learning) of children identified with speech and language impairment at age 4-5 years when they were 6-7 years of age.

The present study extends this work in three ways, by: (1) examining a further wave of longitudinal data, gathered four years after recruitment, at age 7-9 years; (2) examining the associations between communication impairment and a broad range of life activities (hereafter referred to as Activity and Participation outcomes) including, but also extending beyond, a focus on language and learning outcomes; and (3) drawing on multiple perspectives – reports from children, parents, and teachers, as well as direct assessment – to provide a more holistic examination of Activities and Participation outcomes. The specific aim of this paper was to enable a better understanding of the dimensions of childhood communication impairment by investigating the longitudinal associations between communication (speech and language) impairment at age 4-5
years and five domains of Activities and Participation as defined by the ICF-CY (WHO, 2007), at age 7-9 years. A further aim was to examine the relative strength of these associations after accounting for the contribution of important child and family demographic characteristics to the outcomes.

Method

Participants

Participants were a nationally representative sample of 4,329 children (51.1% boys, 48.9% girls) recruited into the Kindergarten cohort in the Longitudinal Study of Australian Children (LSAC; AIFS, 2009) at age 4-5 years (Wave 1). At the time of data collection for the present study (Wave 3), children had a mean age of 8.26 years (SD = 0.44). Most were aged 8 years or under (73.8%); the rest were 9 years or over (26.2%).

At recruitment (Wave 1), the LSAC Kindergarten cohort (n = 4,983) comprised children aged between 4 years; 3 months to 5 years; 7 months (mean = 4.90 years). The children were recruited from every state and territory in Australia, and sample characteristics (e.g., sex, cultural background, and socio-economic status) were broadly representative of the population (Gray & Smart, 2008) as ascertained by the Australian Bureau of Statistics Census data from 2001. Family cultural background was assessed by parental home language, and identification as Aboriginal and/or Torres Strait Islander. Consistent with the Australian national heritage, there were more than 37 languages spoken by parents; however, the majority (86.4%) were English-only speakers. There were 124 (2.8%) children identified as Aboriginal and/or Torres Strait Islander (Indigenous status). In the present study children were included when they had parent-reported information regarding their communication skills in Wave 1, as well as parent, teacher and/or child data at Wave 3. The maximum sample size was 4,329, as 654 of the original Kindergarten cohort did not participate in Wave 3.

Procedure
Wave 3 of LSAC was conducted between April and December, 2008. Parent and child data were collected during home interviews lasting 1-2 hours and via computer-assisted self-administered questionnaires designed for use in LSAC. Structured interviews were conducted by trained interviewers to obtain information from the primary parent about their child (e.g., health, social/cognitive/behavioral development) and family (e.g., socio-demographic information). Parent questionnaires covered additional aspects of the child’s personality and behavior as well as the family’s functioning and support. The interviewers then administered the Adapted PPVT-III (Rothman, 2003) and assisted the child to complete the self-report questionnaire. With the consent of parents, a questionnaire was mailed to the child’s teacher data for completion and return. Full information about the interviews and content is available elsewhere (AIFS, 2009).

**Measures**

**Indicator of communication impairment.**

At age 4-5 years, the identification of children with communication impairment was based on parent responses (no, yes, a little) at Wave 1 to the following interview question: “Do you have concerns about how [child] talks and makes speech sounds?” The interview question was taken from the *Parents’ Evaluation of Developmental Status* (PEDS; Glascoe, 2000), a screener for identifying developmental delays in young children. Those children whose parents responded “yes” or “a little” to the question were identified as having communication impairment (McLeod & Harrison, 2009). That is, the participants in the current study were 1,041 (24.0%) children identified as having expressive speech or language impairment at 4-5 years, and 3,288 (76.0%) children not identified.

At the time of recruitment (4-5 years), a small proportion of children in the group identified by parents with communication impairment were also identified by
parents with comorbid conditions such as hearing problems (4.8%), learning difficulties (5.7%), and/or vision problems (1.6%). In order to be consistent with Harrison et al. (2009), the sample group was not further distinguished into groups with co-morbid diagnoses.

At Wave 3, teachers reported that 604 children (16.9%) had learning difficulties (including problems with reading/mathematics, communication impairment, Autism spectrum disorder, emotional/behavioral problems, intellectual disability, limited English, and hearing impairment) and were receiving additional services at school; however, further information about the type of services received was not gathered. Of the 604 children, 268 were in the group identified with communication impairment at 4-5 years (that is, 30.9% of children in that group), and 336 were in the group with no communication concerns identified (12.4%). It is important to note that in Australia, the provision of services for school-aged children with communication impairment is variable. SLP services are not mandated, and access and provision of services is inconsistent across states and localities (McLeod, Press, & Phelan, 2010). Therefore, receipt of services (or lack of) does not reflect current communication impairment status.

**Outcome measures (Activities and Participation items).**

Table 1 provides an overview of the five ICF-CY domains, and the measures of child Activities and Participation in those domains selected from the LSAC database because they aligned with the previously reviewed literature. Where an LSAC scale or item was relevant to more than one ICF-CY domain, it was only included under the domain considered the best match.
### Table 1.

**ICF-CY Activities and Participation Domains and Outcome Measures**

<table>
<thead>
<tr>
<th>ICF-CY chapter</th>
<th>ICF-CY domain</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning and applying knowledge (d1)</td>
<td>Activities and participation related to learning and application of language and literacy skills (e.g., d133 Acquiring language, d140 Learning to read, d145 Learning to write, d163 Thinking, d166 Reading, d170 Writing)</td>
<td>Academic Rating Scale – Language and Literacy (NCES, 2002) (T)</td>
</tr>
<tr>
<td></td>
<td>Activities and participation related to learning and application of calculation skills (e.g., d137 Acquiring concepts, d150 Learning to calculate, d172 Calculating)</td>
<td>Academic Rating Scale – Mathematical thinking (NCES, 2002) (T)</td>
</tr>
<tr>
<td></td>
<td>Activities and participation related to attention skills (e.g., d160 Focusing attention, d161 Directing attention)</td>
<td>Approach to Learning Scale (Gresham &amp; Elliott, 1990) (T)</td>
</tr>
<tr>
<td>General tasks and demands (d2)</td>
<td>Activities and participation related to completing tasks and handling demands (e.g., d210 Undertaking a single task, d220 Undertaking multiple tasks, d230 Carrying out daily routine, d235 Managing behaviour, d240 Handling stress and other psychosocial demands)</td>
<td>School-Aged Inventory of Temperament (persistence scale) (McClowry, 1995) (P)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strengths and Difficulties Questionnaire (emotional symptoms) (Goodman, 1997) (T, P)</td>
</tr>
<tr>
<td>Communication (d3)</td>
<td>Activities and participation related to expressive and receptive communication (e.g., d310 Communicating with - receiving - spoken messages, d325 Communicating with - receiving - written messages, d330 Speaking, d345 Writing messages, d360 Using communication devices and techniques)</td>
<td>Peabody Picture Vocabulary Test – III (Dunn &amp; Dunn, 1997) (D)</td>
</tr>
<tr>
<td>Interpersonal interactions and relationships (d7)</td>
<td>Activities and participation related to interactions with friends/peers (e.g., d750 Informal social relationships)</td>
<td>Marsh Self-Description Questionnaire (Marsh, 1992) (C)</td>
</tr>
<tr>
<td></td>
<td>Activities and participation related to interactions with others (e.g., d710 Basic interpersonal interactions, d730 Relating with strangers)</td>
<td>Bullying Scale (AIFS, 2009) (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strengths and Difficulties Questionnaire (peer problems scales) (Goodman, 1997) (T, P)</td>
</tr>
<tr>
<td></td>
<td>Activities and participation related to interactions with teachers (e.g., d740 Formal relationships)</td>
<td>Student-Teacher Relationship Scale (Pianta, 2001) (T)</td>
</tr>
<tr>
<td>Major life areas (d8)</td>
<td>Activities and participation related to school progress (e.g., d820 School education, d835 School life and related activities)</td>
<td>School Liking Scale (AIFS, 2009) (C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Progress questions (AIFS, 2009) (T, P)</td>
</tr>
</tbody>
</table>

Three measures were selected to describe the domain of Learning and applying knowledge. All three were based on teacher report: The Academic Rating Scale (ARS): Language and Literacy Scale and Mathematical Thinking Scale (National Centre for Educational Statistics (NCES), 2002), and the Approach to Learning Scale (ALS; Gresham & Elliott, 1990). The ARS Language and Literacy Scale had 9 items (e.g., conveys ideas when speaking, reads fluently), that rate a child’s performance in oral and written language according to a 5-point scale (not yet=1, beginning=2, in progress=3, intermediate=4, and proficient=5). The ARS Mathematical Thinking Scale used the same scale to rate a child’s performance on 9 items (e.g., creates and extends patterns, recognizes shape properties and relationships). The ALS had 6 items (e.g., works independently, persists in completing tasks,) that were taken from the Social Skills Rating Scale (Gresham & Elliott, 1990). Teachers rate a child’s performance on a 4-point scale (never=1 to very often=4). The internal reliability (Cronbach’s alpha) of each of the Scales was high: for the ARS Language and Literacy Scale, $\alpha = 0.96$; for the ARS Mathematical Thinking Scale, $\alpha = 0.94$; and for the ALS, $\alpha = 0.91$. The correlation between the scores on the two Academic Rating Scales was high ($r = 0.81$).

Two measures were selected for General tasks and demands: the emotional symptoms sub-scale from the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), and the persistence sub-scale from the School-Age Temperament Inventory (SATI; McCowry, 1995). Parents and teachers completed the SDQ in its entirety; however, only their ratings for the emotional symptoms subscale were selected to examine this ICF-CY domain. The emotional symptoms scale had 5 items (e.g., often complains of headaches/stomach-aches or sickness, often seems worried), that were rated by both teachers and parents on a 3-point scale (not true=1, sometimes true=2, certainly true=3). The internal reliability (Cronbach’s alpha) of the
emotional symptoms sub-scale was moderate for teachers ($\alpha = 0.75$), but moderate-low for parents ($\alpha = 0.66$). The SATI persistence sub-scale had four items (e.g., goes back to task after interruption) that were rated by parents on a 5-point scale (never=1 to always=5). The internal reliability (Cronbach’s alpha) of the persistence scale was high ($\alpha = 0.84$).

**Communication.**

An adapted, shortened version of the *Peabody Picture Vocabulary Test – Third Edition* (PPVT-III; Dunn & Dunn, 1997) was used to assess later Communication (specifically, later receptive language skills). The Adapted PPVT-III was developed especially for the LSAC study (Rothman, 2003), following Rasch modeling of the results of testing the full PPVT-III with a group of children ($n=215$, aged 3;7 to 5;6). The best 40 items were determined for use in a shortened version, that consisted of a core set of 20 items, with basal and ceiling sets (each with an additional 10 items). For the LSAC sample, Rasch estimates were determined for each item. Estimates were transformed to generate a scale with a mean of 64 and an SD of 8 (Rothman, 2003). Scaled scores for the Adapted PPVT-III were used in all analyses. Further details on scaling of the Adapted PPVT-III are available on the LSAC Web site (AIFS, 2009).

**Interpersonal interactions and relationships.**

A range of measures described Interpersonal interactions and relationships, including data collected solely from children, solely from teachers, and from teachers and parents. The child self-report measures were: the *Marsh Self-Description Questionnaire* (MSDQ; Marsh, 1992) and a Bullying Scale adapted from the *Perceptions of Peer Support Scale* (Kochenderfer & Ladd, 1997; Ladd, Kochenderfer, & Coleman, 1996). The MSDQ was comprised of 8 items (e.g., I make friends easily), which children rated according to a 5-point scale (false=1, mostly false=2, sometimes false/sometimes true=3, mostly true=4, true=5). Internal reliability (Cronbach’s alpha) of the MSDQ was high: $\alpha = 0.84$. The Bullying Scale
was comprised of four questions about the frequency of bullying incidents (peer victimization) that they had experienced (e.g., how often do kids pick on you? how often do kids say mean things to you?). Children rated these items on a 5-point scale (never=1 to always=5). Internal reliability (Cronbach’s alpha) was moderate-high: $\alpha = 0.79$.

The teacher-reported measures were two subscales of the Student-Teacher Relationship Scale (STRS; Pianta, 2001). The conflict sub-scale comprised 7 items (e.g., struggle to get along). The closeness sub-scale comprised 8 items (e.g., shares affectionate relationship, easy to be in tune with feelings). Teachers rated these items on a 5-point scale (definitely does not apply=1 to definitely applies=5). Internal reliability (Cronbach’s alpha) of each of the scales was high: conflict $\alpha = 0.90$; closeness $\alpha = 0.83$.

Two sub-scales (prosocial and peer relationship problems) from the parent- and teacher-completed SDQ measures were selected for this ICF-CY domain. The prosocial sub-scale had 5 items (e.g., considerate of other people’s feelings, shares readily with other children), as did the peer relationship problems sub-scale (e.g., rather solitary, tends to play alone). Teachers and parents rated these items on a 3-point scale (not true=1, somewhat true=2, certainly true=3). The internal reliability (Cronbach’s alpha) of the prosocial sub-scale was moderate-high for parents ($\alpha = 0.72$) and teachers ($\alpha = 0.83$). The internal reliability of the peer relationship problems sub-scale was low-moderate for both parents ($\alpha = 0.61$) and teachers ($\alpha = 0.69$). Although weaker than the other scales, the peer relationship problems sub-scale was included as it provided a useful balance to the measures of relationships and interactions.

**Major life areas.**

Measures of Major life areas (i.e. education) were provided by teachers, parents, and the children themselves. Teachers rated the child’s school progress in reading, mathematics, and overall school achievement in comparison to other children in the class, on a 5-point
scale (far below average=1 to far above average=5). Parents were also requested to rate their child’s progress in these areas relative to their peers (much worse=1 to much better=5). Teachers’ and parents’ ratings for all three items were highly intercorrelated and were combined to form a single measure of children’s achievement and progress at school. The same process was undertaken for parents’ ratings. Internal reliability (Cronbach’s alpha) of the two new measures was very high for teachers ($\alpha = 0.93$) and moderately high for parents ($\alpha = 0.81$).

Children were asked five questions from the School Sentiment Inventory (Ladd & Price, 1987) relating to their enjoyment of school (e.g., is school fun? are you happy about going to school?), using a 3-point scale (yes=1, sometimes=2, no=3). The scale had moderate-high internal reliability: $\alpha = 0.84$. Note that lower scores show greater enjoyment of school.

**Covariates**

Child characteristics (sex, age, Indigenous status) and family socio-economic status were selected as controls in tests of the association between communication impairment status and Activities and Participation outcomes. Following the process adopted by LSAC, a measure of family socio-economic position (SEP; Blakemore, Gibbings, Strazdins, 2006) was derived from three aspects of socio-economic information (parental education, parent income and occupational prestige) and coded as quartiles (low: 0-25%, low-medium: 26-50%, medium-high: 51-75%, high: 76-100%).

**Data Analysis**

The selected data were analysed in two ways. First, for each of the 18 outcome variables, the numbers of children who were performing within the normal range (WNL: i.e., within 1.0 SD of the mean) or outside the normal range (1.0 SD, 1.5 SD, and 2.0 SD below/above the mean) were identified and compared using chi-square tests. Second, the
strength of the association between communication impairment at 4-5 years and each of the Activities and Participation outcomes was tested using analysis of co-variance (ANCOVA), with child sex, age, Indigenous status, and family Socio-Economic Position (SEP) included in the analyses. These tests determined the relative effects of communication impairment and the four covariates on each outcome variable.

**Results**

Results for 18 Activities and Participation outcomes (corresponding to five ICF-CY Activities and Participation domains) for children identified by parents as having communication impairment at 4-5 years (CI group) and children not identified (Non-CI group) are presented in Table 2. It shows the number and percentage of children in each group who performed within the normal range and outside the normal range. A significant chi-square statistic indicates that group membership (CI vs. non-CI) has a significant effect on the distribution.

Table 2.

**Distribution of Children Within (WNL) and Outside Normal Limits on Life Activities at 7-9 Years According to Communication Status at 4-5 years.**

<table>
<thead>
<tr>
<th>Outcome measures according to ICF-CY Activities and Participation chapters</th>
<th>Proportion of children within and outside normal range</th>
<th>Chi-square (χ²)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WNL</td>
<td>1.0 SD below / above¹</td>
<td>1.5 SD below / above¹</td>
</tr>
<tr>
<td><strong>Learning and applying knowledge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARS – Language and Literacy (T) (n=3584)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI group</td>
<td>603 (69.4%)</td>
<td>93 (10.7%)</td>
<td>77 (8.9%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>2372 (87.4%)</td>
<td>151 (5.6%)</td>
<td>114 (4.2%)</td>
</tr>
<tr>
<td>ARS – Mathematical Thinking (T) (n=3579)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI group</td>
<td>620 (71.6%)</td>
<td>106 (12.2%)</td>
<td>60 (6.9%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>2316 (85.4%)</td>
<td>214 (7.9%)</td>
<td>101 (3.7%)</td>
</tr>
<tr>
<td>Approaches to Learning (T) (n=3593)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI group</td>
<td>606 (69.3%)</td>
<td>105 (12.0%)</td>
<td>127 (14.5%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>2214 (81.4%)</td>
<td>217 (8.0%)</td>
<td>242 (8.9%)</td>
</tr>
<tr>
<td>General tasks and demands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDQ – Emotional Symptoms $^1$ (P) (n=3802)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI group</td>
<td>756 (83.3%)</td>
<td>70 (7.7%)</td>
<td>39 (4.3%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>2532 (87.5%)</td>
<td>167 (5.8%)</td>
<td>107 (3.7%)</td>
</tr>
<tr>
<td>SDQ – Emotional Symptoms $^1$ (T) (n=3858)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI group</td>
<td>738 (84.4%)</td>
<td>53 (6.1%)</td>
<td>30 (3.4%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>2425 (89.4%)</td>
<td>117 (4.3%)</td>
<td>79 (2.9%)</td>
</tr>
<tr>
<td>SATI – Persistence (P) (n=3801)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI group</td>
<td>673 (74.2%)</td>
<td>128 (14.1%)</td>
<td>64 (7.1%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>2374 (82.0%)</td>
<td>303 (10.5%)</td>
<td>147 (5.1%)</td>
</tr>
</tbody>
</table>

### Communication

Adapted PPVT-III (D) (n=4271)

| CI group | 824 (80.9%) | 116 (11.4%) | 53 (5.2%) | 26 (2.6%) | 56.88 |
| Non-CI group | 2906 (89.4%) | 223 (6.9%) | 97 (3.0%) | 26 (0.8%) | $p \leq 0.001$ |

### Interpersonal interactions and relationships

Bullying $^1$ (C) (n=4250)

| CI group | 803 (79.9%) | 98 (9.8%) | 38 (3.8%) | 66 (6.6%) | 24.06 |
| Non-CI group | 2795 (86.1%) | 229 (7.1%) | 71 (2.2%) | 150 (4.6%) | $p \leq 0.001$ |

MSDQ (C) (n=4255)

| CI group | 814 (80.8%) | 88 (8.7%) | 40 (4.0%) | 65 (4.5%) | 7.73 |
| Non-CI group | 2722 (83.8%) | 268 (8.3%) | 113 (3.5%) | 145 (4.5%) | $p \leq 0.05$ |

STRS – Carer conflict $^1$ (T) (n=3584)

| CI group | 731 (83.6%) | 50 (5.7%) | 29 (3.3%) | 64 (7.3%) | 18.30 |
| Non-CI group | 2402 (88.6%) | 84 (3.1%) | 67 (2.5%) | 157 (5.8%) | $p \leq 0.001$ |

STRS – Closeness (T) (n=3585)

| CI group | 704 (80.5%) | 90 (10.3%) | 37 (4.2%) | 43 (4.9%) | 5.53 |
| Non-CI group | 2276 (84.0%) | 235 (8.7%) | 93 (3.4%) | 107 (3.9%) | $p = N/S$ |

SDQ – prosocial (P) (n=3801)

| CI group | 692 (76.1%) | 98 (10.8%) | 86 (9.5%) | 33 (3.6%) | 36.98 |
| Non-CI group | 2449 (84.7%) | 221 (7.6%) | 164 (5.7%) | 58 (2.0%) | $p \leq 0.001$ |

SDQ – prosocial (T) (n=3587)

| CI group | 651 (74.5%) | 101 (11.6%) | 60 (6.9%) | 62 (7.1%) | 24.94 |
| Non-CI group | 2181 (80.4%) | 301 (11.1%) | 130 (4.8%) | 101 (3.7%) | $p \leq 0.001$ |

SDQ – peer problems $^1$ (P) (n=3802)

| CI group | 738 (81.3%) | 80 (8.8%) | 50 (5.5%) | 40 (4.4%) | 53.98 |
| Non-CI group | 2599 (89.8%) | 172 (5.9%) | 71 (2.5%) | 52 (1.8%) | $p \leq 0.001$ |

SDQ – peer problems $^1$ (T) (n=3589)

| CI group | 734 (84.0%) | 57 (6.5%) | 35 (4.0%) | 48 (5.5%) | 15.31 |
| Non-CI group | 2410 (88.8%) | 133 (4.9%) | 83 (3.1%) | 89 (3.3%) | $p \leq 0.01$ |

### Major life areas

Progress and achievement (P) (n=4301)

| CI group | 812 (78.8%) | 76 (7.4%) | 46 (4.5%) | 96 (9.3%) | 120.76 |
| Non-CI group | 2930 (89.6%) | 192 (5.9%) | 70 (2.1%) | 79 (2.4%) | $p \leq 0.001$ |
### Progress and achievement (T)

<table>
<thead>
<tr>
<th></th>
<th>CI group</th>
<th>Non-CI group</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=3591</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI group</td>
<td>624 (71.5%)</td>
<td>159 (18.2%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>2366 (87.0%)</td>
<td>284 (10.4%)</td>
</tr>
<tr>
<td>CI group</td>
<td>23 (2.6%)</td>
<td>46 (1.7%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>159 (18.2%)</td>
<td>284 (10.4%)</td>
</tr>
<tr>
<td>CI group</td>
<td>67 (7.7%)</td>
<td>46 (1.7%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>22 (0.8%)</td>
<td>23 (2.6%)</td>
</tr>
<tr>
<td>CI group</td>
<td>144.25</td>
<td>p &lt; .001</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>22 (0.8%)</td>
<td>23 (2.6%)</td>
</tr>
</tbody>
</table>

#### School liking

<table>
<thead>
<tr>
<th></th>
<th>CI group</th>
<th>Non-CI group</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=4258</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI group</td>
<td>777 (77.0%)</td>
<td>126 (12.5%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>2683 (82.6%)</td>
<td>362 (11.1%)</td>
</tr>
<tr>
<td>CI group</td>
<td>75 (7.4%)</td>
<td>128 (3.9%)</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>31 (3.1%)</td>
<td>76 (2.3%)</td>
</tr>
<tr>
<td>CI group</td>
<td>25.51</td>
<td>p &lt; .001</td>
</tr>
<tr>
<td>Non-CI group</td>
<td>22 (0.8%)</td>
<td>23 (2.6%)</td>
</tr>
</tbody>
</table>

---

Note: CI= Concerns about possible communication impairment identified by parents at 4-5 years

Measures: ARS = Academic Rating Scale; SDQ = Strengths and Difficulties Questionnaire; SATI = School-age Temperament Inventory; PPVT III = Adapted Peabody Picture Vocabulary Test – III; MSDQ = Marsh Self-Description Questionnaire; STRS = Student-Teacher Relationship Scale.

Adjusted marginal means = means after accounting for the effects of child sex, age, Indigenous status and family SEP.

1Scores above the mean indicated performance outside normal limits

2df = 3 for all measures. Number of valid cases is given in brackets next to outcome measure

Results of ANOVA and ANCOVA tests are presented in Table 3 that gives the mean scores, 95% confidence intervals, and adjusted means for the CI and Non-CI groups for each outcome variable. Significant $F$-values and the non-overlap of the 95% Confidence Intervals indicate differences between group means. The $\eta^2$ statistics report the unique effects of CI status and each of the co-variates on the outcome variable. The following sections summarise the results for each Activities and Participation domain.

### Learning and applying knowledge.

Three teacher-completed measures described children’s performance in this domain.

Results presented in Table 2 show that for all three outcomes, a greater proportion of children in the CI group scored outside the normal range (represented by the total for Columns 3-5): 30.6% compared to 12.6% for the Non-CI group in ratings of Language and Literacy ability, 28.4% compared to 14.6% for Mathematical Thinking, and 30.7% compared to 18.6% for Approaches to Learning that is a rating of attentiveness and eagerness to learn in class. The largest difference between the groups was the proportion of children who scored 2.0 SD or more below the mean (Column 5). This was particularly evident on the ARS scales: 11.0% compared to 2.9% for the ARS Language and Literacy scale, and 9.2% compared to 3.0% for the ARS Mathematical Thinking Scale.
### Table 3.

The Unique and Combined Effects of Communication Impairment and Other Child and Family Characteristics on Child Outcomes at 7-9 Years.

<table>
<thead>
<tr>
<th>Outcome measures according to ICF-CY Activities and Participation chapters</th>
<th>Parent reported concerns about “how [child] talks and makes speech sounds” at 4-5 years</th>
<th>Child and Family Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>F value</strong></td>
<td><strong>Model Effect</strong></td>
</tr>
<tr>
<td></td>
<td><strong>(R^2)</strong></td>
<td><strong>(Eta^2)</strong></td>
</tr>
<tr>
<td>Learning and applying knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARS – Language and Literacy (T)</td>
<td>3.24 (.87)</td>
<td>3.65 (.74)</td>
</tr>
<tr>
<td></td>
<td>n 852</td>
<td>2680</td>
</tr>
<tr>
<td></td>
<td>Adjusted marginal means</td>
<td>3.30</td>
</tr>
<tr>
<td>ARS – Mathematical Thinking (T)</td>
<td>3.26 (.91)</td>
<td>3.58 (.80)</td>
</tr>
<tr>
<td></td>
<td>3.20 – 3.32</td>
<td>3.55 – 3.61</td>
</tr>
<tr>
<td></td>
<td>n 848</td>
<td>2657</td>
</tr>
<tr>
<td></td>
<td>Adjusted marginal means</td>
<td>3.28</td>
</tr>
<tr>
<td>Approaches to Learning (T)</td>
<td>3.04 (.75)</td>
<td>3.32 (.69)</td>
</tr>
<tr>
<td></td>
<td>2.99 – 3.09</td>
<td>3.29 – 3.34</td>
</tr>
<tr>
<td></td>
<td>n 874</td>
<td>2719</td>
</tr>
<tr>
<td></td>
<td>Adjusted marginal means</td>
<td>3.10</td>
</tr>
<tr>
<td>General tasks and demands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDQ – Emotional Symptoms (P)</td>
<td>1.36 (.37)</td>
<td>1.30 (.34)</td>
</tr>
<tr>
<td></td>
<td>1.33 – 1.38</td>
<td>1.29 – 1.31</td>
</tr>
<tr>
<td></td>
<td>n 908</td>
<td>2894</td>
</tr>
<tr>
<td></td>
<td>Adjusted marginal means</td>
<td>1.35</td>
</tr>
<tr>
<td>SDQ – Emotional Symptoms (T)</td>
<td>1.31 (.39)</td>
<td>1.23 (.35)</td>
</tr>
<tr>
<td></td>
<td>1.28 – 1.33</td>
<td>1.22 – 1.24</td>
</tr>
<tr>
<td></td>
<td>n 874</td>
<td>2714</td>
</tr>
<tr>
<td></td>
<td>Adjusted marginal means</td>
<td>1.30</td>
</tr>
</tbody>
</table>
### SATI – Persistence (P)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>95% CI</th>
<th>n</th>
<th>Adjusted marginal means</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATI – P</td>
<td>3.17 (.86)</td>
<td>3.12 – 3.23</td>
<td>907</td>
<td>3.22</td>
</tr>
<tr>
<td></td>
<td>3.44 (.85)</td>
<td>3.41 – 3.47</td>
<td>2894</td>
<td>3.43</td>
</tr>
<tr>
<td></td>
<td>3.38 (.86)</td>
<td>3.35 – 3.41</td>
<td>3801</td>
<td>3.33</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>3.17 (.86)</td>
<td>3.12 – 3.23</td>
<td>907</td>
<td>3.22</td>
</tr>
<tr>
<td>95% CI</td>
<td>3.44 (.85)</td>
<td>3.41 – 3.47</td>
<td>2894</td>
<td>3.43</td>
</tr>
<tr>
<td>n</td>
<td>3801</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Communication

#### Adapted PPVT-III (D)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>95% CI</th>
<th>n</th>
<th>Adjusted marginal means</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATI – P</td>
<td>7.71 (5.12)</td>
<td>7.67 – 7.75</td>
<td>1019</td>
<td>7.72</td>
</tr>
<tr>
<td></td>
<td>7.81 (.77)</td>
<td>7.78 – 7.84</td>
<td>3252</td>
<td>7.81</td>
</tr>
<tr>
<td></td>
<td>7.91 (.77)</td>
<td>7.88 – 7.94</td>
<td>4271</td>
<td>7.91</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>7.71 (5.12)</td>
<td>7.67 – 7.75</td>
<td>1019</td>
<td>7.72</td>
</tr>
<tr>
<td>95% CI</td>
<td>7.81 (.77)</td>
<td>7.78 – 7.84</td>
<td>3252</td>
<td>7.81</td>
</tr>
<tr>
<td>n</td>
<td>4271</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Interpersonal interactions and relationships

#### Bullying (C)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>95% CI</th>
<th>n</th>
<th>Adjusted marginal means</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATI – P</td>
<td>2.06 (0.92)</td>
<td>1.92 – 2</td>
<td>1005</td>
<td>2.04</td>
</tr>
<tr>
<td></td>
<td>3.95 (.76)</td>
<td>3.92 – 3</td>
<td>3245</td>
<td>3.95</td>
</tr>
<tr>
<td></td>
<td>3.93 (.77)</td>
<td>3.91 – 3</td>
<td>4250</td>
<td>3.93</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>2.06 (0.92)</td>
<td>1.92 – 2</td>
<td>1005</td>
<td>2.04</td>
</tr>
<tr>
<td>95% CI</td>
<td>3.95 (.76)</td>
<td>3.92 – 3</td>
<td>3245</td>
<td>3.95</td>
</tr>
<tr>
<td>n</td>
<td>4250</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### MSDQ (C)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>95% CI</th>
<th>n</th>
<th>Adjusted marginal means</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATI – P</td>
<td>3.85 (.80)</td>
<td>3.81 – 3</td>
<td>1007</td>
<td>3.88</td>
</tr>
<tr>
<td></td>
<td>3.95 (.76)</td>
<td>3.93 – 3</td>
<td>3248</td>
<td>3.95</td>
</tr>
<tr>
<td></td>
<td>3.93 (.77)</td>
<td>3.91 – 3</td>
<td>4255</td>
<td>3.93</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>3.85 (.80)</td>
<td>3.81 – 3</td>
<td>1007</td>
<td>3.88</td>
</tr>
<tr>
<td>95% CI</td>
<td>3.95 (.76)</td>
<td>3.93 – 3</td>
<td>3248</td>
<td>3.95</td>
</tr>
<tr>
<td>n</td>
<td>4255</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### STRS – Carer conflict (T)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>95% CI</th>
<th>n</th>
<th>Adjusted marginal means</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATI – P</td>
<td>1.47 (.70)</td>
<td>1.42 – 1</td>
<td>874</td>
<td>1.43</td>
</tr>
<tr>
<td></td>
<td>1.36 (.64)</td>
<td>1.34 – 1</td>
<td>2710</td>
<td>1.38</td>
</tr>
<tr>
<td></td>
<td>1.39 (.65)</td>
<td>1.37 – 1</td>
<td>3584</td>
<td>1.40</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>1.47 (.70)</td>
<td>1.42 – 1</td>
<td>874</td>
<td>1.43</td>
</tr>
<tr>
<td>95% CI</td>
<td>1.36 (.64)</td>
<td>1.34 – 1</td>
<td>2710</td>
<td>1.38</td>
</tr>
<tr>
<td>n</td>
<td>3584</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### STRS – Closeness (T)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>95% CI</th>
<th>n</th>
<th>Adjusted marginal means</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATI – P</td>
<td>3.97 (.64)</td>
<td>3.92 – 3</td>
<td>874</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>4.07 (.63)</td>
<td>4.05 – 4</td>
<td>2711</td>
<td>4.03</td>
</tr>
<tr>
<td></td>
<td>4.05 (.64)</td>
<td>4.02 – 4</td>
<td>3585</td>
<td>4.03</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>3.97 (.64)</td>
<td>3.92 – 3</td>
<td>874</td>
<td>4.00</td>
</tr>
<tr>
<td>95% CI</td>
<td>4.07 (.63)</td>
<td>4.05 – 4</td>
<td>2711</td>
<td>4.03</td>
</tr>
<tr>
<td>n</td>
<td>3585</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### SDQ – Prosocial (P)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>95% CI</th>
<th>n</th>
<th>Adjusted marginal means</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATI – P</td>
<td>2.58 (.38)</td>
<td>2.52 – 2</td>
<td>909</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td>2.67 (.33)</td>
<td>2.66 – 2</td>
<td>2892</td>
<td>2.66</td>
</tr>
<tr>
<td></td>
<td>2.65 (.35)</td>
<td>2.64 – 2</td>
<td>3801</td>
<td>2.63</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>2.58 (.38)</td>
<td>2.52 – 2</td>
<td>909</td>
<td>2.60</td>
</tr>
<tr>
<td>95% CI</td>
<td>2.67 (.33)</td>
<td>2.66 – 2</td>
<td>2892</td>
<td>2.66</td>
</tr>
<tr>
<td>n</td>
<td>3801</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### SDQ – Prosocial (T)

| Mean (SD) | 2.44 (.48) | 2.55 (.44) | 2.52 (.45) |
| 95% CI    | 2.41 – 2.47 | 2.53 – 2.57 | 2.51 – 2.54 |
| n         | 874         | 2713        | 3587       |
| Adjusted marginal means | 2.48 | 2.54 | 2.51 |

### SDQ – Peer relationship problems (P)

| Mean (SD) | 1.37 (.37) | 1.27 (.31) | 1.30 (.33) |
| 95% CI    | 1.35 – 1.40 | 1.26 – 1.28 | 1.28 – 1.31 |
| n         | 908         | 2894        | 3802       |
| Adjusted marginal means | 1.36 | 1.28 | 1.32 |

### SDQ – Peer relationship problems (T)

| Mean (SD) | 1.33 (.38) | 1.25 (.34) | 1.27 (.35) |
| 95% CI    | 1.30 – 1.35 | 1.24 – 1.26 | 1.26 – 1.28 |
| n         | 874         | 2715        | 3589       |
| Adjusted marginal means | 1.32 | 1.25 | 1.29 |

### Major life areas

#### Progress and achievement (P)

| Mean (SD) | 3.51 (.94) | 3.83 (.82) | 3.76 (.86) |
| 95% CI    | 3.45 – 3.57 | 3.81 – 3.86 | 3.73 – 3.78 |
| n         | 1030        | 3271        | 4301       |
| Adjusted marginal means | 3.52 | 3.83 | 3.68 |

#### Progress and achievement (T)

| Mean (SD) | 2.92 (.90) | 3.27 (.75) | 3.19 (.81) |
| 95% CI    | 2.86 – 2.98 | 3.24 – 3.30 | 3.16 – 3.21 |
| n         | 873         | 2718        | 3591       |
| Adjusted marginal means | 2.95 | 3.26 | 3.11 |

#### School liking (C)

| Mean (SD) | 1.54 (.53) | 1.46 (.46) | 1.48 (.48) |
| 95% CI    | 1.51 – 1.58 | 1.45 – 1.48 | 1.47 – 1.49 |
| n         | 1009        | 3249        | 4258       |
| Adjusted marginal means | 1.51 | 1.47 | 1.49 |

Note: C = Child-report measure, P = Parent-report measure, T = Teacher-report measure, D = Direct assessment, CI status = Communication impairment status, ATSI = Aboriginal and Torres Strait Island (Indigenous) status, SEP = Socioeconomic position.

Measures: ARS = Academic Rating Scale; SDQ = Strengths and Difficulties Questionnaire; SATI = School-age Temperament Inventory; PPVT III = Adapted Peabody Picture Vocabulary Test – III; MSDQ = Marsh Self-Description Questionnaire; STRS = Student-Teacher Relationship Scale.

Adjusted marginal means = means after accounting for the effects of child sex, age, Indigenous status and family SEP.

Significance of F value: *** p ≤ 0.001, ** p ≤ 0.01, * p ≤ 0.05
Results in Table 3 (Columns 2 and 3) showed that children in the CI group were rated lower (by 0.3-0.4 of a point for unadjusted means and 0.2 - 0.3 for adjusted means) than their non-identified peers. Effect sizes for communication impairment status (Column 7) were significant: $eta^2 = .035, .023$ and $0.015$, for Language and Literacy, Mathematical Thinking, and Approaches to Learning, respectively. The results indicate a small effect (Cohen, 1988); however, the figures are larger than or comparable to the effects of the co-variates – child sex, age, Indigenous status, and family SEP, that ranged from $eta^2 = .000$ (ns) to $0.061$ ($p < .001$).

**General tasks and demands.**

Parent and teacher rated emotional symptoms on the SDQ, and parent rated persistence on the SATI were the measures selected to describe this domain. Values presented in Table 2 showed that for all three outcomes, a significantly higher proportion of children in the CI group scored outside the normal range than children in the Non-CI group: 16.7% compared to 12.5% on the parent-rated SDQ, 15.5% compared to 10.6% on the teacher-rated SDQ, and 25.8% compared to 18.0% on the SATI persistence scale. The pattern of results was similar for parent and teacher ratings suggesting that the association between early childhood communication impairment and difficulty handling stress and emotional concerns was similarly evident both at home and at school. Table 3 results showed that mean scores were significantly higher for emotional symptoms and lower for persistence in the CI group, indicating that these children had more difficulty with managing demands or stress than their peers in the Non-CI group. Effect sizes for communication impairment status were very small: $eta^2 = .004, .007, \text{ and } .011$, but tended to be larger than or comparable to the effects of child sex, age, Indigenous status, and family SEP.

**Communication.**

Children’s receptive vocabulary scores on the adapted PPVT-III provided a
measure of communication at age 7-9 years. Figures in Table 2 showed that almost
twice the proportion of children in the CI group (19.1%) obtained scores outside the
normal range on the PPVT-III as children in the Non-CI group (10.6%). Comparison of
the distributions of children who scored outside the mean showed a higher proportion of
children in the CI group across all cut-off points (Columns 3-5), with the greatest
difference being in the group who scored 2.0 SD or more below the mean (2.6% of the
CI group vs. 0.8% of the Non-CI group). Results in Table 3 showed a clear separation in
mean scores between the CI and Non-CI groups. Communication impairment status had
an effect size of 0.017, that was greater than the effects of child sex, age and Indigenous
status, but smaller than the effect of family SEP (eta² = 0.056).

**Interpersonal interactions and relationships.**

Eight measures, representing child, teacher, and parent perspectives, were
available to describe this domain. For seven of the eight outcomes, a significantly
higher proportion of children in the CI group scored outside the normal range than
children in the Non-CI group; however, figures suggested that the differences between
groups were less marked than in the Learning and applying knowledge domain.

A greater proportion of children in the CI group (20.1%) than their peers
(13.9%) reported a degree of bullying at 7-9 years that was outside normal limits (see
Table 2). Differences were also noted for children’s ratings of self-esteem (MSDQ):
19.2% of the CI group scored below the normal range compared to 16.2% of the Non-
CI group. For each of the outcomes, mean scores and the non-overlap of the 95%
Confidence Intervals confirmed a significant difference between children in the CI and
Non-CI groups (Table 3). The effect sizes for communication impairment status for
child-reported bullying and self-esteem were very small (eta² = .003 and .001), but were
similar in magnitude to the effects of child and family variables (eta² ranged from .000
to .009).
Teacher-student relationships were poorer for children in the CI group, but only for teacher-rated conflict (16.4% of the CI group scored below the normal range compared to 11.4% of the Non-CI group). Effect sizes for early communication impairment were very small ($\eta^2 = .001$) for teacher-reported conflict and closeness, relative to the effects of child sex ($\eta^2 = .033$) and family SEP ($\eta^2 = .014$).

For prosocial behavior, more children in the CI group (parent rated: 23.9%; teacher-rated: 25.5%) scored outside the normal range at 7-9 years than children in the Non-CI group (parent rated: 15.3%; teacher-rated: 19.6%). Similar findings were reported for peer relationship problems. A higher proportion of the CI group (parent rated: 18.7%; teacher-rated: 16.0%) received scores outside the normal range than the Non-CI group (parent rated: 10.2%; teacher-rated: 11.2%). The pattern of results did not suggest that teachers gave children with communication impairment poorer ratings for social problems than did their parents, as has been reported by Redmond and Rice (1998). In contrast, on the four parent and teacher reported subscales of the SDQ, effect sizes for parents’ ratings of prosocial and peer problems ($\eta^2 = .007$ and .012, respectively) were somewhat larger than effect sizes for teacher ratings ($\eta^2 = .003$ and .007), suggesting that parents may be harsher, or perhaps more accurate, judges of their children’s difficulties with peers.

**Major life areas.**

Education as a Major life area for 7-9 year olds was described by parent- and teacher-rated school progress and child attitudes to school. As noted for ratings of achievement in the Learning and applying knowledge domain, a significantly higher proportion of children in the CI group fell below the mean on reports of school progress and achievement in comparison to their peers in the Non-CI group: parent-rated: 21.2% vs. 10.4%; teacher-rated: 28.5% vs. 13.0% (Table 2). Comparison of the distributions of children who scored outside the normal range revealed a substantially higher proportion
of children in the CI group whose scores were 2 SD or more outside the mean: parent-rated: 9.3% vs. 2.4; teacher-rated: 7.7% vs. 1.7%. Parents’ and teachers’ ratings of children’s progress in school education were noticeably poorer for the CI group compared to the Non-CI group, as shown in Table 3 by a difference in mean scores: 0.32 and 0.35 (on a 5-point scale) respectively. Effect sizes for communication impairment status were similar for parents and teachers, ($eta^2 = .023$ and $.029$, respectively), and relatively large when compared with the effects of child and family co-variates, particularly for parents’ reports. These results suggest that early communication impairment has a lasting impact on children’s experience of school education.

Children in the CI group reported poorer attitudes to school than their Non-CI peers. A total of 23.0% of children in the CI group scored outside the normal range on child self-reports of school liking at 7-9 years, of whom 7.4% scored 2 SD or more below the mean. In comparison, 17.4% of children in the Non-CI group scored outside the normal range and only 3.9% scored 2.0 SD or more below the mean. That children in the CI group had poorer attitudes to school was also shown by significantly different mean scores for school liking (0.08 on a 3-point scale) compared to the Non-CI group. The effect size for communication impairment was very small ($eta^2 = .001$), that was similar in magnitude to the effects of child age and Indigenous status, and family SEP, but considerably smaller than the effect of child sex.

**Discussion**

This research utilised a nationally representative study of Australian children to comprehensively investigate the association between childhood communication impairment and Activities and Participation during the primary school years, using reports from children, parents and teachers, as well as direct assessment. Studies with nationally representative samples have not typically examined a broad range of
outcomes for school-aged children with communication impairment, nor have they considered children’s perspectives regarding the association between communication impairment and life activities. The United Nations Convention on the Rights of the Child (UNICEF, 1989) and numerous researchers (Dockett & Perry, 2007; McCormack et al., 2010; Owen, Hayett, & Roulstone, 2004; Rannard & Glenn, 2009; Vanryckeghem, Brutten, & Hernandez, 2005) have recognized the rights of children to express their views about issues that concern them, and acknowledged the valuable insights gained from children with communication impairment. Understanding the association between communication impairment and a broad range of Activities and Participation outcomes, and including the perspective of children who experience this impairment as well as the parents and teachers who support them is necessary to ensure adequate intervention is provided to address their needs.

In the present study, two methods were used to examine the association between communication impairment in early childhood (4-5 years) and 18 outcome measures at school age (7-9 years). The first approach, that used cut-off points of 1.0, 1.5, and 2.0 SD outside the sample mean, demonstrated that the majority of children identified by parents with communication impairment at 4-5 years (the CI group) performed within normal limits on all outcomes. However, for all of the 18 Activities and Participation outcomes (across all five Activities and Participation domains), there were children with a history of communication impairment who performed outside the normal range, and this proportion was consistently higher than the proportion of children in the group with no such history. The second approach showed a significant association between communication impairment at 4-5 years and poorer scores on all 18 Activities and Participation outcomes at 7-9 years, even when accounting for the effects of other important child and family socio-demographic factors. Although effect sizes for communication impairment status were small ($\eta^2 < 0.04$), they were comparable to the
effect sizes for child and family demographic factors.

The results provide compelling evidence that communication impairment in early childhood is associated with limitations to children’s Activities and Participation into their primary years of school, and that these limitations are recognised by parents and teachers, and child self-report. This research explored a broad range of associations between communication impairment and Activities and Participation outcomes and these are discussed in more detail below. Future research would be useful to examine the complexity of the interactions between multiple outcomes, and between factors contributing to the outcomes. Furthermore, given the valuable information that children can provide, future research could examine children’s perceptions of their performance of activities across ICF-CY domains other than Interpersonal interactions, that was the only domain in the current study for which child-reports were available.

In the present study, the greatest areas of difficulty for children identified with communication impairment at 4-5 years were with Activities and Participation outcomes related to Learning and applying knowledge. Nearly a third of these children were reported by their teachers to have limitations with reading and writing, calculating, and attention and thinking. This is consistent with previous research that has identified difficulties with reading and writing in children with communication impairment (e.g., Harrison et al., 2009; Nathan, Stackhouse, Goulandris & Snowling, 2004b). However, limitations in other Activities and Participation domains were also identified for a quarter of children with a history of communication impairment including: completing tasks and handling demands, informal social relationships with friends/peers, and school education/school life. Furthermore, approximately one-fifth of children in the CI group were reported to have difficulty with receptive vocabulary, interactions with peers, and interactions with teachers. Such results indicate the need to consider more than academic skills when investigating outcomes for children with a history of
communication impairment.

Previous research has shown that children identified with communication impairment are more likely to have difficulty with social interactions than other children (e.g., Fujiki, Brinton, & Todd, 1996; Lindsay & Dockrell, 2000). In the present study, the association between communication impairment and Interactions and relationships, particularly peer relationships, was demonstrated by reports from parents, teachers and the children themselves. Children in the present study with a history of communication impairment experienced a significantly higher incidence of bullying and less ease in making friends compared to children with no such history. These findings contrast with those of Lindsay, Dockrell and Mackie (2008), who identified similar rates of victimization among children with a history of communication impairment, children with special education needs, and typically developing children, but are consistent with those of Conti-Ramsden and Botting (2004) and Savage (2005), who reported that students with communication impairment were more likely to be bullied than their peers. Conti-Ramsden and Botting (2004) and Savage (2005) reported higher proportions of children with communication impairment experienced bullying than was found in the present study (36% and 50% respectively, compared to 20.2%); however, factors such as the age and number of participants, as well as the type and severity of communication impairment, and the tools used to measure experiences of bullying or victimization may have contributed to the different findings. In the present study, the proportion of children with no history of communication impairment who reported bullying (13.9%) was consistent with prevalence rates for peer victimization provided by other studies of typically developing children, such as Nansel et al. (2001; 10.6%) and Perry, Kusel, and Perry (1988; 10.0%).

This body of work demonstrates the need for interventions that target the children’s environment as well as the impairment. It also shows the need for SLPs and
teachers to focus on children’s social development and self-esteem, as well as the provision of academic support, when providing services to children with communication impairment at school (Durkin & Conti-Ramsden, 2007). Such a change in focus might address parental concern that SLPs do not always prepare students for the social world at/beyond school (Paradice & Adewusi, 2002), since SLPs often give literacy and academic skills higher priority.

Good communication skills are important for academic progress. In the present study, children identified at 4-5 years with communication concerns achieved significantly lower ratings than did other children on both parent and teacher reported measures of school progress and achievement at 7-9 years. The effect of communication impairment in early childhood was particularly strong for parent reported progress. Results from the current study extend the findings reported by Harrison et al. (2009) to show that difficulties associated with school achievement continue beyond the early school years for children with a history of communication impairment. Previous longitudinal studies of individuals with communication impairment have indicated that communication impairment may be associated with lower grades and the need for remedial assistance as individuals progress through high school (Felsenfeld, Broen & McGue, 1994), and with higher likelihood of vocational and employment training than completion of higher years of schooling (Snowling et al., 2001). In the present study, children identified with communication concerns in early childhood reported less enjoyment of school than their peers. Although inter-relationships among the ICF-CY domains were not examined in this study, it is possible that less enjoyment of school was related to their poorer academic performance and/or less effective relationships with peers and teachers (Ladd, 1990). The findings suggest the need to improve school experiences for children with communication impairment.
Limitations

It may be considered a limitation of this study that the indicator of communication impairment in the preschool years (4-5 years) was a parent-report measure and no objective data were collected regarding the expressive communication skills of children. Thus, it is unclear whether the children identified by parents with concerns about their “ability to talk and make speech sounds” would be diagnosed with communication impairment by professionals. While parent perspectives and concerns about their children should be considered valid means of identification in their own right (cf. Bishop & McDonald, 2009), the validity of the parent-report measure used in LSAC (PEDS; Glascoe, 2000) as a means of identifying communication impairment has been supported by other studies. McLeod, Harrison, McAllister and McCormack (2011) utilized the same PEDS question to identify children with communication concerns in a study of speech impairment in a community sample of preschool children (aged 4-5 years). They then examined the correspondence between parent identification of communication impairment with direct speech-language pathology assessment for 143 children, and found that 83.3% of children identified by parents with concerns would receive a clinical diagnosis of speech (communication) impairment. Therefore, it may be anticipated that the parent identification of children with communication impairment in the present study is likely to be consistent with a clinical diagnosis of communication impairment in the majority of cases. Unfortunately, the LSAC dataset did not include the PEDS measure as an indicator of communication impairment at age 7-9, so it was not possible to assess the extent of long-term parental concern about their children's speech and language. However, the focus of the current study was the association between communication impairment identified in early childhood and outcomes at school, rather than the persistence of communication concerns.

It may also be considered a limitation of the present study that all children
identified with communication concerns in early childhood were included, even those with other primary diagnoses. There were two main reasons for this decision. The first reason for including all children identified with communication concerns in early childhood was to ensure consistency of the participant group in the present study and previous studies utilising the same database that the present study builds upon (e.g., Harrison et al., 2009; Harrison & McLeod, 2010). However, the second and most important reason was that the focus of the present study was on the link between communication impairment and other skills regardless of the cause of the communication impairment. Thus, difficulty with “talking and making speech sounds” in the early childhood years was the variable common to all participants. It is acknowledged that for some children additional impairments may have contributed to the difficulties identified. However, attempting to isolate children with a specific speech or language impairment presents a difficult and somewhat ineffectual task. “Children with communication difficulties are a heterogeneous population” (Broomfield & Dodd, 2004, p. 305), who present at clinics with a range of symptoms and potential causes (although often the origin is unknown). Furthermore, McLeod and McKinnon (2010) have indicated that the presence of communication impairment (and not other areas of learning need) was the most important predictive factor of teachers’ recommendation that students required a high level of support at school. Finally, as suggested by the ICF-CY framework, there are a range of Personal and Environmental factors that uniquely influence the presentation and experience of communication impairment for each child. SLPs and teachers work with all these children regardless of the underlying cause of their communication impairment. Therefore, all children were included to ensure the full range of capabilities was investigated.

**Future Research**

In this study, the focus was on exploring the range of negative outcomes
(Activity limitations) that may be associated with early childhood communication impairment, the degree of limitation, and the consistency across data sources (child/parent/teacher perspectives). Communication impairment in early childhood was found to be associated with Activity Limitations and Participation Restrictions for a number, but not all, children at school age. Future research could use longitudinal trajectories to explore successful (positive) outcomes. Furthermore, research could examine the value of early measures of communication impairment at predicting specific outcomes, or developmental pathways associated with specific outcomes.

The Activities and Participation outcomes found to be associated with communication impairment in this study may be mediated by other biological, individual and societal factors (as discussed in the Personal and Environmental Factors component of the ICF-CY). The current research investigated the contribution of four child and family factors (age, sex, Indigenous status, and socio-economic status). Future research could investigate other factors that may contribute to outcomes, both positive and negative, for children with communication impairment, given the small amount of variance explained by the covariates in this study.

Acknowledgments

This research was supported by The Sir Robert Menzies Memorial Research Scholarship in the Allied Health Sciences, and comprises a portion of the first author’s PhD, supervised by the subsequent authors. The authors would like to acknowledge the members of the Longitudinal Study of Australian Children (LSAC) Research Consortium: John Ainley, Donna Berthelsen, Michael Bittman, Bruce Bradbury, Linda Harrison, Jan Nicholson, Bryan Rodgers, Ann Sanson, Michael Sawyer, Sven Silburn, Lyndall Strazdins, Judy Ungerer, Graham Vimpani, Melissa Wake, and Stephen Zubrick.

References


Hart, S. A., Petrill, S. A., & Kamp Dush, C. M. (2010). Genetic influences on language,


Appendix

Population and Community Studies That Consider Childhood Speech and Language

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Age range at recruitment</th>
<th>Number of participants&lt;br&gt; (n=1,127 with communication impairment)</th>
<th>Communication skills investigated</th>
<th>Outcomes reported (Corresponding ICF-CY domains)</th>
<th>Data source</th>
<th>Indicative references</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avon Longitudinal Study of Parents and Children</td>
<td>UK</td>
<td>During pregnancy</td>
<td>14,000</td>
<td>Speech, Expressive language</td>
<td>Speech and oral language (Communication)</td>
<td>Assessment, parent &amp; child report</td>
<td>Roulstone et al. (2002; 2009)</td>
</tr>
<tr>
<td>British Cohort Study</td>
<td>UK</td>
<td>Birth</td>
<td>17,196</td>
<td>Receptive language</td>
<td>Literacy (Learning and applying knowledge)</td>
<td>Assessment &amp; adult report</td>
<td>Schoon et al. (2010)</td>
</tr>
<tr>
<td>Early Language in Victoria Study</td>
<td>Australia</td>
<td>7-10 months</td>
<td>1,911</td>
<td>Speech, language, stuttering</td>
<td>Gesture and early oral language (Communication)</td>
<td>Assessment &amp; parent report</td>
<td>Reilly et al. (2006; 2009)</td>
</tr>
<tr>
<td>Epidemiology of Specific Language Impairment</td>
<td>USA</td>
<td>5-6 years</td>
<td>7,218</td>
<td>Expressive language, speech</td>
<td>Speech and oral language (Communication)</td>
<td>Assessment</td>
<td>Tomblin et al. (1997); Shriberg et al. (1999); Nippold et al. (2009)</td>
</tr>
<tr>
<td>Family &amp; Child Experiences Survey</td>
<td>USA</td>
<td>3-4 years</td>
<td>3,200&lt;br&gt; (n=1,015 with communication impairment)</td>
<td>Language, literacy</td>
<td>Oral language and literacy (Learning and applying knowledge, Communication)</td>
<td>Assessment &amp; parent report</td>
<td>Scheffner Hammer et al. (2010)</td>
</tr>
<tr>
<td>Longitudinal Study of Australian Children</td>
<td>Australia</td>
<td>4-5 years&lt;br&gt; (Kinder cohort)</td>
<td>4,983</td>
<td>Speech, language</td>
<td>Oral language, literacy and numeracy (Communication)</td>
<td>Assessment, parent, teacher &amp; child report</td>
<td>McLeod &amp; Harrison (2009); Harrison et al. (2009)</td>
</tr>
<tr>
<td>National Longitudinal Survey of Youth</td>
<td>USA</td>
<td>Birth</td>
<td>7,862</td>
<td>Language, literacy</td>
<td>Oral language, literacy and numeracy (Communication)</td>
<td>-</td>
<td>Hart et al. (2010)</td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Age range at recruitment</td>
<td>Number of participants&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Communication skills investigated</td>
<td>Outcomes reported (Corresponding ICF-CY domains)</td>
<td>Data source</td>
<td>Indicative references</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------</td>
<td>--------------------------</td>
<td>-----------------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Ottawa Language Study</td>
<td>Canada</td>
<td>5 years</td>
<td>1,655</td>
<td>Language, speech</td>
<td>Language, cognition, literacy, education, occupation and social networks (Learning and applying knowledge, Communication, Major life areas, Interpersonal interactions and relationships)</td>
<td>Assessment &amp; adult report</td>
<td>Beitchman et al. (1986); Johnson et al. (2010)</td>
</tr>
<tr>
<td>Pittsburgh Otitis Media study</td>
<td>USA</td>
<td>0-2 months</td>
<td>2,253</td>
<td>Hearing, language, speech</td>
<td>Oral language (Communication)</td>
<td>Assessment</td>
<td>Dollaghan &amp; Campbell (2009); Feldman (1999); Paradise et al. (1997; 2000);</td>
</tr>
<tr>
<td>RASCALS</td>
<td>Australia</td>
<td>Birth</td>
<td>4,007 (n=1,766 with communication impairment)</td>
<td>Language, speech</td>
<td>Oral language (Communication)</td>
<td>Assessment &amp; parent report</td>
<td>Rice et al. (2008); Zubrick et al. (2007)</td>
</tr>
<tr>
<td>Sound Effects Study</td>
<td>Australia</td>
<td>4-5 years</td>
<td>1,097</td>
<td>Speech, language</td>
<td>Speech and oral language (Communication)</td>
<td>Assessment, parent, teacher &amp; child report</td>
<td>McLeod et al. (2010)</td>
</tr>
<tr>
<td>Understanding the Early Years</td>
<td>Canada</td>
<td>5-6 years</td>
<td>2,743</td>
<td>Language</td>
<td>Oral language, early literacy and attention (Learning and applying knowledge, Communication)</td>
<td>Assessment, parent &amp; teacher report</td>
<td>Kohen et al. (2009)</td>
</tr>
</tbody>
</table>

Key: <sup>a</sup> = At the beginning of the study.
RASCALS=Randomly Ascertained Sample of Children born in Australia’s Largest State
Conclusion to Part 2

The three research studies presented in part two of this doctoral research (papers 4-6) investigated Activities that may be associated with, and limited by, speech impairment. The studies used the ICF and/or ICF-CY as a theoretical framework to examine the extent and direction of the association between childhood speech impairment and a broad range of Activities, and so the findings from the studies expand on existing research investigating the outcomes of individuals with childhood speech impairment.

There was consistency across the studies in terms of many of the Activities (taken from the ICF and/or ICF-CY Activities and Participation component) found to be associated with speech impairment (see Table 1). For instance, all three studies found Activities related to Learning and applying knowledge (d1), Communication (d3), and Interpersonal interactions and relationships (d7) could be difficult for individuals with childhood speech impairment. The consistency of the findings in the studies presented in papers 5 and 6 with the findings from the study in paper 4 (the systematic review) reflect the consistency of two new investigations of Activity limitations/Participation restrictions with previous research, and so give weight to the findings reported in those papers.

There were some differences between the three studies in terms of additional Activities found to be associated with speech impairment, and the degree of concern/difficulty identified by different participants. This could be due to the mode/source of data collection, the ICF-CY items included, the age of participants, and/or their relationship to the individual with speech impairment. For instance, results from the studies in papers 5 and 6 show an association between speech impairment and Activities related to General tasks and demands (d2); however, this association was not identified in the systematic review. Indeed, no papers were located in the database search that investigated this association.
### Table 1. Activities and Participation Domains Associated with Speech Impairment:

*Findings from the Three Quantitative Research Studies*

|---------------------|-------------------------------|-----------------------------|----------------------------------|-----------------------------|
| Learning and applying knowledge (d1) | Learning to read/reading (d140, d166)  
Learning to write/writing (d145, d170)  
Focussing attention (d160)  
Calculating (d172) | ✓ | ✓ | ✓ |
| General tasks and demands (d2) | Undertaking a single task (d210)  
Undertaking multiple tasks (d220)  
Managing behaviour (d235)  
Handling stress and other psychosocial demands (d240) | N/A¹ | ✓ | ✓ |
| Communication (d3) | Communicating - receiving spoken messages (d310)  
Speaking (d330)  
Conversation (d350) | ✓ | ✓ | ✓ |
| Mobility (d4) | Fine hand use (d440)  
Hand and arm use (d445)  
Walking (d450) | ✓ | N/A² | N/A³ |
| Self care (d5) | Eating (d550)  
Drinking (d560)  
Looking after one’s health (d570) | ✓ | N/A² | N/A³ |
| Domestic Life (d6) | Assisting others (d660) | N/A¹ | ✓ | N/A³ |
| Interpersonal interactions and relationships (d7) | Relating with persons in authority (d7400)  
Informal relationships with friends (d7500)  
Informal relationships with peers (d7504)  
Parent-child relationships (d7600)  
Sibling relationships (d7602) | ✓ | ✓ | ✓ |
| Major life areas (d8) | School education (d820)  
Acquiring, keeping and terminating a job (d845) | ✓ | N/A² | ✓ |
| Community, social and civic life (d9) | Recreation and leisure (d920)  
Play (d9200) | N/A¹ | ✓ | N/A³ |

Note: Tick indicates an association between speech impairment and activity limitation was identified in the research study.

¹ No papers investigating this component located in review, ² No items investigating this component included on questionnaire, ³ No outcome measures investigating this component included in analyses

It may be that search terms used in the systematic review did not fully encapsulate the Activities that fall within the General tasks and demands chapter, or that there currently
is a lack of research investigating the association between such Activities and speech impairment. Other research has shown links between language impairment and difficulties with this area, so future research focusing on the association between childhood speech impairment and Activities related to General tasks and demands would be valuable.

The systematic review found associations between speech impairment and Activities related to Mobility (d4), and Self care (d5), which were not investigated in the other two studies (papers 5 and 6). However, the papers identified in the systematic review included children with childhood apraxia of speech (CAS) and developmental coordination disorder (DCD) as participants, while the studies reported in papers 5 and 6 primarily included children with speech (communication) impairment of unknown origin. Thus, the systematic review indicated difficulty with Activities related to Mobility and to Self care may be associated with speech impairment when the speech impairment has a known origin (e.g., difficulty with motor planning). It is not clear if this association exists when the origin of the impairment is unknown.

Both the systematic review (paper 4) and the analysis of data from the Longitudinal Study of Australian Children (paper 6) found an association between speech (communication) impairment and Activities and Participation related to Major life areas (d8), specifically school education and/or employment. This association was not examined in the study of parents’ and SLPs’ perspectives of preschool children with speech impairment (paper 5) as the Activities were not relevant for preschool children. Instead, the study with parents and SLPs examined the association between speech impairment and Activities related to Community, social and civic life (d9) (e.g., Recreation and leisure, play) and found difficulties may be experienced for preschool children with speech impairment.

In the study reported in paper 5, there were some differences between the
perceptions of parents and SLPs in terms of the Activities most often limited by speech impairment for preschool children. While both parents and SLPs indicated difficulties with Activities related to verbal communication and advanced learning were most common for children with speech impairment, parents were less worried than SLPs about interpersonal interactions. However, in the study reported in paper 6, difficulties with Activities related to Interpersonal interactions (d7) were a frequent concern for parents of school-aged children with a history of speech (communication) impairment. Thus, it may be that parents become more worried about their children’s social development once their children attend school. This warrants further investigation.

**Summary and Future Directions**

Findings from the three studies presented in part 2 of this doctoral research showed that management of speech impairment should extend beyond individual, clinic-based, impairment-focused intervention to target a broad range of life Activities. Furthermore, results from the study in paper 5 (which focused on preschool children) showed the need for early intervention, while results from the studies in papers 4 (systematic review) and 6 (which focused on school-aged children) showed the need for intervention to be ongoing.

Future research could examine the association between speech impairment and life Activities in specific populations, and when co-occurring difficulties are also present. For instance, results from the systematic review (paper 4) suggested individuals with speech impairment may be at increased risk of difficulties with Activities (e.g., Learning to read/write) when they also experienced co-occurring language impairment. Future research could also investigate developmental pathways. Currently, it is clear that an association exists between speech impairment and a range of Activity limitations; however, further information about the nature of the association, and mediating factors (Personal and Environmental factors) would be valuable. In part 3 of
this doctoral research, interviews with individuals with speech impairment and their communication partners were conducted to better understand some of the factors that may contribute to their experience of speech impairment, and mediate the effects of speech impairment on Activities and Participation.
PART 3: THE EXPERIENCE OF

CHILDHOOD SPEECH IMPAIRMENT
Introduction to Part 3

In part 3, three studies (papers 7-9) are presented that described the experience of childhood speech impairment. All papers utilised a qualitative strategy of inquiry, which focused on understanding the experience of speech impairment as described and understood by individuals with speech impairment and their communication partners. Data was collected through interviews and child drawings. The ICF and/or ICF-CY was used as a theoretical framework to guide the formation of interview questions, but interviews were semi-structured and comprised open-ended questions to enable individuals to present their own perspectives. A phenomenological approach was used in the analysis of interviews, and a meaning making approach was used in the analysis of drawings, to enable the best understanding of individual experiences of living with childhood speech impairment.

The study reported in paper 7 was an investigation of the experience of speech impairment as understood by preschool children. A variety of methods (drawings, questionnaires, and interviews) was used in order to enable children to share their perspectives, which is consistent with Articles 12 and 13 of the United Nations Convention on the Rights of the Child (UNICEF, 1989). The study reported in paper 8 expanded on that in paper 7 through describing the experience of speech impairment from the perspective of the families and teachers of children with speech impairment, as well as the children themselves. Finally, the study reported in paper 9, extended the scope of the doctoral research by examining the life experiences of two young adults with a history of childhood speech impairment and their mothers.

The studies reported in papers 8 and 9 incorporated a series of semi-structured interviews. In the child interviews presented in paper 8, the Speech Participation and Activities Assessment – Children (SPAA-C; McLeod, 2004), which is based on the ICF-CY Activities and Participation component, was used as a prompt to talk about speech impairment and life activities. In the adult interviews presented in papers 8 and 9, components of the ICF
were used as prompts to enable a holistic understanding of the experience of speech impairment, including the Activities and Participation, Environmental and Personal Factors that may influence or be influenced by childhood speech impairment.

The participant sample was the same for the studies reported in papers 7 and 8, and was purposefully drawn from the same community sample as that which participated in the quantitative study reported in paper 5 (the analysis of parents’ and SLPs’ perspectives about the impact of speech impairment). The range of perspectives considered in the study in paper 8 was the same as the range reported in paper 6 (i.e., parents, teachers, and children), while the scope of the study in paper 9 (ranging from early childhood to adulthood) was the same as paper 4. Thus, the qualitative studies presented in part 3 (papers 7 - 9) may be seen to augment the quantitative findings of the studies presented in part 2, through providing deep insights into the individual experience of living with speech impairment. Furthermore, the studies in part 3 enabled an understanding of the way in which the experience of childhood speech impairment extends beyond the individual to encompass significant others in their lives, and thereby offer insight into the third party effects of impairment/disability.
Paper 7

A different view of talking: How children with speech impairment picture their speech


A different view of talking
How children with speech impairment picture their speech

Jane McCormack, Sharynne McLeod, Linda J. Harrison, Lindy McAllister, and Erin L. Holliday

The views of children with speech impairment are often unheard during speech pathology assessments and intervention due to concerns about the children’s age and level of intelligibility. This paper presents the views of 13 preschool children with speech impairment who participated in the Sound Effects Study. Children drew pictures of themselves “talking to somebody” as part of a comprehensive communication assessment, and were interviewed about their talking. Drawings and interview transcripts were analysed to investigate the way in which children view their speech. Findings indicate that drawings and interviews are valuable modes for accessing the views of children, which is an important aspect of truly child-centred clinical practice.

Three recent large-scale Australian studies have found that approximately one in five preschool children is identified by their parents or teachers as having difficulty “talking and making speech sounds” (McLeod & Harrison, 2009; McLeod, Harrison, & McAllister, 2009; Trofari Eecen, Pialy, & Eideh, 2008), and the most commonly identified difficulty is speech that is “unclear to others” (McLeod & Harrison, 2009). Many children with speech difficulties are referred to speech pathology clinics for assessment and intervention. Increasingly, speech pathologists aim for a “family-friendly” approach to the clinical management of these children (Natta Pappas, McLeod, McAllister, & McKinnon, 2008), encouraging the input of caregivers in the management process. They have not, however, routinely investigated the views of the children with speech impairment regarding their speech and their goals for intervention.

Since the United Nations Convention on the Rights of the Child (UNICEF, 1989) was ratified, there has been a growing awareness of the need to include the views of children in issues that affect them. However, accessing the views of preschool children with speech impairment has typically been considered a difficult task, due to their age and their level of intelligibility (Marsham, van Laar, Gibbard, & Donn, 2008). The use of drawings has been recommended by early childhood researchers as a way of enabling children to express themselves and facilitating researchers’ access to children’s views (Einarsdottir, Dockett, & Perry, 2009; Holliday, Harrison, & McLeod, 2009). For children with speech impairment, activities such as drawing provide a means by which they can express their thoughts and feelings in a non-verbal manner.

Investigating and understanding the views of children with speech impairment has important clinical implications. The decision to seek and receive intervention for young children with speech impairment is typically made by parents or teachers on behalf of these children. The children themselves have not sought intervention and may not perceive anything wrong with their speech (McCormack, McLeod, McAllister, & Harrison, 2009). For speech pathologists, understanding the views of both the child with speech impairment and their family is necessary in order to develop intervention that addresses the problems perceived and experienced by both in communication interactions.

The aim of this study was to explore the views of children with speech impairment about their speech and difficulties associated with talking using three methods: drawings, yes/no questionnaires, and interviews.
Method

Participants

The participants were 13 preschool children (9 males and 4 females; see table 1), who were purposefully selected from children (n = 143) taking part in the Sound Effects Study investigating speech impairment in early childhood (McLeod et al., 2007–09). The children (mean age 4;7) were all identified by parents and/or teachers as having “difficulty talking and making speech sounds”. Each child was given a pseudonym to protect their identity.

Measures and procedure

The assessments for the Sound Effects Study were conducted by a qualified speech pathologist in a quiet room in the child’s preschool or childcare centre. Children were accompanied by a familiar adult, usually a parent. Parents provided consent for their children to participate and children gave assent, following a description of the task.

Communication assessments lasted approximately 1–1½ hours and took place over 1 to 2 sessions, depending on the child’s concentration during the tasks. The children’s speech skills were assessed using the Diagnostic Evaluation of Articulation and Phonology (DEAP; Dodd, Hua, Croabie, Holm, & Ozanne, 2002). The communication assessment also included screening of receptive and expressive language, hearing, oromusculature, nonword repetition, pre-literacy skills, voice, and fluency.

Three tasks were then undertaken to determine children’s views of speech. First, the Kiddy-Communication and Attitude Test (KiddyCAT; Vanryckeghem & Brutton, 2007) was administered to investigate the children’s perceptions of their speech ability and difficulties they had with talking. The KiddyCAT is a standardised assessment for children aged 3–6 years. The test comprises 12 yes/no questions, including “Is talking hard for you?” and “Do you think that people need to help you talk?”

Upon completion of the KiddyCAT, the children were given a blank piece of white A4 paper and 10 coloured texts and invited to draw a picture of themselves talking to somebody (see Holliday, 2008 for the protocol). As the child drew, the speech pathologist transcribed verbatim comments from the children. She also drew a replica of the

<table>
<thead>
<tr>
<th>Name*</th>
<th>Sex</th>
<th>Age</th>
<th>PCC</th>
<th>Do you like to talk?</th>
<th>Is talking hard for you?</th>
<th>Do you think people need to help you talk?</th>
<th>Total KiddyCAT score (12)</th>
<th>Focal points</th>
<th>Faces – how I feel about talking</th>
<th>Faces – how I feel about speaking</th>
<th>Faces – how I feel when not understood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wade</td>
<td>M</td>
<td>4;1</td>
<td>42.1</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>7 (outside normal range)</td>
<td>Accentuated body features</td>
<td>Happy, sad</td>
<td>Happy</td>
<td>In middle</td>
</tr>
<tr>
<td>Grace</td>
<td>F</td>
<td>4;3</td>
<td>53.2</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>0 (WNL)</td>
<td>Sense of self</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Patrick</td>
<td>M</td>
<td>4;3</td>
<td>34.3</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>6 (outside normal range)</td>
<td>Did not draw self</td>
<td>All, happy</td>
<td>Don’t know</td>
<td>In middle</td>
</tr>
<tr>
<td>Gus</td>
<td>M</td>
<td>4;3</td>
<td>47.8</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>3 (WNL)</td>
<td>No partner; facial expression</td>
<td>Sad</td>
<td>Happy</td>
<td>Happy</td>
</tr>
<tr>
<td>Ewan</td>
<td>M</td>
<td>4;3</td>
<td>40.3</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>6 (outside normal range)</td>
<td>No partner; colour</td>
<td>Sad, happy</td>
<td>Happy</td>
<td>Sad</td>
</tr>
<tr>
<td>Kara</td>
<td>F</td>
<td>4;4</td>
<td>78.4</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>4 (WNL)</td>
<td>Colour</td>
<td>Happy</td>
<td>Happy</td>
<td>Happy</td>
</tr>
<tr>
<td>Owen</td>
<td>M</td>
<td>4;6</td>
<td>17.9</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>3 (WNL)</td>
<td>No partner; facial expression</td>
<td>Don’t know</td>
<td>In middle</td>
<td>Sad</td>
</tr>
<tr>
<td>Matt</td>
<td>M</td>
<td>4;6</td>
<td>51.8</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>2 (WNL)</td>
<td>No partner; facial expression</td>
<td>Happy</td>
<td>Happy</td>
<td>In middle</td>
</tr>
<tr>
<td>Zac</td>
<td>M</td>
<td>4;9</td>
<td>67.1</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>5 (outside normal range)</td>
<td>Sense of self</td>
<td>Happy</td>
<td>Happy</td>
<td>Sad</td>
</tr>
<tr>
<td>Fenn</td>
<td>M</td>
<td>4;11</td>
<td>55.7</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>3 (WNL)</td>
<td>Sense of self; accentuated body features</td>
<td>Happy</td>
<td>Happy</td>
<td>Happy</td>
</tr>
<tr>
<td>Evelyn</td>
<td>F</td>
<td>4;11</td>
<td>56.8</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>3 (WNL)</td>
<td>Sense of self</td>
<td>In middle</td>
<td>Happy</td>
<td>Happy</td>
</tr>
<tr>
<td>Jamie</td>
<td>M</td>
<td>5;0</td>
<td>74.1</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>4 (WNL)</td>
<td>Sense of self</td>
<td>In middle</td>
<td>In middle</td>
<td>In middle</td>
</tr>
<tr>
<td>Liltah</td>
<td>F</td>
<td>5;9</td>
<td>74.1</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Sense of self</td>
<td>Happy</td>
<td>Happy</td>
<td>Don’t know</td>
</tr>
</tbody>
</table>

*Pseudonyms have been used to protect the identity of participants, WNL = within normal limits, PCC = percent consonants correct, Y = yes, N = no, N/A = not available
child’s drawing and labelled it accordingly. The children were then asked questions about their drawing (e.g., “Who is in the drawing?”), “Do you like talking to this person?” and were asked to identify how they felt about talking. Children were provided with visual prompts (e.g., faces showing a range of emotions: 😊😊😊, a blank face for “other feelings” and a question mark signifying “don’t know”) to assist in answering.

On another occasion, 13 children were interviewed. Twelve of the interviews were conducted by the same speech pathologist who conducted the communication assessments. A teacher with special education training conducted the remaining interview. Interviews were conducted face-to-face in a location that was familiar to the child (e.g., home or early childhood centre) with a familiar person nearby. Interviews followed a semi-structured format. (Minichiello, Aroni, & Hays, 2008). Questions were based on the Speech Participation and Activity Assessment – Children (SPAA-C) “Questions for children” (McLeod, 2004). Children were again requested to identify how they felt about the way they talk, and how they felt when talking in specific contexts (e.g., to parents, siblings, friends and teachers).

All assessments and interviews were audio-recorded with the consent of both child and adult participants using a Sony MP3 digital recorder (ICD-UX50), and were transcribed and checked by the interviewer.

**Data analysis**

**Drawings**

A meaning-making approach was used to determine how children perceive “talking.” This approach recognises the importance of consulting children and having them explain their drawings. Each child’s drawing and their explanation of the drawing was examined in terms of the meaning they conveyed, particularly in relation to how the child conceptualised their talking. Holliday et al. (2009) identified six potential key features or focal points that may be present in the drawings of children with communication impairment. These included: talking and listening, accentuated body features (mouth, eyes, ears), facial expressions, colour and vitality, sense of self, and negativity (e.g., no conversational partner, scribbling). These focal points were noted in the drawings completed by children in this study and were used to develop themes across the children’s drawings.

**Interviews**

A phenomenological approach (Minichiello et al., 2008) was used to analyse the interview transcripts. Using this approach, the researchers attempted to understand the meaning of the phenomenon (living with childhood speech impairment) from the children’s descriptions of the experience. Techniques used to ensure rigour in the analysis.

---

**Figure 1. Wade’s (4;1) drawing of himself with his brother (eyes coloured and mouth on left). Wade’s description of this picture was not intelligible (PCC = 42.1).**

**Figure 2. Grace’s (4;2) drawing of herself (right) talking to her mum about “going across the park” (PCC = 53.2).**

**Figure 3. Patrick’s (4;3) drawing of Henry the Octopus (PCC = 54.3).**

**Figure 4. Gus’ (4;2) drawing of himself talking to his dog (not pictured) at home (PCC = 47.8).**

**Figure 5. Evan’s (4;3) drawing of himself. When asked who he liked talking to be replied “Mummy and Daddy...and my dog”. Evan felt sad about talking to others because “they don’t let me play” (PCC = 40.3).**

**Figure 6. Kara’s (4;4) drawing of herself (right) with her cousin. Kara is “hula-hooping with my new sparkly hula hoop” (PCC = 76.4).**
Results

Speech assessment

Twelve of the 13 children presented with a percentage of consonants correct (PCC) that was below the normal range (i.e., standard score less than 7) on the DEAP Phonology subtest, and one child was within the normal range (standard score of 7). The PCC produced by the 13 children in this study ranged from 17.9 to 78.4 (mean 53.4).

KiddyCAT assessment

The KiddyCAT was administered with 12 of the 13 children, as it had not been included in the protocol when the other child (Lish) was assessed. Children’s scores ranged between 0 and 7 (see Table 1), with eight children obtaining scores that placed them within the normal range (0–5 out of 12), indicating positive feelings about communication.

Drawings

One child (Patrick) chose to draw a picture of Henry the Octopus. His drawing was excluded from the analysis because he did not draw himself talking. Four focal points were identified to be consistent across the other 12 drawings (see Figures 1–12).

Focal point 1 – Accentuated body features

The children’s drawings showed their awareness that features such as the mouth and ears are important in communication. In Finn’s drawing of himself talking to his friend he accentuated his friend’s ears, highlighting the importance of listening when conversing (see Figure 10). In Wade’s drawing of himself and his brother, he accentuated their mouths, eyes (coloured in) and ears (above eyes) (see Figure 1).

Focal point 2 – Facial expressions

The children also indicated that communicating can be a happy, sad or neutral process. Owen, Gus, and Matt all drew pictures of themselves talking without conversation partners, and the different facial expressions they portrayed as well as their descriptions of the drawings suggest their feelings about talking. Matt drew a happy face and stated that he was talking to his “best friend” (not pictured) about “going to Nan and Pop’s house” (see Figure 8). In contrast, Owen drew a neutral expression and stated that he was talking to
the speech pathologist about “nothing” (see Figure 7). When asked who he liked talking to Owen said “no one.” Gus drew himself talking with his dog at home (see Figure 4). The absence of a second figure and his negative facial expression may suggest Gus does not feel happy about talking.

**Focal point 3 – Colour**

There was a great degree of individuality regarding the use of colours. Kara’s drawing of herself with her cousin reflects happiness with talking, which is evoked through the smiling faces, vibrant colours and background detail (see Figure 6). Kara explained that she is “playing outside ... whirling in my new hula hoop that I got for my birthday.” In contrast, Ewan, who liked talking to “Mummy, Daddy and to my dog” drew only himself, and used only a black texta (Figure 5).

**Focal point 4 – Sense of self**

Most children portrayed a positive sense of self in their drawings, through drawing themselves a similar size and in similar detail to their conversation partner. They portrayed themselves as happy when talking to family and friends, with the inclusion of smiles, colour and by drawing people close together. Grace drew herself talking with her mother about “going across the road to the park” (see Figure 2). Grace drew the figures with similar features and standing close together.

**Faces – “How do you feel about talking?”**

Eight children indicated they felt “happy” about talking and one (Gus) indicated that he felt “sad.” One child (Owen) responded that he “didn’t know” how he felt about talking, and three indicated more than one response (e.g., happy and sad). Data were unavailable for Grace.

**Interviews**

Phenomenological analysis of the interviews revealed two themes. First, the children were aware of “problems” when communication breaks down, and second, they used strategies to “solve” the problems. When asked to colour in a face in response to the question “How do you feel when other people don’t understand you?”, Owen, Zac, and Ewan coloured the “sad” face, while Wade, Patrick, Matt, and Jamie coloured “in the middle”. This suggested they perceived a problem when they weren’t understood. However, children did not identify their speech as the cause of communication problems. When asked to colour in a face in response to the question “How do you feel about the way you talk?” most children coloured the “happy” face, except Jamie and Owen (“in the middle”) and Patrick (“don’t know”). No children indicated that they felt “sad”. Kara alone identified she had a speech problem during the interview, stating “I can’t say Tara. I say Tara when I’m saying my name.” Furthermore, Kara identified the role of the listener in communication breakdowns, stating “I keep say ... and they don’t know what’s my ... they keep saying they think my name’s Tara.” For Kara, part of the problem she perceived was that the listener did not understand her. Other children implied that listeners may have problems “hearing” and suggested solutions. For instance, when asked what they do when others don’t understand them, Gus responded, “Speak up a bit” and Evelyn said, “Say it another time.” During the interviews, Fenn and Wade were observed to repeat their utterances to help the interviewer hear (and understand). Additional analyses of these children’s interviews can be found in McCormack et al. (2009).

**Discussion**

The results from this study showed that preschool children with speech impairment can express views about their speech in non-verbal (drawings) and verbal tasks (yes/no questions, interviews with visual prompts). Analysis of these tasks revealed common themes. First, children were generally happy about talking and the way they talk. This was evident through their use of colour and facial expressions in the drawings, and their responses to interview and KiddycAT questions. In the latter, all except Patrick reported that they “liked to talk”.

Second, despite being identified as having speech difficulties by their parents and teachers, and despite confirmation on the formal speech assessment for all except Kara, most of the children did not perceive themselves as having speech difficulties. In the KiddycAT assessment, they reported talking was not “hard” for them. A positive sense of self was also evident in their drawings, where children drew themselves as similar to their conversation partners.

Finally, children showed awareness of the need for both the mouth (talking) and ears (listening) when communicating. Fenn and Wade drew and identified both these facial features in their drawings, while Kara identified the need for the mouth and ears by identifying faults in the speaker and listener when communication breaks down.

Traditional speech pathology practice focuses on “correcting” speech skills (Van Riper & Erickson, 1996). However, young children who do not perceive a problem with their speech skills (but rather with their communication partner’s listening) may be reluctant to participate in intervention that focuses on themselves as the speaker. In this study, five children indicated that they did not think people needed to help them talk. Three of these children (Grace, Patrick, and Evelyn) also indicated that talking was not difficult for them, despite obtaining PCC scores of 53.2, 34.3 and 56.8 respectively. Increasing children’s awareness of speech errors through metacognitive strategies as in Metaphon (Dean & Howell, 1986) and Parents and Children Together (PACT; Bowen & Cupples, 1998) may motivate participation in intervention. However, two children (Owen and Fenn) who identified talking was “hard” did not think people needed to help them talk. Thus, making children aware of the speech problem will not guarantee their motivation to visit the speech pathologist.

Furthermore, increasing children’s awareness of their speech problem does not address the problem of listeners needing to understand the child’s message while the speech problem is being resolved, or the child’s frustration when he/she is not understood. A more holistic intervention approach could incorporate strategies that enabled others to understand and to minimise frustration (e.g., creating and using available cues such as a diary to share knowledge of events, or a list of child’s typical productions of words), alongside strategies that aimed to improve the child’s speech (Most, 2002; Pretty, 1995).

**Limitations**

The themes described in this study emerged from across the participant sample; however, triangulation of methods revealed inconsistency for some individual participants. For instance, Gus obtained a KiddycAT score which suggested a positive attitude towards talking, but after drawing his picture, he circled a “sad” face in response to the question about how he felt about talking. Dockett and Perry (2007) suggested that different data obtained from the same children should be considered valid, and researchers should accept that children, like adults, may have many different perspectives on the same issue “rather than seeking ‘one truthful perspective’ from children” (p. 49). Accordingly, rather than perceiving inconsistencies in the data as a limitation of this study, the authors accept that the data reflect the way children’s views develop and change, and are
influenced at all times by contextual factors (Daniel & McLeod, 2006). Furthermore, the authors recognise the importance of multi-method approaches when researching with young children, in order for the research to reflect the different perspectives of those children.

Conclusions

The findings from this research exemplify the valuable information that children can provide and support the inclusion of children in research about them. The findings also support the use of a range of methods to understand children's views, when verbal communication may be difficult. This study revealed that children perceive talking as a happy experience and may hold different views from their parents, teachers and speech pathologists regarding their speech impairment.

Acknowledgment

The Sound Effects Study was supported by Australian Research Council Discovery Grant (DP0773978). Drawings from the 143 children were displayed at the Speech Pathology Australia National Conference in Adelaide in 2009 and will be published in a book titled Children Draw Talking.

References


Paper 8

My speech problem, your listening problem, and my frustration:

The experience of living with childhood speech impairment

My Speech Problem, Your Listening Problem, and My Frustration: The Experience of Living With Childhood Speech Impairment

Jane McCormack
Sharyne McLeod
Lindy McAllister
Linda J. Harrison
Charles Sturt University, Albury, Australia

Research has investigated the strategies used by children and their communication partners to resolve communication breakdowns (e.g., Corsaro, 1976; Gallagher, 1977; Girbau, 2001; Levy, 1999; Spilton & Lee, 1977). However, little research has been conducted to describe the experiences of children and their communication partners when communication breakdowns occur (e.g., children with speech impairment/speech sound disorders and their communication partners). Thus, little is known about young children’s perceptions of the experience of living with speech impairment and, particularly, their experience of communication.

In recent years, there has been a growing awareness of the need to consider the views of children in issues that affect them. For instance, second theme described the solutions participants used to overcome the problems. Solutions included (a) strategies to improve the child’s speech accuracy (e.g., home practice, speech-language pathology) and (b) strategies to improve the listener’s understanding (e.g., using gestures, repetition). Both short- and long-term solutions were identified. Conclusion: Successful communication is dependent on the skills of speakers and listeners. Intervention with children who experience speech impairment needs to reflect this reciprocity by supporting both the speaker and the listener and by addressing the frustration they experience.

KEY WORDS: children, families, speech impairment, experience, qualitative research, speech sound disorders
Article 12 of the United Nations Convention on the Rights of the Child recognizes the right of all children capable of forming their own views to express those views freely in all matters affecting them (UNICEF, 1989). Other researchers have identified children as valid participants in research about themselves (Cresmin & Slater, 2004; Dockett & Perry, 2007; Marsh, Ellis, & Craven, 2002).

Owen, Hayett, and Roulstone (2004) considered children’s experiences and views to be invaluable to research about children with communication impairment. They interviewed a sample of children with communication impairment attending mainstream schools in order to learn about their experience of communication and intervention. They found that some children were aware of their specific communication difficulties and the way this affected other aspects of their life (e.g., friendships). However, only two children in the sample (both in year 5 at school) had speech impairment, and no further information about the type or severity of the impairment was provided. Owen et al. suggested that future research investigating the experiences of younger children and those with more severe impairments would be valuable.

Markham and colleagues (Markham & Dean, 2006; Markham, van Laar, Gibbard, & Dean, 2009) investigated the quality of life (QOL) of young people with communication impairment as perceived by those young people and their significant others, including their families and speech-language pathologists (SLPs). Their research was conducted with participants aged 6–18 years who experienced a range of speech and/or language impairments. They found that both the young people and their significant others acknowledged the importance of appropriately understanding and responding to communication needs in order to create a positive QOL. However, like the Owen et al. (2004) study, the participant sample interviewed by Markham et al. (2009) did not include preschool-age children or children with severe impairment due to the perceived difficulty these groups may have had with participating. Markham et al. recognized this as a paradox facing researchers; that is, the individuals whose QOL may be most affected by their impairment are often those who are excluded from studies investigating their experience of the impairment. As a consequence, it is unclear whether individuals with more severe impairment perceive their communication experiences in the same way as those with milder impairment, and whether the perceptions of young children are comparable to the perceptions of older children, and others, such as family members and SLPs.

There is also a lack of research investigating the experiences of individuals who communicate with children with speech impairment. For the most part, research into the experiences of families of children with speech impairment has focused on access to and involvement in intervention (e.g., Band et al., 2002; Głogowska & Campbell, 2000; Paradise & Adeyusi, 2002; Watts Puppas, McLeod, McAllister, & McKinton, 2008). However, one study by Barr, McLeod, and Daniel (2008) examined the experiences of siblings of children with speech impairment and described the way in which speech impairment impacted their relationships with one another, with other family members, and with people outside the family. Barr et al. identified the important roles that siblings play in the lives of children with speech impairment, taking on the task of interpreting for the children when others are unable to understand and protecting the children from potential conflict with others (e.g., teasing, bullying). However, they also identified how speech impairment could affect the sibling, for example, by causing them worry and concern. Barr et al. concluded that SLPs should routinely include siblings in assessment and intervention.

Research investigating the experiences of teachers of children with speech impairment is limited to studies of teachers’ perceptions of the children’s academic and social skills (Overby, Carroll, & Bemtham, 2007) and of their own competence to teach these children (Marshall, Ralph, & Palmer, 2002). Findings from this research indicate that both parents and teachers recognize the need for professional (SLP) advice and intervention to improve the communication skills of children with speech impairment.

Traditionally, SLPs have diagnosed speech impairment on the basis of normative data that were obtained in typical environmental contexts, such as whether children are producing age-appropriate sounds on standardized assessments in clinical settings (Gould, 2009; McLeod, 2006; McLeod & Biele, 2004). Intervention, then, has traditionally targeted the elimination of communication breakdowns through improving children’s speech accuracy (i.e., ability to produce age-appropriate sounds). This style of intervention may be considered to follow a medical model, which “views disability as a problem of the person...which requires medical care provided...by professionals” (World Health Organization, 2001, p. 20). It is unclear whether this model reflects the communication experience of children with speech impairment and their communication partners and adequately addresses their perceived needs.

The decision to seek and receive intervention for young children with speech impairment typically is made by parents or teachers on behalf of the children, as opposed to adults with communication impairment who make this decision of their own accord (Jordan & Bryan, 2001). As such, the “implied acceptance” that there is something wrong with their communication skills that exists for adults seeking intervention may not exist for children with speech impairment (Jordan & Bryan, 2001, p. 456). As Corsano (1976) asserted, “Adults and children do not always share the same world view.” (p. 195). Children have not sought intervention and may not perceive anything wrong with their skills as a speaker. The ability to accurately self-evaluate speech performance is a metacognitive skill, and previous research has shown that accurate self-evaluation develops as children age (e.g., Butler, 1990; Kademvesk, Gillam, Ukrainetz, Justice, & Eisenberg, 2004; Nichella, 1979).

Although young children lack the metacognitive skills to critique their communication performance accurately, they can still provide a valid and valuable description of the experience of living with speech impairment. The aims of this study were to explore the different perceptions about speech impairment that may exist and to understand the experience of living with speech impairment in childhood as described and understood by children with speech impairment and significant others in their environment. Understanding the experiences of child speakers and their listeners is necessary in order to gain a more holistic perspective of the reciprocity involved in communicative interactions and to ensure that intervention reflects this reciprocity.

METHOD

Participants

The participants were 13 preschool children (4 to 5 years of age) and 21 significant others (e.g., parents, grandparents, siblings, and teachers). The preschool children, their families, and their teachers were recruited as part of a larger sample for the Sound Effects study, a project investigating the prevalence, severity, impact, and service
delivery for children with speech impairment in early childhood (McLeod, Harrison, & McAllister, 2007–2009). The children were all identified by parents and/or teachers as having "difficulty talking and making speech sounds," and this was reported to be the primary area of difficulty (i.e., not secondary to language difficulties, structural difficulties such as cleft palate, or functional difficulties such as developmental delay). As part of the larger project, children had participated in a comprehensive battery of communication assessments, during which the Diagnostic Evaluation of Articulation and Phonology (DEAP; Dodd, Hua, Crosbie, Holm, & Ornaan, 2002) was administered to evaluate their speech skills. The percentage of consonants correct (PCC) was calculated on the basis of the children's responses to the DEAP items. The PCC produced by the 13 children in this study ranged from 18.6 to 78.4, which equated to a standard score of 3 for 12 of the 13 children (Table 1). A standard score of <7 indicates skills outside the normal range. However, one child (Kara) was included in the sample despite obtaining a PCC standard score of 7 (within the normal range). She was included in the sample on the basis of her raw PCC (78.4), which suggested some speech sound errors, and her DEAP phonological analysis, which revealed persistent froniting. Furthermore, both Kara's mother and teacher had identified Kara as experiencing speech impairment,

Table 1. Characteristics of the children with speech impairment.

<table>
<thead>
<tr>
<th>Name</th>
<th>Sex</th>
<th>Age (years; months)</th>
<th>Percentage consonants correct (PCC)</th>
<th>PCC standard score</th>
<th>Family history of speech/language difficulties</th>
<th>Location</th>
<th>Currently attends speech-language pathology intervention</th>
<th>Siblings (approx. ages)</th>
<th>Significant others who were interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wade</td>
<td>M</td>
<td>4:1</td>
<td>42.1</td>
<td>3</td>
<td>Yes</td>
<td>Large regional</td>
<td>Awaiting intervention</td>
<td>1 brother, 6:9, Mother pregnant</td>
<td><strong>Mother Teacher</strong></td>
</tr>
<tr>
<td>Grace</td>
<td>F</td>
<td>4:3</td>
<td>53.2</td>
<td>3</td>
<td>Yes</td>
<td>Small regional</td>
<td>Yes</td>
<td>1 brother, 7:0</td>
<td><strong>Mother Grandmother Teacher</strong></td>
</tr>
<tr>
<td>Patrick</td>
<td>M</td>
<td>4:3</td>
<td>34.8</td>
<td>3</td>
<td>Yes</td>
<td>Small regional</td>
<td>Yes</td>
<td>1 brother, 9:0, 1 sister, 7:0</td>
<td><strong>Teacher</strong></td>
</tr>
<tr>
<td>Gus</td>
<td>M</td>
<td>4:3</td>
<td>47.3</td>
<td>3</td>
<td>Yes</td>
<td>Metropolitan</td>
<td>Awaiting intervention</td>
<td>1 brother, 17:0, 1 twin brother, 4:3</td>
<td><strong>Teacher</strong></td>
</tr>
<tr>
<td>Ewan</td>
<td>M</td>
<td>4:3</td>
<td>38.8</td>
<td>3</td>
<td>Yes</td>
<td>Metropolitan</td>
<td>Awaiting intervention</td>
<td>1 brother, 17:0, 1 twin brother, 4:3</td>
<td><strong>Teacher</strong></td>
</tr>
<tr>
<td>Kara</td>
<td>F</td>
<td>4:4</td>
<td>78.4</td>
<td>7</td>
<td>Yes</td>
<td>Metropolitan</td>
<td>No</td>
<td>1 sister, 3:6, 1 brother, 1:6</td>
<td><strong>Mother and Father (together)</strong></td>
</tr>
<tr>
<td>Owen</td>
<td>M</td>
<td>4:6</td>
<td>18.6</td>
<td>3</td>
<td>Yes</td>
<td>Metropolitan</td>
<td>Yes</td>
<td>1 sister, 7:0, 1 twin brother, 6:8, 2:0</td>
<td><strong>Teacher</strong></td>
</tr>
<tr>
<td>Matt</td>
<td>M</td>
<td>4:6</td>
<td>50.7</td>
<td>3</td>
<td>No</td>
<td>Metropolitan</td>
<td>Awaiting intervention</td>
<td>2 sisters, 6:6, 2:6</td>
<td><strong>Mother</strong></td>
</tr>
<tr>
<td>Zac</td>
<td>M</td>
<td>4:9</td>
<td>67.1</td>
<td>3</td>
<td>No (Yes, reading)</td>
<td>Metropolitan</td>
<td>No</td>
<td>3 sisters, 1:0, 7:0, 1:8</td>
<td><strong>Mother</strong></td>
</tr>
<tr>
<td>Finn</td>
<td>M</td>
<td>4:11</td>
<td>55.8</td>
<td>3</td>
<td>Yes</td>
<td>Rural</td>
<td>Awaiting intervention</td>
<td>1 sister, 3:6</td>
<td><strong>Mother Teacher</strong></td>
</tr>
<tr>
<td>Evelyn</td>
<td>F</td>
<td>4:11</td>
<td>56.8</td>
<td>3</td>
<td>No (previously has attended)</td>
<td>Metropolitan</td>
<td>Yes</td>
<td>1 sister, 2:0</td>
<td><strong>Mother</strong></td>
</tr>
<tr>
<td>Jamie</td>
<td>M</td>
<td>5:0</td>
<td>74.1</td>
<td>3</td>
<td>No (previously has attended)</td>
<td>Metropolitan</td>
<td>No</td>
<td>1 brother, 6:6</td>
<td><strong>Mother</strong></td>
</tr>
<tr>
<td>Lilah</td>
<td>F</td>
<td>5:9</td>
<td>54.5</td>
<td>3</td>
<td>No (previously has attended)</td>
<td>Large regional</td>
<td>Yes</td>
<td>1 brother, 2:0</td>
<td><strong>Teacher</strong></td>
</tr>
</tbody>
</table>

*On the Diagnostic Evaluation of Articulation and Phonology (DEAP; Dodd, Hua, Crosbie, Holm, & Ornaan, 2002) assessment, the lowest possible standard score is 3. Children receive a standard score of 3 for PCC scores <49 for ages 4:0–4:5, <72 for ages 4:6–4:11, <83 for ages 5:0–5:5, and <84 for ages 5:6–5:11. Therefore, most children in this sample received the same standard score despite having variable PCC raw scores. *Locations were defined according to population size: rural = <5,000; small regional = 5–40,000; large regional = 40,000–100,000; metropolitan = capital city (>1 million). Locations also varied in their level of remoteness and distance to local health services.

McCormack et al.: Living With a Childhood Speech Impairment
and Kara had identified her own difficulty saying it. Broomfield and Dodd (2004) recommend the use of both standardized assessments and clinical judgments to identify individuals with speech and/or language impairment.

The children and families were selected through purposive sampling. According to Patton (2002), purposive sampling occurs when “cases for study ... are selected because they are ‘information rich’ and illuminative, that is they offer useful manifestations of the phenomenon of interest; sampling, then is aimed at insight about a phenomenon, not empirical generalisation from a sample to a population” (p. 40). In this research, the sample of children interviewed was considered to be “information rich” in that they represented both sexes and a range of ages, PCCs, involvement in speech-language pathology intervention, family characteristics, and living locations (see Table 1). Parents were asked to identify significant others to be interviewed. The number of significant others interviewed varied for each participant (n = 1–4), depending on the number of people listed by the parents as possible participants and the number of people available for interviews. Significant others included parents, grandparents, siblings, and teachers. The inclusion of family members and teachers in the sample of significant others was intended to provide insights into the different everyday contexts in which the children communicate, their communicative experiences in those contexts, and the experiences of their different communication partners. For seven of the 13 children, it was possible to gain data from both families and teachers (see Table 1); however, for five children, only the parents were interviewed, and for one child, only the teacher.

Following a description of the task, all the adult participants provided consent to participate (Conroy & Harcourt, 2009; Harcourt & Conroy, 2005; Hurley & Underwood, 2002). The children agreed to participate, and their parents also provided consent to participate in the study. Each of the participating children was given a pseudonym to protect his or her identity.

Procedure

The interviews were semi-structured and incorporated open-ended questions. This enabled participants to offer a range of responses regarding their experiences and to expand on key aspects when prompted. This style of questioning also enabled the interviews to be undertaken by more than one interviewer. Twelve of the 13 interviews with the focus children were conducted by the first author, a qualified SLP who had previously assessed the children’s speech as part of the larger project. One was conducted by another researcher, a teacher with special education training who was previously unknown to the child. All child interviews were conducted face-to-face in a familiar environment (child’s home or preschool) and with a familiar adult nearby. Interviews with significant others were conducted face-to-face when possible. On one occasion, both parents were interviewed together, and 12 telephone interviews were necessary due to time and distance. The qualified SLP conducted interviews with 19 of the 21 significant others, and the other with special education training conducted the other two interviews. Attempts were made to conduct all interviews relating to a particular focus child within a 1-month time frame. For one participant (Grace), this was not possible due to family commitments. Interviews with Grace and her family were completed within a 3-month time frame.

In the child interviews, questions were guided by the Speech Participation and Activity Assessment—Children (SPAA-C; McLeod, 2004). Children were asked questions about their feelings when talking in different contexts and were provided with visual prompts (e.g., faces showing happy, sad, in-the-middle expressions) to assist answering the questions. Children were asked to circle or color the face that showed the emotion corresponding to their response or to draw another face expressing a different emotion. They were asked additional questions depending on their response. For instance, children were asked how they feel when talking to their friends or siblings, and then were asked about the activities they enjoyed doing with them. Children were also asked how they feel when others do not understand them, and then were prompted to describe what they did when this occurred. In addition, children were requested to draw a picture of themselves “talking to somebody” as another way of enabling them to express their ideas and feelings. The use of drawings has been previously recommended as a way of enabling children, including those with communication disorders, to express themselves and enable researchers to access children’s perspectives (Finnarsdottir, Dockett, & Perry, 2009; Holdiday, Harrison, & McLeod, 2009).

Interviews with the adult participants followed a conversational style of questioning in accordance with the established protocols for in-depth qualitative interviewing (Minichello, Aroni, & Hays, 2008). A fixed set of questions was not used; instead, adults were asked open-ended questions regarding key topics, and the order of questions was flexible. The development of key topics was guided by the International Classification of Functioning, Disability and Health: Children and Youth version (ICF CY; World Health Organization, 2007). Topics included personal factors (e.g., questions about the child’s development, personality characteristics, and interests), body functions (e.g., questions about the child’s academic, motor, communicative, and social skills), activities and participation (e.g., questions about the child’s participation in life activities), and environmental factors (e.g., questions about the child’s significant others, attitudes of significant others, and their access to services). Interviews commenced with an open-ended question/statement such as, “Tell me about your child,” but the structure and content of subsequent questions was influenced by the responses of the interviewees, and so the line of questioning developed as each interview progressed. When asking questions, the interviewers aimed to emphasize the experiences of the children rather than their speech impairment (cf. McLeod, 2004).

The duration of each interview varied from 10 min to 50 min. The variation in the length of interviews was influenced by the number of participants being interviewed at one time (for example, both parents of one child were interviewed together), the attention and motivation of the participants, and the participants’ other commitments.

All interviews were audio-recorded. The interviews were transcribed verbatim and were then checked for accuracy by the first author. The checked transcripts were sent to the participants for review. Adult participants were invited to make changes to their transcripts (e.g., additions and deletions) to ensure that the transcripts accurately reflected their thoughts and experiences and to assure them that they could not be identified in the transcripts. In the case of children, parents were asked to check their child’s transcript, as they were also present at the interview. Occasional modifications were requested to increase the clarity of the respondent’s own comments, but no information was deleted.

Data Analysis

Transcripts from all the interviews were analyzed by the first author. Analysis was based on the phenomenological approach (see,
for example, van Manen, 1990), which attempts to understand the essence of and give meaning to a phenomenon as described by individuals who experience that phenomenon. The phenomenon under investigation in this study was that of living with speech impairment, and the experience of this phenomenon was described by children with speech impairment and their communication partners. Thus, the analysis was oriented around the experience of being a child with speech impairment or of being the child’s communication partner.

This type of analysis involves immersion in the data (Patton, 2002), that is, repeated readings of interview transcripts in order to identify key words and ideas that directly relate to the phenomenon. These key words and ideas form the initial codes, which were used to identify and sort content from the interview transcripts (see Table 2). The coding process was undertaken using the data management computer program NVivo 2 (QSR International, 2002), which enabled the large amount of coded text to be sorted and tracked.

The content from each transcript was coded separately, and resulting codes for each transcript were then compared with the original transcript to check the accuracy of the analysis. Codes were compared within and across interview transcripts using the process of constant comparative analysis (Patton, 2002). This ensured that commonalities and differences in codes were understood. For instance, frustration was identified as a key word and was used as a code to sort data. However, comparative analysis identified differences in the perceived cause of the frustration, so separate codes were used to discriminate between these in the subtheme of the frustration problem (see Table 2). This constant rechecking of the coding system was conducted to enhance the robustness and applicability of the codes. Triangulation was also used to ensure rigor in data collection and analysis. The triangulation of data collection methods used in the children’s interviews enabled the researcher to perform a comparative analysis to check the consistency of findings generated by the children’s verbal and nonverbal (e.g., happy, sad, and other faces; drawings) responses. The triangulation of data sources enabled the researcher to check the consistency of information collected with different participants (e.g., interviews with children and significant others; Patton, 2002). In this research, interview data from different sources relating to a particular child were triangulated to ensure consistency of data for each participant. Interview data from participants sharing the same relationship to other children (e.g., all parents) were triangulated to ensure robustness of analyses across participant groups.

Following the initial sorting of interview data into codes, diagrams were developed to organize the identified codes and to determine the relationships between codes. The diagrams were refined through ongoing immersion in the data and constant comparative analysis, and patterns were found to emerge in the data. The codes were collapsed into two larger overarching themes, each with three subthemes (see Table 2 and Figure 1). Further testing of the analyses occurred through checking of understanding of the data with participants (participant validation) and illustrating data analysis using detailed extracts (i.e., thick descriptions) in research reports to ensure authenticity (Patton, 2002).

The reliability of the analysis was determined by providing a sample of the transcripts and the identified codes and themes to the second and third authors. Each author independently checked that the codes accurately reflected the phenomenon as described by the sample of participants, and that the themes appropriately encompassed the codes.

RESULTS

This research used a phenomenological framework to understand the phenomenon of living with speech impairment as described by children with speech impairment and their significant others. It was intended that this description would enable a “fuller and deeper” understanding of “the lived quality and significance of the experience” (van Manen, 1990, p. 10) than is possible through traditional clinical assessment or through interviews with only the adult listeners. The phenomenological analysis saw the emergence of two themes related to the phenomenon of living with speech impairment. In the first theme, termed problems, participants recognized that to live with speech impairment (as a child with speech impairment or as the child’s communication partner) is to encounter difficulties, particularly with communication interactions (Figure 1). In the second theme, termed solutions, participants recognized that to live with speech impairment is to search for, and try, ways to manage the difficulties they encounter.

Theme 1: Problems

Throughout the interviews, participants variously referred to “problems,” “difficulties,” “issues,” or “troubles” in their experience

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
<th>Code</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problems (trouble, difficulty, concern, struggle)</td>
<td>Speech problem</td>
<td>Frustration problem</td>
<td>Nature of the current problem</td>
</tr>
<tr>
<td></td>
<td>Speech/sounds/words = incorrect</td>
<td>With self (child)speech</td>
<td>Identifying the problem (advise, know ledge, child awareness)</td>
</tr>
<tr>
<td></td>
<td>Listening problem</td>
<td>With others/listening</td>
<td>Potential future problems (relationships, literacy)</td>
</tr>
<tr>
<td></td>
<td>Hearing/understanding = effort, inability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solutions (fix, help, get better, work on, improve)</td>
<td>Solving speech problem</td>
<td>Solving frustration problem</td>
<td>Nature of the solution</td>
</tr>
<tr>
<td></td>
<td>Speech-language pathology/practice</td>
<td>Calming down, learning to not panic</td>
<td>Current progress and future needs (getting better, needing help)</td>
</tr>
<tr>
<td></td>
<td>Solving listening problem</td>
<td></td>
<td>Future solutions (goals, expectations, hopes)</td>
</tr>
<tr>
<td></td>
<td>Repeating</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gestures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interpreting/ translating</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

McCormack et al.: Living With a Childhood Speech Impairment 383
of living with speech impairment. Further analysis revealed that the problems they described could be separated into three distinct but related problems: (a) a speech problem based on the child’s unclear speech; (b) a listening problem based on the communication partner’s inability to “hear” (or understand) the child’s message; and (c) a frustration problem based on the child’s reactions to communication breakdowns, which occurred as a consequence of both the speaking and the listening problems. Adults discussed all three problems, the ways in which the problems were first identified, and their concerns about related problems that might arise in the future. However, the children were less likely to perceive the speech problem. In the following sections, the participants’ discussion of the problems is illustrated through interview excerpts. Unless otherwise specified, the terms “significant others” or “adults” is used to refer to both family members and teachers as similarities were found between the responses of both groups.

(a) The speech problem: “He just doesn’t say the word correctly.” Child and adult participants in this study recognized the existence of problems through experiencing or observing (in the case of adults) communication breakdowns. Their descriptions suggest that the speech problem (not saying the words “correctly”) lies within the speaker—that is, the child. The speech problem exists in isolation from contextual factors (e.g., conversational partner, environment) and is ongoing. Karu was the only child participant who identified that she had a speech problem.

Interviewer: Sometimes when you’re talking is it a bit tricky for you to say the words?
Karu: Yep I can’t say Tarn [Kara], I say Tarn when I’m saying my name.

Kara’s awareness of her speech problem focused on the functional impact—her inability to say her name. None of the other children mentioned a problem with his or her speech as a topic of conversation. When explicitly asked to color in a face in answer to the question “How do you feel about the way you talk?” most children indicated that they felt “happy” about their talking, except Jamie and Owen (“in the middle”) and Patrick (“don’t know”). None indicated that he or she felt “sad.” Such positive responses suggest that the children may not perceive a problem with their speech.

In contrast to the children’s perspective, all of the significant others except Kara’s father identified a speech problem. Kara’s father reported that he “didn’t notice” a speech problem but knew that others (including his wife, Kara’s mother) did. Parents described how comments or advice from professionals (e.g., teachers, child health nurses) contributed to their recognition of a problem with their child’s speech. At times, this advice was the first time that the problem was identified, although sometimes it appeared to confirm the parent’s own perception of a speech problem, as Grace’s teacher explained:

Once I realized, once I thought that there was a problem for her [Grace], I spoke to her mom fairly soon. I think her mom was saying, you know, was almost ready herself for someone to say something and they got onto it straight away at home.

Adults defined the child’s speech problem in one of two ways. Some focused on the functional impact and described how the speech impairment restricted the child’s participation at preschool. For example, Owen’s teacher reported, “He can’t express what he wants to, to the other children. And he can’t ask the question and get them to

384  LANGUAGE, SPEECH, AND HEARING SERVICES IN SCHOOLS  •  Vol. 41  •  379–392  •  October 2010

189
understand it and give him the answer back that he’s seeking.” However, others provided a normative definition of the problem, describing the child’s speech as not being “correct” or “proper.” For instance, Patrick’s father reported that “probably the sounds in the words is the biggest problem, I think… like we see when he says ‘dog’ or something, he doesn’t say the ‘d’ properly sometimes.”

Adult participants identified variables that appeared to influence the clarity of the child’s speech, yet even these variables were child related (e.g., the child’s mood, level of fatigue, and his or her rate/volume of speech). Adults perceived the severity of the child’s speech problem according to their own ability to understand the child, and consequently, some parents perceived the problem as less severe than the teachers did. For instance, Wade’s mother reported, “Most of the time I can understand, but he just doesn’t say the word correctly.” In contrast, Wade’s teacher identified that the extent of Wade’s speech errors made it difficult for extended family, peers, and teachers to understand his message, and she expressed concern about his readiness for school the following year. Other parents, such as Lilah’s mother, also spoke of their concern about potential future problems (such as literacy difficulties) that may be experienced by their children with speech impairment.

Adults, such as Grace’s mother, recognized that their children did not share their awareness of the speech problem:

And she always enjoys news time, which does surprise me because when they said they couldn’t understand her and there were all these children that she had to stand up in front of, I really thought that she would have indicated that she didn’t want to do it. But, no. Every week she gets something from home and gets up there and says her spiel. I remember that’s what fascinated me… when you asked her did she think she had a problem with her speech and she clearly said no. That shocked me. Because I really thought she would have said, you know “yes!”

Gus and Ewan’s teacher commented that rather than a lack of awareness of a speech problem, children might just perceive a different problem to exist. She stated, “I think they just think they’re not getting what I’m trying to say.” And it’s not “I can’t…” say the words properly.”

(b) The listening problem: “Mate, I can’t hear you.” Within the present study, both child and adult participants identified a listening problem (Figure 1). Their descriptions suggest that the problem of understanding the child is a problem that lies with the listener—that is, the child’s conversational partner. It exists only in interactions with others and so cannot be separated from contextual factors.

For some child participants, the perception of a listening problem was interpreted through their responses to the coloring faces task. For example, when explicitly asked to color in a face in response to the question “How do you feel when other people don’t understand you?” Owen, Zac, and Ewan indicated that they felt “sad,” whereas Wade, Patrick, Matt, and Jamie indicated that they felt “in the middle.” This suggests that they perceived a problem when they were not understood. Kara described the listening problem during the interview in terms of her message being misinterpreted:

Interviewer: Is it sometimes tricky for other people to understand what you are saying?
Kara: Yeah, I keep say, and they don’t know what’s my, they keep saying they think my name’s Tara.
Interviewer: And they think your name is Tara instead of Kara. I see.

Other children, such as Fenn, did not verbalize their awareness of this listening problem during the interviews, but it was evident in their interactions with the interviewer:

Fenn: This is Baden. He’s my friend.
Interviewer: Do you like talking to Baden?
Fenn: It’s not Baden it’s [unclear].
Interviewer: Oh… Braden is it?

Both Kara and Fenn identified the immediate and functional impact of the listening problem on themselves as communicators: The listener had failed to understand their message (and consequently was referring to a person by the wrong name).

Adults described the listening problem as not “working out” or “picking up on” the child’s message, but also not being able to “hear” or “listen clearly,” as shown below:

Fenn’s mother: I can’t remember what he said when we were camping. He just kept saying, “can I have rub” and I’m there going, “mate, I can’t hear you, slow down, point to it.” You know? He was getting more frustrated, and he wouldn’t point at it.
Interviewer: Okay, right. So normally when you do have difficulty understanding, you would do things like that, like asking him to point something, to try and work out what it was that he was saying?
Fenn’s mother: Yeah, or I’ll ask him, I’ll say “Can you say it slowly? Mom doesn’t understand.”

Similarly to the children, the significant others recognized that a functional impact of the listening problem was that the child’s message may be misunderstood, lost, or unknown:

Interviewer: And what happens when you don’t understand him, what do you do?
Patrick’s brother: I ask Mom and Dad to see what he says.
Interviewer: And do they know?
Patrick’s brother: Probably not.
Interviewer: Sometimes no one knows.
Patrick’s brother: [nods]

Adults also recognized that the listening problem had a functional impact on them as communication partners, in that they were forced to make a greater effort in order to understand. Grace’s grandmother explained, “When she gets going and she gets excited, then… well, you can virtually understand her so long as you’re listening hard enough”

Wade’s teacher acknowledged that other children sometimes chose not to make the effort and would “just run off and play.” Some parents, such as Patrick’s father, expressed concern about potential future problems at school (such as teasing) related to the inability of other children to understand the child’s speech.

Adult participants identified a range of contextual variables that appeared to influence the ability of the listener to understand the child. These contextual variables included use of visual props, prior knowledge of topic, and familiarity with the child (as evident in the excerpt below). For instance, Wade’s teacher reported:

I have heard extended family members say that they find him difficult to understand and they can’t understand him. So, although mom and dad are understanding, not everybody else is in their family.

(c) The frustration problem: “He gets cranky.” Adults (particularly parents) discussed a third problem in their children’s communication experience: child frustration. In contrast, children did not explicitly talk about the frustration they experienced, but frustration was evident in the nonverbal messages of some, such as Owen and Lilah. During the initial assessment when Owen was asked to draw
a picture showing him talking to someone, he drew a picture only of himself and reported that he did not like talking to anyone (Figure 2, left). During the interview with Owen, 7 weeks later, he was asked to draw another picture of himself talking to someone. He drew a picture of his mother. When asked where he was in the picture, Owen drew an additional figure (see Figure 2, right). He was noted to draw both figures in red and yellow markers and then scribble over both faces in black marker, possibly indicating underlying tension and frustration about talking.

Lilah’s mother shared a similar anecdote:

Something unusual that she did—I can’t remember how old she was—she would have only been about two maybe. I had all these photos, like duplicate photos that I wasn’t putting in albums. She went through them all. She had a sheet of stickers and she put this little round sticker on top of the mouth of every face in all the photos. That was sort of around about the time we were first noticing that she was having frustration getting her thoughts across.

Lilah’s mother suggested that Lilah’s frustration was possibly due to a mismatch between child and adult perceptions of the underlying cause of the problem:

But it’s [Lilah’s frustration] not happening so much anymore because she’s getting a lot cleverer with her sounds. But it certainly has been something [that has been a problem] as she was growing up. [She was] very, very frustrated. … When we were asking her questions … she couldn’t understand why we didn’t know.

Some parents, such as Zac’s mother, perceived that frustration could arise as the child’s reaction to the speech problem:

He’s frustrated [when he’s not understood] … disappointed with himself, as much as [frustrated about] you not understanding. So … he doesn’t just think we can’t understand. He knows that it’s hard [for him] to explain.

However, other parents, such as Fenn’s mother, identified the frustration problem as part of the child’s reaction to the listening problem:

Fenn’s mother: There was one example, we went to a birthday party and a parent came up going, “I don’t know what Fenn’s trying to tell me.” And he was getting frustrated.

Interviewer: Okay, because that’s sort of an environment that’s supposed to be fun and exciting.

Fenn’s mother: Yes, that was the problem. He was really happy and excited and he wanted something, but we couldn’t understand him. I couldn’t understand him.

Adults described different ways in which the child’s frustration problem presented. One way was through externalizing behavior problems such as the child becoming upset or angry. For instance, Fenn’s mother stated, “Well if he’s excited he gets … you can’t understand him. He gets cranky and frustrated and starts yellin’ at you. Chucks a tantrum kind of thing.” Another way in which the child’s frustration problem presented was through internalizing behavior problems such as the child becoming withdrawn. Zac’s mother reported that he doesn’t get “wound up” when he isn’t understood, but instead “he just probably shuts inside himself type of thing.”

Parents felt that the manner in which frustration was expressed depended on contextual variables (e.g., different communication partners) and child characteristics (e.g., a persistent temperament). For instance, Fenn’s mother reported that Fenn reacted in a “totally different” way when teachers were unable to understand him compared to when she was unable to understand. Instead of Fenn “chucking a tantrum” as he did with her, Fenn’s mother reported that with teachers, “he would just keep repeating himself until they heard.”

Figure 2. Owen's drawings of himself talking. The first drawing (left) was collected during Owen’s speech assessment; he did not draw a conversational partner. When asked who he liked talking to, Owen responded “no one.” Owen’s second drawing (right) was collected during the speech interview, approximately 7 weeks after the assessment. Initially, he only drew his mother (large figure). Then he drew himself “talking” to his mother. Owen drew their faces, bodies, and legs in red and yellow, then scribbled over their faces with black. Owen produced 18.6% percentage of consonants correct on the DEAP, and his teacher reported, “as the years progressed, he started to use gesture more.”
Theme 2: Solutions

Participants in this study described, and at times demonstrated, the ways in which they attempted to solve the communication problems they experienced. Solutions were described in terms of strategies that were currently employed to solve the problems and perceptions of eventual solutions to the problems (see Figure 1). These could be separated into solutions to (a) the child’s speech problem, (b) the other’s listening problem, and (c) the frustration problem. Solutions could be further separated into the strategies that were employed by the child speakers and those that were employed by the adult listeners. In the following sections, the participants’ discussion of the solutions is illustrated through interview excerpts.

(a) Solving the speech problem

The child’s (speaker’s) solution to the speech problem: “Just ask Mom.” As child participants were less inclined to perceive a speech problem, they did not explicitly discuss solutions to this problem. However, for one child (Owen), a potential solution could perhaps be inferred by his drawings and responses during the interview. Owen stated that he did not like talking to anyone (in Figure 2, left) or playing with other children at preschool but was happy when playing alone. It is possible that Owen’s happiness when engaged in solitary activities was because he did not have to speak. Thus, avoiding situations where speech was required could be one way that children aim to solve the problem of unclear speech. Another solution may be to allow others to speak in their place. For Owen, reliance on others to speak for him may explain his initial drawing of his mother when asked to draw a picture of himself talking (Figure 2, right). Interviews with the adult participants supported the suggestion that “not talking” may be a solution employed by children. For instance, Kara’s mother reported that she sometimes took on the role of interpreter at the request of her child.

Interviewer: So she doesn’t just give up, she’ll keep on trying to get that message across?

Kara’s mother: Yeah. Except for lately when she said “no, just ask Mom.”

The adult’s (listener’s) solution to the speech problem: “I got her to hold her tongue and bob her head like an emu to say /g/.” In contrast to the children’s solutions, adults spoke about solving the speech problem by giving “help” through methods such as modeling correct productions and attempting formal instruction and practice. For instance, Kara’s mother reported:

I’ve been trying with the finger on the tongue and she’s still getting the /t/ sound... I got her to hold her tongue and bob her head like an emu to say /g/. (An emu is an Australian flightless bird, similar to an ostrich.)

To further help their children, adults also discussed receiving help in the form of professional (SLP) intervention. Table 1 lists the children who were accessing intervention at the time of the interviews, those who had previously received intervention, and those who were awaiting intervention. This solution was influenced by participant factors such as prior experience and/or expectations of successful intervention and environmental factors such as advice or support from others. For instance, Matt’s mother reported seeking intervention with an SLP for Matt after observing a neighbor’s child speaking “better” after intervention.

For adult participants, eventual solutions to the speech problem were identified and referred to in terms of their “goals” or “hopes” for the future. For instance, they spoke of the child’s speech “getting better” or becoming “cleaner.” The adults’ goal of overall speech improvement reflected their identification of the child’s speech being the underlying problem. They identified progress toward the solution by comparing their experiences “now” with what “used to” happen. Lilah’s teacher identified progress in Lilah’s ability to “participate and actually talk to you a lot more” (i.e., a functional improvement). However, Kara’s mother identified progress in terms of Kara becoming “quite good with the ‘g’ sounds” (i.e., a normative improvement).

(b) Solving the listening problem

The child’s (speaker’s) solution to the listening problem: “I keep saying . . . .” For children, the perception that the listening problem belonged to the listener may have influenced their identification of a solution—repeating what they were saying because the listener was not “listening.” For instance, when asked what they do when others don’t understand them, Gus reported that he has to “speak up a bit, and Evelyn reported that she has to “say it another time.” Kara, too, reported that she had to “keep saying” her name, and other children were observed to repeat their utterances in an attempt to make the listener hear (and understand). Adult participants also spoke of observing the child repeating his or her message. For instance, Matt’s teacher stated that “some kids might use gestures or point or, you know, phrase it another way. But we [Patrick] just will keep saying the same thing again and again.”

In contrast to the repetition strategy used by most children, Ewan identified that he didn’t talk with others who didn’t understand him. However, he reported that he would recommence talking with them when they started to “talk” to him. It is possible that his use of “talk” refers to both speaking and listening:

Interviewer: If people don’t know what you’re saying, what do you do?
Ewan: Um, I don’t talk to them.
Interviewer: You don’t talk to them? No? You just talk to the people who do know what you’re saying. Yeah, I see.
Ewan: And then when they do talk to me, that when I will talk to them.

The adult’s (listener’s) solution to the listening problem: “We didn’t quite get all that, what was that about?” Adult participants considered the listening problem as an immediate problem and therefore they wanted to improve the listener’s ability to understand the child’s speech while the speech problem was still being resolved. Like the children, adult participants also perceived the listening problem as being influenced by the listener. Consequently, one solution listeners employed was to rely on another listener (one more familiar with the child) for interpretation of the child’s message. For instance, Grace’s grandmother stated, “Often we’d say to [Grace’s mother], ‘we didn’t quite get all that, what was that about?’” Both parents and siblings in the current study reported calling on each other, or being called on by unfamiliar listeners, to act as interpreters for the child with speech impairment. At times, they were noted to do this spontaneously:

Interviewer: Do you like playing with the other children at kinder?
Ewan: Ah, no. I like playing with Declan (points to brother)
Interviewer: You like playing with Declan. Ok, right. So is he your favorite person to play with?
Ewan: [nods]
Interviewer: Why do you like playing with Declan?
Ewan: He my . . . [unintelligible] . . . world
Interviewer: Cause he . . .?
Declan [brother]: is my favorite friend in the world.
Another solution was employed by adult participants when other listeners were not around or when familiar listeners were not able to interpret the child’s message either. This solution involved asking the child to show the object or demonstrate the meaning by gesture:

- Fenn’s mother: Yes, like um, the other day, that’s right, camping, he kept saying he wanted a “bit of.” And we kept saying, what’s a “bit of”? What are you talking about?
- Interviewer: And how did you eventually find out that was what he was trying to say?
- Fenn’s mother: Well we just … I just said to him, okay we’ll play a game, now tell me what does this “bit of” do? And he said, you go like this (gestured playing the guitar) … and that’s when we clicked.

However, the success of these strategies was variable. For instance, Zac’s mother noted that the use of gesture was not always adequate for expressing meaning, particularly when Zac was talking about things that couldn’t be seen, such as “how he feels about something.”

Owen’s teacher identified his increased use of gesture as demonstrating progress toward solving the listening problem, but acknowledged the corresponding lack of progress in solving the speech problem:

As the years progressed he started to use gesture more, point to things more. So it’s almost like, he’s thought “this is too hard, I’m just going to take people by the hand and show them what I want.” I know that’s good because he’s getting across to us what he wants. But at the start of the year he actually used to try to tell us.

(c) Solving the frustration problem

Adults did not discuss ways in which they attempted to solve the frustration problem. It is possible that they did not have strategies for solving the frustration problem but focused instead on solving the speaking and listening problem to prevent the frustration problem from occurring. However, Fenn’s mother identified her lack of strategies for solving her son’s frustration—wondering how to “calm this kid down” following a communication breakdown. She identified a solution to Fenn’s frustration as being a goal for the future, stating “I’d like him to … learn to not panic [when he isn’t understood].” Fenn’s mother recognized that solving Fenn’s frustration problem would enable him to cope more effectively with communication breakdowns that may arise from speaking and listening problems.

DISCUSSION

This study aimed to describe the experience of living with speech impairment as perceived and understood by children with speech impairment and their communication partners. The participants in this research described two major problems that they encountered in their experience: a speech problem and a listening problem, which resulted in a third problem of frustration (see Figure 1). They also described the strategies they used to solve these problems.

The Speech Problem

Only one of the 13 children identified a speech problem (Kara, who had difficulty saying her name); the others did not explicitly discuss their speech as being a problem. In contrast, all of the significant others (except Kara’s father) identified the child’s speech problem, and it is possible that Kara’s father never “noticed” the speech problem due to never having experienced a problem listening to (and understanding) his daughter. The difference in perceptions held by most children and adults in this study about the nature of the problems may be a function of the children’s age, specifically in relation to self-concept and the development of metacognitive skills. Researchers have suggested that young children may “blur the boundaries” between their actual competence and their wish to be competent (Harter & Pike, 1984; Stipek, 1981). Therefore, young children may not initially recognize or believe that there is a problem with their speech. As they get older, children’s capacity for metacognitive thinking develops, which in combination with environmental factors such as response feedback from others may assist them to develop a more realistic self-concept (Chapman & Tummer, 1995; Marsh, Craven, & Debus, 1998). For instance, in this study, Kara’s mother conducted formal home practice to assist her daughter to produce sounds (k and g) correctly. This may have influenced Kara’s awareness of a speech problem, however, formal intervention with SLI did not appear to influence the awareness of other children who were receiving intervention. It may be that Kara’s awareness was also linked to the particular sounds and words (e.g., her name) that she had difficulty producing and was practicing with her mother, and the significance of those words in her life. Information about the intervention received by the other children (e.g., the words targeted in intervention and the inclusion of metacognitive strategies) was not provided.

Children’s awareness of a speech problem has been reported in other studies with older children. For instance, in the study reported by Owen et al. (2004) that investigated the communication experiences of school-age children, one child with speech impairment perceived the problem as being that he didn’t “speak properly” (p. 65). The difference in perceptions about the nature of the problems held by the young children and significant others in this study may also reflect the different ways in which they identify and define the speech problem. In the present study, adults described the children as not speaking properly. This suggests that older children and adults must have a perception of what “speaking properly” means (i.e., a benchmark for comparison). Their benchmark may be based on adult production of targets, and when sounds or words are not produced in accordance with these targets, the speaker is considered to have a problem. Researchers have suggested that young children are unfamiliar with comparing themselves to others or to a benchmark, and this may contribute to their inaccurate self-evaluation skills (Butler, 1990; Ruble, Boggiano, Feldman, & Loeb, 1980). In this study, the child participants may not have developed a perception of “speaking properly” or “correct” speech. The lack of a benchmark for evaluating their own skills may have resulted in the children identifying problems in their communication experiences only when communication breaks down (and listeners do not understand). Further investigation of the different perceptions held by children and adults regarding the identification of speech impairment, and the role of metacognition and social comparison in identification, would be beneficial.

Solutions to the Speech Problem: Perceptions of Child Speakers and Adult Listeners

The mother of Kara, the child who identified herself as having a speech problem, reported that Kara told listeners who misunderstood her speech to “just ask Mom.” The teacher of Owen, the boy who
drew his mother when asked to draw himself talking, reported that he no longer tries to "tell them" what he wants but relies on "showing them" instead. It is possible that these children had developed a more realistic self-concept and an increased awareness of a speech problem as a result of others’ responses to their communication attempts (e.g., parents, teachers, or SLPs). Researchers have suggested that an explicit statement of misunderstanding or explicit request for clarification shows the speaker that the listener is confused and that he or she is "expected to take responsibility for solving the problem of noncomprehension" (Robinson & Robinson, 1983, p. 318). Therefore, SLPs often incorporate such strategies into their intervention to increase children’s awareness of speech errors (i.e., develop their metacognitive skills) and to motivate them to elaborate or recode the message (Bowen & Cupples, 1998; Dean & Howell, 1995; Giasson, Baker, & McCabe, 2008; Weiner & Ostrowski, 1979). However, even when child speakers are aware of a speech problem, they may have difficulty solving the problem. For instance, it is possible that Kam and Owen have begun to rely on others or on nonverbal methods to communicate because they feel unable to solve the problem of their own unclear speech.

The young children in this study did not identify SLP intervention as a solution to the speech problem. This may contrast with the perception of older children, such as the school-age participant in the Owen et al. study (2004, p. 63) who recognized that the purpose of therapy targeting his speech skills was to "help" him "talk better." Similarly, the adults in this study perceived intervention (in speech-language pathology clinics and/or at home) as providing children with "help" to solve the speech problem. Intervention with SLPs is common for many young children with speech impairments (Hoffmefnd & Dodd, 2004; Joffe & Pring, 2008; McLeod & Baker, 2004) to address the speech problem.

The Listening Problem

Both child speakers and adult listeners in this study identified the listening problem that was experienced in communication interactions. It is possible that the children’s identification of the listening problem was influenced by their perceptions of the role of the communication partners. Robinson and Robinson (1981) and McDevitt et al. (1990) found that younger children perceived good listening as orienting behaviorally (e.g., not interrupting, doing as told), whereas older children perceived good listening as attending (careful listening and concentrating). They found that children often attributed blame for communication breakdowns to the listener, even when the speaker’s message was unclear or ambiguous. It may be that some of the child speakers in this study attributed blame for communication breakdown to the speaker’s inability to understand and act on their message or to “do as they’re told” (outcome), rather than to the intelligibility of their own message (cause). Adult listeners often appeared to accept blame for being unable to “hear” their child’s message, perceiving it as a failure on their part for not “working it out.”

Solutions to the Listening Problem: Perceptions of Child Speakers and Adult Listeners

Children and adults in this study reported that child speakers frequently repeated their communication attempt or “kept saying” their message as a way of solving the problem of listeners’ not understanding. It is possible that the child’s choice of strategy may have been influenced by the listener’s response. For instance, the use of repetition is reportedly a common response by children to nonspecific requests for clarification (e.g., what? Tomassello, Comi-Ramden, & Evert, 1990). Corsaro (1976) suggested that adults often use clarification requests to signify that an utterance was not heard, and so children, such as the participants in this study, may believe that repetition is an appropriate repair strategy.

Fagan (2008) suggested that child speakers can influence the behavior of adult listeners in that if they persist in their communication attempt, then adults persist in attempting to understand (offer solutions). In this study, Kam reported that she would “keep saying” her name, and that her listeners would “keep saying” what they thought she meant. It may be that child factors such as having a persistent temperament (cf. Harrison & McLeod, 2010; Hanon, Shriberg, Kwasitkowski, & Allen, 2005), and environmental factors such as the listener’s responsiveness, influence the decision of children to repeat their message in order to solve the listening problem. Further investigation of factors that influence child and adult responses to communication breakdowns would be valuable.

Adult listeners, particularly grandparents and teachers, identified their reliance on other, more familiar listeners, such as parents or siblings, to improve their ability to “hear” what the child was saying. The need for family members to take on the role of interpreter has been reported previously in studies of parents (Goldbart & Marshall, 2004) and siblings (Barr et al., 2008) of individuals with communication impairment. It is likely that others rely on parents and siblings who know more about their child and their child’s communication, and so can guess the meaning. However, as Patrick’s brother recognized, sometimes no one is able to interpret the child’s spoken message. At such times, adult listeners identified the use of nonverbal strategies as a way of solving the listening problem.

No participants in this study identified intervention with SLPs as a way in which they attempted to solve the listening problem, and SLPs have not traditionally targeted the problem of communication partners being able to hear and understand the child. Instead, it is expected that the listening problem will be solved by solving the child’s speech problem. In this study, both child and adult participants recognized the listening problem as a significant and immediate concern. Future research investigating the possibility of addressing the listening problem as an explicit goal in intervention would be valuable.

The Frustration Problem

Adults identified the frustration problem as a consequence of the speaking and listening problems. It is possible that it also results from the different perceptions held by the speakers and listeners in this study about their roles in the communication problems they experienced, and consequently, their perceived roles in solving the problems. The significance of the frustration problem was particularly evident for one mother who identified her main goal (solution) for herself and her child (Ferdi) as being that he would learn “not panic.” Despite the frustration problem being experienced by most of these children with speech impairment, and despite the significance of this problem for many of their communication partners, it is not a problem that SLPs have traditionally targeted. Instead, an
elimination or reduction in frustration is generally an anticipated outcome of intervention targeting the speech problem. Future research investigating the possibility of targeting frustration as an explicit goal would be valuable.

Clinical Implications

The participants in this research highlighted two key problems: speaking properly and listening properly. Adult participants identified that intervention with SLPs was one way in which they attempted to solve the child's speech problem, and traditional speech-language pathology practice does focus on "correcting" speech skills (Van Riper & Erickson, 1996). However, young children who perceive that the problem does not lie so much within themselves as within the listener may be reluctant to participate in speech-language pathology intervention focused on themselves as the speaker. Increasing children's awareness of the speech problem through metacognitive strategies may be one way to increase their motivation to participate in intervention. However, making children aware of the speech problem does not address the other, more immediate problem of listeners needing to understand the child's message and the frustration arising when listeners do not understand. These problems were identified by child speakers and adult listeners when describing their experience of communication, yet have not typically been the focus of intervention.

The findings of this research suggest that the strategies and advice that SLPs provide to children with speech impairment and their families need to go beyond changing children's speech production and incorporate ways to enhance listeners' understanding and ways to address the frustration experienced by both communication partners. That is, there needs to be a more holistic approach to the assessment and management of childhood speech impairment.

During the assessment phase, a holistic approach may incorporate a visit by the SLP to other environments in which the child communicates, an analysis of communicative demands in those environments, an investigation of situations when communication breaks down to determine what children/listeners do, and the effectiveness of these strategies (Most, 2002; Pretty, 1995). A holistic approach should also incorporate interviews with children, parents, siblings, and significant others who can provide expert knowledge regarding their experiences (Barr et al., 2008; Goldbart & Marshall, 2004) and their perceptions of the problems. Such interviews would enable SLPs to learn more about the children with speech impairment, their communication partners, and the nature of the communicative problems that are experienced as described by those who experience them. In turn, this should enable a better understanding of the perceived solutions to these problems, to ensure that clinicians are targeting the desired goals.

During the intervention phase, a holistic approach may incorporate teaching others (adults, siblings, and peers) ways to better understand the child's communicative intent (e.g., creating and using available cues such as a diary to share knowledge of events, or a list of child's typical productions of words) and teaching the speaker and the listeners ways to recognize communication breakdowns and strategies to repair these breakdowns (Most, 2002; Pretty, 1995).

SLPs working with children with speech impairment could learn from the experiences of colleagues working with people with aphasia and their families (Hyng & Duchan, 2005; Jordan & Bryan, 2001; Worrall, 2006). Researchers in the field of aphasia have previously suggested that SLPs should be aware of possible differences between the perspectives of those experiencing the impairment and others (including SLPs) in terms of the impairment and intervention targets. They recommended an approach based on the social model as a more holistic way of assisting clients and their families. Worrall (2006, p. 322) reminded SLPs working with adults with aphasia that "talking better" is only one part of successful therapy.

Limitations

As this was the first study of its kind to describe the experience of speech impairment in young children and significant others in their environment, a qualitative approach using a small, purposely selected sample was considered most appropriate to develop a detailed understanding. Further research with a larger sample size would be useful to determine whether the themes that emerged from this study can be generalized to other young children with speech impairment and their families and teachers.

As the child participants in this study were preschool children, it is acknowledged that their metacognitive skills are still developing, and so their perceptions of their communication skills are also developing. However, the purpose of this study was to describe the experience of living with speech impairment for these children and their communication partners at this time in their lives. Therefore, the perceptions of both children and adults were considered valid and important in order to understand their experience. Further research with different age groups would be useful to determine how children's perception of their communication skills and their description of living with speech impairment changes over time.

Conclusion

This research aimed to provide an understanding of the experience of speech impairment as described by preschool children with speech impairment and their significant others. No other study has explored this issue. Interviews with children and others revealed two global themes. In the first theme, participants identified the problems they encounter in their experience of living with speech impairment. For the child speakers, the main problem was the inability of others to understand their message (a listening problem). For listeners (families and teachers), there was an underlying problem of the child's speech being unclear (a speech problem) and an immediate problem of being unable to work out what the child was saying (a listening problem). Adult participants spoke about the frustration that often resulted from these two problems and identified potential future problems. In the second theme, participants described solutions to the communication problems in terms of the child's speech getting better and listeners being able to understand. They identified the strategies that were being used to reach those solutions, such as participating in intervention with SLPs to address the speech problem and using a range of informal strategies to address the listening problem. There appeared to be a link between perceptions about the nature of the problem and possible solutions, but this varied between participants, particularly between adults and children. The children with speech impairment who participated in this research were 4 to 5 years of age, and so the researchers interpreted their perceptions through their verbal responses to interview questions, their observed responses to communication breakdowns, their drawings, and other nonverbal behaviors. The findings from this research illustrate the valuable information that children can provide and support the inclusion of children in research about them. The findings also support the use of a range of methods to understand...
children's views when verbal communication may be difficult (e.g., severe speech impairment).

The themes that were uncovered in the current research indicate that difficulty producing speech sounds is only one of the problems encountered by young children and their families in their experience of living with speech impairment. Consequently, "speaking properly" is only one part of the solution. In keeping with the biopsychosocial framework recommended for considering health and well-being (World Health Organization, 2001, 2007), SLPs working in the field of childhood speech impairment may need to consider expanding their role and modifying their practice to reflect the experiences of their clients and achieve a more holistic solution that also involves intervention for "listening properly."

ACKNOWLEDGMENTS

The authors wish to thank the children and their families and teachers who participated in this research for sharing their experiences and Jacquie Barr for assisting with data collection. This research was supported by Australian Research Council Discovery Project Grant DP0773976 and comprises a portion of the first author’s PhD, which was supervised by the subsequent authors.

REFERENCES


Donohue, M. L. (1997). Beliefs about listening in students with learning disabilities: "Is the speaker always right?" Topics in Language Disorders, 17(3), 41–61.


Paper 9

Knowing, having, doing:

The experience of speech impairment from childhood to adulthood

Abstract

Speech impairment (speech sound disorder) is a high prevalence condition in early childhood. It is associated with social and academic difficulties at school and may impact on occupational choices. This study described the life experiences from infancy through to early adulthood of two individuals, Fraser (17 years) and Tim (23 years), with a history of childhood speech impairment and their parents. Semi-structured interviews were conducted with all participants, and questions were framed around the International Classification of Functioning, Disability and Health (ICF; WHO, 2001) to gain a holistic understanding of life with speech impairment. Phenomenological analysis of the interviews revealed the experience of speech impairment was associated with three key themes: 1) Knowing, 2) Having, and 3) Doing. The themes emerged from both the mothers’ and individuals’ descriptions of living with speech impairment; however, they emerged at different life stages for both groups. The mothers described their awareness of a problem and attempts to help their children in early childhood, while the individuals did not become aware of a problem until they started having difficulties at school. A core theme of Battles/Struggles was common to all themes; however, there were differences in the battles described by participants. This qualitative research provides valuable insights into the experiences of those living with speech impairment, and shows the importance of considering such information alongside quantitative research when making decisions in clinical practice.
INTRODUCTION

Speech impairment (also called speech sound disorder or speech delay) is a high prevalence condition in childhood (Law et al., 2000; McLeod & Harrison, 2009) and residual articulation errors may continue into adolescence and adulthood for some individuals. However, the nature of childhood speech impairment and associated difficulties with life activities may change for individuals across the lifespan.

Longitudinal studies of individuals with a history of childhood speech impairment provide valuable information about the difficulties associated with the impairment at different life stages, even when the articulation or phonological errors have apparently resolved. A landmark study was reported by Felsenfeld and colleagues (1992, 1994, and 1995) in which the effects of childhood phonological (speech) impairment on educational, vocational and linguistic outcomes were demonstrated 28 years after individuals initially presented to clinic. These results showed speech impairment may be associated with other developmental and academic difficulties, and may influence career decisions. For instance, those with a history of phonological impairment were more likely to require remedial assistance at school, complete fewer years of formal education, and be employed in occupations with less reliance on communication skills.

A number of other studies have investigated the association between speech impairment and social, academic and occupational outcomes. McCormack et al. (2009) reviewed 57 of these studies in a systematic review of the literature investigating the association between speech impairment and Activity Limitations/Participation Restrictions across the lifespan. The review revealed a range of Activity Limitations may be associated with speech impairment, including difficulties with learning and applying knowledge (e.g., reading, spelling, and mathematics), social interactions (e.g., negative peer relationships), and major life areas (e.g., education and employment).
Information about difficulties associated with speech impairment is necessary for clinical decision-making to ensure timely and holistic intervention is provided for clients, targeting the range of activities with which they are having difficulty. However, information about the experience of individuals with speech impairment and their families is also essential in order to understand the perspectives of those experiencing the difficulty, as well as their priorities and goals for intervention and for life. Kovarsky (2008, p. 51) has suggested “an exclusive reliance on objective data is at odds with the very nature of what it means to participate in the life world and how communication disorders manifest themselves”. She suggested the need for both experimental and qualitative modes of inquiry to gather evidence for clinical practice. Similarly, Liamputtong and Ezzy (2005, p. 4) suggested that qualitative methods and the interpretative data they provide are “invaluable” in research that attempts to understand people’s experience from their perspective.

Qualitative studies provide descriptions of what the experience of a phenomenon is really like for individuals who live that experience; that is, to gain insight into their world. There is little research describing the lived experience of individuals with communication impairment generally, and with speech impairment in particular.

McCormack et al. (2010) described the communication experiences of preschool children with speech impairment and their communication partners. The participants in their study understood living with speech impairment meant encountering problems which then needed to be solved. They recognised three problems in their communication experiences: a speech problem experienced by the child, a listening problem experienced by communication partners, and the child’s frustration arising from the speech and listening problems.

The study by McCormack et al. (2010) provided an insight into the experiences of children with speech impairment and their families at a single moment in time.
However, Brinton, Fujiki and Robinson (2005) have suggested that a long-term view of children with communication impairments is necessary to gain a detailed understanding of the complexity of impairments and the way in which they unfold over time. They presented the case of a child with language impairment to show the range of difficulties experienced by the individual throughout childhood and adolescence and the actions taken by his family to support his development. There are no such examples of children with speech impairment. Thus, it is unclear whether the problems described during childhood by McCormack et al. (2010) continue to present in later years, or whether the experience and understanding of those living with speech impairment changes across the lifespan.

While there are no reports of adolescents and adult experiences of childhood speech impairment, there have been studies describing the experiences of individuals with a history of stuttering (also called stammering) (e.g., Anderson & Felsenfeld, 2003; Crichton-Smith, 2002; Hearne, et al., 2008; Kathard, 2006). For instance, Hearne et al. (2008) described the experience of stuttering in the adolescent years and factors motivating adolescents to seek intervention, while Crichton-Smith (2002) examined the experiences of adults who stutter, the strategies used to manage stuttering, and perceptions of the impact of stuttering on life areas (e.g., education and employment). It may be expected that some parallels could be drawn between the experience of stuttering and the experience of speech impairment across the lifespan given both may be associated with no known cause, may initially present in the childhood years and persist into adulthood, and may be associated with difficulties in other life areas. However, research investigating the experiences of individuals with speech impairment is needed before comparisons can be made.

Research is also required to investigate the experience of parents of individuals with speech impairment in order to gain an insight into the challenges they face, and to
help them deal with the demands they experience (Goldbart & Marshall, 2005). There are currently a limited number of studies that describe the experience of living with communication impairment from the perspective of parents (e.g., Canary, 2008; Goldbart & Marshall, 2004; McCormack et al., 2010). The existing studies have focused on individuals with a range of disabilities (Canary, 2008) or with complex communication needs requiring augmentative and alternative communication systems (Goldbart & Marshall, 2005). Only the study by McCormack et al. (2010) focused on the experiences of living with speech impairment. Additional studies have focused on the experience of intervention, rather than the experience of life, for individuals with communication (including speech) impairment and their families (e.g., Glogowska & Campbell, 2000; McAllister et al., 2010; Owen, French & Roulstone, 2003; Paradice & Adewusi, 2002).

Research Aims

This research aimed to describe the experience of living with speech impairment from childhood until early adulthood from the perspective of two young adults with speech impairment and their mothers.

METHOD

Participants

The two focus individuals, Fraser and Tim, were recruited through purposive sampling; that is, they were selected to take part in the study because their cases were “information rich” and gave “insight about a phenomenon” (Patton, 2002, p.40) rather than for generalisation purposes. They were informed about the research by members of their family or friends who were known to the researchers. They were asked to identify their significant others who could also participate. Both identified their mothers, who subsequently agreed to be interviewed. Fraser and Tim, as well as their mothers, were provided with further written information before consenting to participate. During the
interview with Fraser and his mother, other family members were also present, who Fraser had identified as potential participants; however their participation in the interview was minimal and has not contributed to the analysis and interpretation of information for the current study.

Both Fraser and Tim had received individual clinic-based intervention for speech impairment during early childhood, supported by home programmes implemented by parents. Direct intervention with a speech and language therapist (SLT) had ceased during their school years. At the time of the interviews, both continued to exhibit residual speech sound errors (described in the following sections).

Fraser (17 years).

Fraser was the youngest of three children, all of whom were diagnosed with “dyspraxia” (childhood apraxia of speech) during their childhood years. Fraser’s father, uncle and cousins were also reported to present with characteristics of dyspraxia; however, this had not been clinically diagnosed. Fraser was first assessed by a SLT at 12 months due to feeding difficulties. He presented with minimal speech output as an infant, and attended early intervention where he was taught to communicate using Makaton key word signing. Fraser also received intervention with an occupational therapist to assist with balance and coordination, as well as fine motor skills. His non-verbal IQ was assessed by a paediatrician and found to be within the normal range.

During his primary school years, Fraser’s mother and school were provided with activities to assist his speech and language development, and he attended 6-monthly reviews with the SLT. Fraser was identified with literacy difficulties at school, and repeated the first year of secondary schooling (year 7).

Fraser was 17 years old and in year 11 at school at the time of the study. He reported ongoing difficulties with reading, spelling and auditory memory, and presented with residual articulation errors (such as substitution of /f/ in place of “th” and /w/ in
place of /r/) in conversational speech. Fraser was completing his secondary school qualifications with a combination of academic and vocational subjects, expressing particular enjoyment of graphics (drawing and design) and circus subjects (stage design and lighting). He indicated a wish to work for an international circus when his schooling was completed.

**Tim (23 years).**

Tim was the youngest of a family of nine children. There was a history of stuttering in his father’s family; however, there was no history of other speech or language difficulties. Tim attended speech and language therapy at 3;6 years due to “poor tongue movement” and “difficulties with pronouncing words.” However, intervention was discontinued as Tim was uncooperative, then experienced a period of “childhood depression” when his older brother (aged 5 years) passed away.

Tim experienced “learning difficulties” at school and returned to the SLT where he was diagnosed with “auditory discrimination impairment.” He received intervention with the SLT for approximately two school terms. During the remainder of his schooling, Tim continued to experience difficulty with mathematics and literacy.

Tim was 23 years old and completing a traineeship in broadcast journalism at the time of the study. He reported ongoing difficulties with “mispronouncing” words, particularly polysyllabic words, and noted getting “tangled” or “tongue-tied” when he was talking too quickly. He described and presented with residual articulation errors (sound substitution) when producing multisyllabic words (e.g., “specific,” and “particularly”) during the interview and when producing tongue-twisters (e.g., “She sells sea shells by the sea shore”; Haber & Haber, 1982) during a brief informal assessment following the interview.

**Procedure**

Semi-structured interviews were conducted with Fraser and Tim, as well as their
mothers. Three of the four interviews were conducted face-to-face, and one (with Tim’s mother) was conducted over the telephone due to distance. The duration of each interview varied from 30 to 90 minutes, depending on the number of participants being interviewed at one time, and their other commitments.

The interviews incorporated open-ended questions, which enabled participants to offer a range of responses regarding their experiences, and to expand on key aspects when prompted. Interviews followed a conversational style of questioning, in accordance with the established protocols for in-depth qualitative interviewing (Minichiello, Aroni & Hays, 2008). A fixed set of questions was not used, instead adults were asked questions regarding key topics, and the content of subsequent questions was influenced by the responses of the interviewees. The development of key topics was guided by the International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001). Topics are presented in Table 1.

Table 1. Key Topics for Interviews

<table>
<thead>
<tr>
<th>ICF component</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Body Functions</strong></td>
<td>Description of individual’s speech / impairment (childhood impairment and any current concerns)</td>
</tr>
<tr>
<td><strong>Activities And</strong></td>
<td>Description of impact of speech impairment on:</td>
</tr>
<tr>
<td><strong>Participation</strong></td>
<td>• Learning and applying knowledge (listening, attention, literacy, mathematics)</td>
</tr>
<tr>
<td></td>
<td>• General tasks and demands (undertaking tasks, handling stress)</td>
</tr>
<tr>
<td></td>
<td>• Communication (speaking, using non-verbal strategies, receptive language, conversation)</td>
</tr>
<tr>
<td></td>
<td>• Interpersonal interactions and relationships (forming relationships, relating with family, friends, teachers, strangers)</td>
</tr>
<tr>
<td></td>
<td>• Major life areas (school education, work)</td>
</tr>
<tr>
<td></td>
<td>• Community, social and civic life (play, sports, hobbies)</td>
</tr>
<tr>
<td><strong>Environmental Factors</strong></td>
<td>Description of:</td>
</tr>
<tr>
<td></td>
<td>• Support and relationships (family, friends, peers, health professionals, teachers)</td>
</tr>
<tr>
<td></td>
<td>• Attitudes (family, friends, peers, health professionals, teachers)</td>
</tr>
<tr>
<td></td>
<td>• Services accessed, systems and policies (health, education and training)</td>
</tr>
<tr>
<td><strong>Personal Factors</strong></td>
<td>Description of factors including personality, interests, and family history</td>
</tr>
</tbody>
</table>
Interviews were audio-recorded, then transcribed verbatim by the first author. Interview transcripts were sent to the participants for review. Participants were invited to make changes to their transcript (e.g., additions and deletions) to ensure the transcript accurately reflected their thoughts and experiences and to assure them they could not be identified in transcripts. Occasional modifications were requested to increase the clarity of the respondent’s own comments, but no information was deleted.

Ethical approval for the research was obtained from the Charles Sturt University Ethics on Human Research Committee.

**Data Analysis**

Themes were determined using the phenomenological approach, which attempts to describe the essence of an experience, and through this description show “the lived quality and significance of the experience in a fuller or deeper manner” (van Manen, 1990, p.10). The analysis involved repeated readings of interview transcripts in order to identify content which directly related to the experience of living with speech impairment (i.e. the phenomenon). This analysis was inductive, so themes and patterns emerged from the data rather than being imposed prior to data collection (Patton, 2002).

Each interview was analysed separately; however constant comparative analysis was conducted to identify commonalities and differences among them (Patton, 2000). The comparative analysis enabled recurring patterns in the data to be identified, which then enabled the data to be categorised into themes in a meaningful and accurate way. Initially, the transcripts from the focus individuals were compared to one another, and the transcripts from the parents were compared. Next, the transcripts from each family member were compared (e.g., Tim and his mother, and Fraser and his mother). Finally, the four interview transcripts were compared, and participant checking was conducted to ensure that the meaning assigned to statements and phrases were not taken out of their intended context. Detailed extracts (i.e. “thick description”) from the interviews
are provided in the results section as evidence of the authenticity of the themes drawn from the data (Davidson & McAllister, 2002). Scientific rigour of the findings occurred through the triangulation of sources, which enabled the researcher to check the consistency of information collected with different participants (i.e., those with a history of childhood speech impairment, and their mothers), and to consider possible explanations for differences (Patton, 2002).

RESULTS

This research used a phenomenological framework to understand the experience of speech impairment across the lifespan, as described and understood by young adults with a history of childhood speech impairment and their mothers. The phenomenological analysis saw the emergence of three themes related to the experience of speech impairment: Knowing, having, and doing. In the first theme, knowing, participants reported being aware that a problem existed. In the second theme, having, participants described the nature of the speech impairment and difficulties associated with the impairment. In the third theme, doing, participants identified how they managed the speech impairment and associated difficulties. These three themes were common to both the mothers’ and individuals’ descriptions of living with speech impairment; however, the themes emerged at different life stages for both groups (see Figure 1).

Participants described the difficulties they encountered as a result of their experience of speech impairment (knowing, having and doing), and as a result of the interaction between speech impairment and other life events. Thus, a core theme of battles and struggles (common to the other three themes) was found to emerge. The battles and struggles of living with speech impairment were experienced and described differently by each individual (see Figure 2).


<table>
<thead>
<tr>
<th>Experience of speech impairment</th>
<th>Life stages of the focus individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents</td>
<td>Early childhood</td>
</tr>
<tr>
<td>Individuals</td>
<td>Knowing</td>
</tr>
</tbody>
</table>

*Figure 1*. The experience of speech impairment from childhood to adulthood, according to individuals with speech impairment and their parents. Individuals and parents described the experience of speech impairment in terms of the same three themes (knowing, having and doing), but at different life stages.
For Fraser’s mother, each component of her experience of speech impairment (knowing, having, and doing) presented unique challenges and combined to make life “hard.” For Tim’s mother, life was already “busy,” and made the experience of speech impairment an additional (and secondary) challenge. For Fraser and Tim, the experience of having speech impairment (rather than knowing or doing) was their main battle. In the sections that follow, the themes of knowing, having and doing, and the core theme of battles and struggles are described and illustrated using excerpts from the interviews.

Figure 2. Battles in the experience of living with speech impairment. The shaded areas show the key battles identified by participants: a) Fraser’s mother, b) Tim’s mother, c) Fraser and Tim.

**Knowing**

Participants described their identification of speech difficulties using terms such as being “aware,” “recognising” and “knowing.” For the mothers, knowledge of a problem with their child’s speech emerged during their child’s early childhood (e.g., prior to school) (see Figure 1). For Tim’s mother, her awareness that Tim “wasn’t speaking properly” resulted from her knowledge of typical (or proper) development, most probably through comparing Tim to his typically-developing older siblings. For Fraser’s mother, her recognition of a problem resulted from her knowledge of atypical development. She was able to identify characteristics similar to both Fraser and his
older brother with dyspraxia, which meant she “picked it [Fraser’s speech impairment] up straight away.”

As shown in Figure 1, Tim and Fraser both spoke about their knowledge of speech impairment developing later. Tim’s first awareness of his speech impairment was related to his recollection of attending speech and language therapy and receiving a diagnosis:

Tim: I did have trouble talking…not so much talking, but pronouncing my words, and I did have speech pathology assessments when I was about six, seven, eight, nine…

That is, his first knowledge of speech impairment resulted from information given to him by others. Similarly, Fraser’s initial knowledge about speech impairment resulted from the feedback he received from others at school when attempting to communicate. He recalled having difficulty “getting on with kids” when he commenced school and described the realisation that others didn’t understand and didn’t care what he was saying:

Fraser: There were very few that actually tried to understand, and they would be closer friends. The rest of them just didn’t really care – they’d just walk away.

Thus, Tim’s and Fraser’s initial knowledge about speech impairment arose through difficulties they experienced having speech impairment. Their current knowledge about the existence of a problem reflected greater insight regarding their performance of speech tasks, rather than a reliance on feedback from others:

Tim: When I talk quick, that’s when you get all tangled and have difficulty expressing, and I know, I know, I’m conscious of it.

**Battles and struggles: Knowledge.**

Within the theme of knowing, Fraser’s mother described the battle she
encountered when she was aware that a problem existed and wanted to learn more about it (see Figure 2a). She described her search for knowledge as a difficult process, due to the lack of information publicly available, and the lack of recognition of impairment labels being used.

Fraser’s mother: Whatever information I gathered from here, I then would take it back to the speech pathologist in [town] and go “This is what it’s [dyspraxia’s] about…” And he’d still say, “Oh no, but…it’s just a general term for whatever…” You’d be in this limbo of...[thinking] “Well, what really is it?”

Furthermore, as her children progressed from infancy to childhood, Fraser’s mother attempted to find out information from her children about the difficulties they were experiencing at school, but this was also a struggle:

Fraser’s mother: If one of them came home and they wouldn’t say anything to me and they’d just walk in the gate and straight into their bedroom, I’d ask [sister] “Did anything happen at school today?” She was like the eyes and the ears…and if she hadn’t noticed anything I’d go, “Oh well okay, I’m going to see the teacher tomorrow to see what really happened.” Quite often the teacher hadn’t noticed either; it was probably something that happened in the playground. And then I’d have to spend the rest of the week finding out from the boys what had actually happened.

Thus, obtaining knowledge was a battle for Fraser’s mother. However, for Tim’s mother, it was the interaction between knowing about the speech impairment and other life experiences that presented a challenge:

Tim’s mother: Being number nine in a large family, he [Tim] didn’t have to learn to speak because speech was done for him. I was aware of that but also my life at that stage was extremely busy because...there was an eighteen month old son ahead of him [Tim] who had serious heart conditions and he died at five.

While Tim’s mother was aware that Tim had difficulties with speech, other life factors (i.e., the health and medical needs of Tim’s older brother) were fore-grounded and impacted on her ability to do more to assist Tim, despite her knowledge that his speech was impaired (Figure 2b).
Having

Participants described the experience of having speech impairment in terms of “difficulties,” “problems” or “trouble” they previously had, or currently have. Tim and Fraser described their own experiences of difficulties, and their mothers described difficulties they observed their children experiencing. Tim’s mother and Fraser’s mother also described the difficulties they experienced (as parents) through having a child with speech impairment.

Battles and struggles: Having speech impairment (Tim and Fraser).

While Tim and Fraser recognised the experience of speech impairment as incorporating knowing, having and doing, the difficulties they had and continue to have were central to their experience of living with speech impairment (Figure 2c). Tim and Fraser described the experience of having speech impairment in childhood in terms of difficulty producing sounds and words, and therefore having a message misunderstood. However, both identified their speech difficulties continued into adolescence and/or adulthood (see Figure 1). For instance:

Fraser: I still have a lot of trouble with pronouncing words. Even small words, I still have trouble with doing it. And I still mix up words when I’m actually saying it out in a class...

As Tim and Fraser progressed beyond childhood, they began to perceive having speech impairment meant having a range of difficulties, and not just difficulty producing speech sounds. They described how these difficulties had impacted on their lives, such as preventing their involvement in some extracurricular activities (such as debating), or leading them to avoid some people and situations for fear of being “ridiculed”:

Tim: I found that through high school people that did well academically, they’d come and talk and I couldn’t really talk to them because they’d be like “What’re you saying?” [And I] just felt bad because they just said…oh whatever. So that’s probably what affected me
psychologically… in high school, but…other than that I could speak to any of my family obviously but some people I went to school with, I would just try and avoid…or avoid specific topics ‘cause I wouldn’t know what to say…or don’t know much about the topic or just feel that I might stuff up…just be ridiculed pretty much.

Both Tim and Fraser also described negative social interactions (such as teasing and bullying), although the degree and frequency of social difficulties varied for both. For instance, Tim’s mother reported that Tim was a popular child, despite his speech impairment, while Fraser’s mother identified that he “had been bullied severely.”

Both parents also identified having speech impairment meant their children experienced frustration. However, they reacted to this frustration in different ways. For instance, Tim withdrew from situations:

Tim’s mother: Frustration was in his life…it was never a big tantrum. He would just take himself away - exclude himself….He never used to come to me distressed in not being able to be understood… I would say possibly there would be a withdrawing before the distressing came about.

Fraser became upset and angry. His mother recalled Fraser often came home “het up” about things, and she attributed his distress and frustration to the bullying that he was experiencing at school.

**Battles and struggles: Having children with speech impairment (mothers).**

Within the theme of having, Fraser’s mother, described the battle she experienced as a mother of three children with dyspraxia. She described how tiring and stressful it was to learn more about her children’s difficulties and to carry out programmes to assist them. She also identified the battle she experienced at times when trying to communicate with them:

Fraser’s mother: I was a pretty stressed out mother… And your brain has got to work all the time. The boys would come home…I don’t know which one it was, Fraser or [his brother], but I remember… one of them came home really, really upset and really stressed and tears pouring and everything….I don’t know which kid it was….

Fraser: It might have been me…I remember one time where you
[mother] were out the front and I was crying, but I wouldn’t tell you what happened to me.

Fraser’s mother: Yeah, because it wouldn’t come out. I mean, he didn’t want to [tell] – that was one thing, because it meant the effort of having to tell me… but I don’t know which kid it was this time, but they came home and they were really, really upset. And it took over an hour to find out what the story was…

She spoke about attending a support group for parents of children with dyspraxia, but soon realised many of the parents had children with other developmental disabilities. Consequently she felt isolated and alone in her experience as a mother of children with dyspraxia. For Fraser’s mother, her children’s difficulties had become her difficulties and she had a lack of support to overcome these difficulties:

Fraser’s mother: And the only support group they had was down in [town]. But as I got to know the Mums I found they weren’t actually dyspraxic children; they had ADHD [attention deficit hyperactivity disorder], they had cerebral palsy, intellectual disabilities…they had all these things that I didn’t have, I just had dyspraxia…..

Both mothers expressed sadness about their children’s speech impairment and their associated difficulties with communication and social interactions.

Tim’s mother: I can remember though I was saddened by that comment when he said to me about all the stuff that he had in his brain that he couldn’t get it out, that he couldn’t express it and …I realised, he couldn’t express it even in a family time…”cause we were so busy and we would move on…

Growing knowledge about speech impairment, and the impact of impairment on other life areas, led Tim’s mother to feel “guilty” that she didn’t do more, but she acknowledged the impact of life experiences (being “busy” and having “other stuff going on”):

Tim’s mother: He was always slower on that [literacy development]. And you see once again guilt comes in, that horrible word, and thinking…he could get away with it ‘cause there was so much other stuff going on and he managed.

Doing

Participants described the experience of doing something to manage the speech
impairment and associated difficulties. Both Tim’s and Fraser’s mothers described the experience of seeking help for their children’s speech impairment when they were aware of the problem (see Figure 1). This incorporated taking their children to the SLT and then doing exercises and activities with them at home. Interviews with both parents revealed an ongoing desire to help their children with their speech impairment achieve their life goals.

Fraser and Tim both described their development and use of informal strategies to help manage their speech impairment and associated difficulties, which began when they became aware of their speech impairment. For instance, Tim had recognised that when he slowed down his speech rate, he spoke better and was better understood, while Fraser used a range of visual (and mnemonic) strategies to assist with literacy-based tasks that he found difficult. Both had found ways to manage the teasing or bullying they received, by either walking away (“shrugging it off”) or fighting back:

Fraser: Now I walk away from it [bullying] – I learn it from the past. If it’s verbal…I do it back to them or I walk away. If it’s physical, well there’s nothing I can do. So I have to stand there – either get hit myself or fight back. And after awhile I started to fight back and it started to work.

Fraser acknowledged the help provided by a clinic that his mother had taken him to, but hadn’t actively sought assistance since then. However, Tim had begun to actively seek out further intervention as an adult in order to improve his speaking skills, and succeed in his chosen career (see Figure 1).

**Battles and struggles.**

Within the theme of doing, Fraser’s mother, described the battle she experienced in trying to coordinate all of the information and programmes she was receiving from the numerous professionals involved in her children’s care:

Fraser’s mother: You’ve got the paediatrician saying ‘this is what you do with this’ then you’ve got the OT [saying] ‘you do this with that,’ the speech pathologist [saying] ‘you do this with that,’ But not once did they all sort of get together and say ‘well, if these things are
all happening, what exactly are we doing?’ It was me in the middle trying… ‘OK, I’ll take that advice because I think that’s appropriate, so I’ll take that advice, that advice, that advice – because it’s working.’ And then you find that doesn’t work, ‘OK, I’ll go back to that one…’ So you’ve got this constant juggling all the time…

She reported *doing* speech and language therapy programmes at home with Fraser and then visiting the school each day to do the programmes there. Fraser’s mother spoke about the need to make the intervention creative and functional, in order to motivate the children to participate.

Both parents spoke about difficulties associated with doing the therapy programmes. For Tim’s mother, the difficulties were associated with Tim’s lack of cooperation in intervention, due to his age and other family (life) factors:

Tim’s mother: The sort of work that I was doing with him when he was a child – you might know how hard it is to do with a child...getting them to lick the lollipop, poking the tongue out and getting him to do all those sorts of things. So anyway we did try those. But also I’m not quite sure whether…when [brother] died, Tim actually went into a childhood depression, I could say, when I look back on it. He… he switched off for a while.

As an adult, Tim’s ability to do something to manage his speech impairment was affected by difficulties in accessing appropriate services, rather than a lack of willingness to engage:

Tim: It wasn’t until I got this career at the beginning of this year that I thought, “OK, I might want to work on trying to access or trying to get some speech coaching”…so that’s why I’ve been looking, but unfortunately I haven’t been finding anything. Because everyone’s retired or they’re like not in [town] or somewhere else…too far away…so I’ve been trying to do it myself and the problem is with myself I don’t really know how good I’m going or what to improve.

**DISCUSSION AND CLINICAL IMPLICATIONS**

Interviews were conducted with two young adults with a history of childhood speech impairment and their mothers to understand their experience of living with
speech impairment across the lifespan. Three themes emerged in their description of living with speech impairment: Knowing, having, and doing. These themes interacted with each other and with life events in a number of battles. In the following section, the results are discussed in terms of their implications for clinical practice.

**Knowing**

For parents in this study, knowledge about the existence of speech impairment initially came while their children were in infancy; however, more specific knowledge about the impact of their children’s speech impairment came later, as their children experienced difficulties with a range of life activities. Thus the quest for knowledge was an ongoing battle. Canary (2008) identified a similar theme in her interviews with parents of children experiencing a range of disabilities (including some with speech/language impairment). Adults in her study identified they had a lack of knowledge about their children’s disability, which they identified as a “puzzle that they have not solved” (p. 448). They continued trying to understand the disability, and relied on professionals to provide them with more information to assist this process. Similarly, McAllister et al. (2010) found parents of children with speech concerns relied on other professionals (e.g., teachers, doctors) to identify or confirm their concerns about the existence of speech impairment, before they accessed speech and language therapy services. Thus, there is a need for other professionals to be educated in the identification of speech impairment.

There may also be a need for more publically available information. Fraser’s mother identified the lack of accessible information regarding dyspraxia as a particular battle during Fraser’s childhood. While it is possible that more is known now about speech impairment, and specifically dyspraxia, than was known when Fraser was young, it is important for this knowledge to be available to families of children with such difficulties as well as to professionals. According to parents in the study conducted
by Paradice and Adewusi (2002), teachers’ lack of knowledge about speech and language difficulties limited their ability to help children with speech and language needs. Consequently, parents had to “fight” to have access to specialist services, such as speech and language therapy (p. 263). Similarly, Fraser’s mother sought greater knowledge about speech impairment in order that she could access more services for her children. Knowledge about difficulties that may be associated with speech impairment and the potential benefits of speech and language therapy is also essential for individuals to seek intervention actively as adults.

For the individuals in this study (Tim and Fraser), knowledge of their speech impairment did not come until later in childhood. For Fraser, reflecting on his childhood, the awareness about the existence of a problem coincided with his growing awareness of difficulties with a range of skills. In particular, he identified social interactions with others and subsequent communication breakdowns as problematic. For Tim, his awareness about the existence of a problem was associated with having to attend speech and language therapy. That is, they became aware of their speech impairment, through having problems communicating with others. These findings are consistent with those of Crichton-Smith (2002), who interviewed adults who stuttered. She reported that first recollections of stuttering were associated with communication breakdowns in social settings, particularly at school.

The results from the current study indicate children are unaware of speech impairment prior to school. This is consistent with findings from McCormack et al. (2010) who found most preschool children with speech impairment were happy about the way they talked and did not perceive communication breakdowns to be a result of a speech problem. Other researchers have suggested young children’s inability to perceive their own difficulties may be due to unrealistic self-concept. They have suggested self-concept develops as children age and begin comparing themselves to others in their
environment (Marsh & Shavelson, 1985). Thus, individuals with speech impairment may only become more aware of the existence of a problem once they commence school. Owens, Hayett and Roulstone (2004) found children with communication impairments attending mainstream school were aware of their specific communication difficulties and the way this affected other aspects of their life (e.g., friendships). Similarly, Tim’s and Fraser’s current knowledge about their speech impairments had developed as a result of maturation and growing insight. The findings from the current study suggest children and adolescents may need additional support to manage their speech impairment and to maintain self-esteem during the school years. That is, intervention may need to continue, but the focus of intervention may need to be expanded.

Having

The description of having speech impairment provided by the two individuals in this study revealed the changing nature of their impairments and associated difficulties with other life activities. While both individuals recognised their past and current difficulties with producing sounds or words, they also reflected on other academic and social difficulties that they attributed to their speech impairment. The range of difficulties reported by Tim and Fraser is consistent with research showing the association between speech impairment and Activity Limitations across the lifespan (McCormack et al., 2009).

The additional difficulties experienced by Tim and Fraser became more apparent as they progressed from early childhood into later childhood and adolescence. Brinton et al. (2005) described a similar evolution of difficulties in a case study of a child with language impairment. In their study, the child presented in childhood with a highly specific language problem; however, as he matured, his language difficulties became more pervasive and reached into many areas of his life. Consequently, they suggested
intervention needs to extend beyond “traditional” therapy aimed at improving impaired skills (such as articulation or language) and focus instead on quality of life. Arkkila and colleagues (2008) suggested support for children with language impairments and their families needs to continue into adulthood in order to improve health-related quality of life in later years.

Findings from the current study suggest management of speech impairment needs to consider the range of difficulties which individuals may experience, and the way in which these difficulties present at different life stages. Intervention, then, needs to be holistic, functional and extend beyond the early years. Furthermore, intervention needs to consider the family members of individuals with speech impairment. The parents in the current study identified themselves as experiencing battles, as well as their children. They reported distress with observing their children’s struggles, and occasional difficulty communicating with their children to find out more about their struggles. The battle that exists when communication breaks down is consistent with the “listening problem” identified by children and their communication partners in the study by McCormack et al. (2010). In that study, the inability of communication partners to hear/understand the child’s message was recognised as a problem associated with living with speech impairment, hence the need to support listeners as well as speakers in communication interactions.

Parents’ feelings of stress and worry also need to be considered. For Fraser’s mother, having children with dyspraxia led her to feel overwhelmed and isolated. She had taken on the role of interpreter, protector, and advocate for her children, in addition to the role of case manager, and each role incorporated a battle. For Tim’s mother, she felt guilty for not having done more to assist her child. Similar feelings were identified by parents of children using AAC in the study by Goldbart and Marshall (2004). They reported some parents expressed general feelings of being worn down due to the
demands on their time and energy, others felt socially isolated with a lack of support for the difficulties they needed to manage, and other parents expressed guilt arising from feelings of not having put enough time into working with their children.

Research investigating the health and wellbeing of mothers of children with speech impairment have found they are more likely to obtain lower scores on health-related Quality of Life measures, and are more likely to meet criteria for emotional disorders (namely anxiety and depression) in comparison to mothers of children without speech impairment (Rudolph et al., 2005; 2003; Wink et al., 2007). In the current study, the demands associated with being the caregiver and therapist (at home/school) of a child with additional needs (such as speech impairment) also impacted on the social and emotional wellbeing of the mothers. Thus, speech and language therapy needs to support parents to cope with the difficulties they’re experiencing, as well as managing the range of difficulties faced by their children.

Doing

The results from this study indicate that once parents are aware that their children experience speech impairment, they will attempt to help their children to overcome their difficulties; however, other life events may influence their ability to do so. For instance, family illness impacted on the ability of Tim’s mother to access help, and Tim’s unwillingness as a child to cooperate in therapy sessions also played a role. Similarly, McAllister et al. (2010) found that families’ decisions to seek help for their children was affected by their awareness of impairment, and also by ability to access services. They found service-related factors, such as waiting lists and cost, as well as family-related factors, such as other time and work commitments, and child-related factors, such as a readiness to participate, impacted on the ability of families to access and engage in speech and language therapy.

The parents in the current study were involved in carrying out home therapy
programmes devised by professionals but found this could be a battle at times, due to the amount of input required or other family commitments. Similarly, Goldbart and Marshall (2004) found parents of children using AAC reported high levels of demands on their time and energy, which were not always understood or acknowledged by the professionals working with them. The findings from the current study reinforce the need for therapists to provide sufficient knowledge, support and direction for families to make informed decisions about intervention and to enable participation, but to be aware of family goals and priorities outside of speech and language therapy.

Parents may seek help in their child’s early years as they are often aware of the impairment during the early years; however, children may not be ready to accept help until later, as they don’t have the same level of awareness. Individuals with speech impairment may develop informal strategies for dealing with their impairment and the impact of their impairment and may not actively seek assistance (e.g., speech and language therapy) until they can see the benefits of the intervention in terms of other life goals and priorities (e.g., future career success). For Tim, having insight into the difficulties he experienced and the way this might impact on his career as a broadcast journalist, led him to “do” something (e.g., seek intervention or assistance) as an adult to minimise the impact of speech impairment on his life goal. This finding is consistent with findings reported by Hearne et al. (2008) in a study of adolescents who stutter. They found adolescents needed to feel ready in order to seek intervention, and often were motivated by reasons such as going to university or starting work. They reported having a stutter was not in itself a sufficient reason to seek help.

Results from the current study indicate that both individuals with speech impairment and their parents want the intervention they receive to be functional. These findings reinforce the need for therapists to involve individuals with speech impairment and their families in decision-making about intervention goals and provide intervention
that will have real-world effects. Watts Pappas et al. (2008) identified that SLTs are more likely to involve families in service provision than service planning, and do not typically allow families to have the final decision regarding intervention goals. Thus, engaging in true family-centred intervention remains a challenge for clinical practice (Crais, Poston Roy & Free, 2006; Watts Pappas & McLeod, 2009).

**Limitations**

This study was the first qualitative investigation of the experience of speech impairment across the lifespan, and case studies were chosen as the most appropriate method to obtain detailed descriptions and understandings of individual experiences. It is acknowledged that there are limitations to such research, namely the inability to generalise findings based on two individuals to the wider population of individuals with speech impairment. However, the approach was chosen due to the depth, rather than the breadth, of data that could be collected. The qualitative design fulfilled this purpose, by enabling a deeper understanding of the experience of speech impairment from the perspective of individuals and their parents, and by highlighting the similarities and differences in experience that may exist among individuals with a diagnosis of speech impairment. Further research with a larger number of participants would be useful to determine whether the experiences described by the participants in this study and the themes that emerged from their descriptions are consistent with those of other individuals with speech impairment and their parents.

The aim of this study was to describe experiences across the lifespan and it is acknowledged that their descriptions were therefore reliant on their memories of experiences. Triangulation of data sources was used to ensure consistency of data for both participants. Further research with individuals of different ages, or with the same individuals at different points throughout their lives would be useful to understand how their perceptions and descriptions of the experience living with speech impairment
CONCLUSION

The current study presented the experiences of two individuals with speech impairment and their mothers from childhood through to early adulthood. There has been no previous research investigating the life experience of childhood speech impairment from the perspective of individuals and their family members. The lack of research investigating their experiences has implications for clinical practice. As Patton (2002, p. 14) stated, “Doctors who look only at test results and don’t also listen to their patients are making judgments with inadequate knowledge, and vice versa.” SLTs have access to a body of research identifying the “test results” for individuals with speech impairment. That is, SLTs know what constitutes a diagnosis of speech impairment and are increasingly aware of the association between speech impairment and other areas of development (e.g., language, literacy, self-esteem). However, we do not have the same body of research describing the experience of clients with speech impairment and their families. Consequently our knowledge (or evidence) base for clinical decision-making is incomplete.

The current research highlighted some of the battles encountered by individuals with a history of childhood speech impairment and their mothers. The research showed the valuable insights that can be provided by individuals and their families, and showed the similarities and differences in experiences between families, and among family members. The research also showed the way in which life interacts with speech impairment, and influences the decisions made by individuals with speech impairment and their parents. As Kovarsky (2008) suggested, there is a need for research and clinical practice to consider this qualitative information alongside quantitative data in order to have the most socially significant and ecologically valid evidence on which to base clinical decision-making.
ACKNOWLEDGEMENTS

The authors wish to thank the individuals who participated in this research for their time and valuable insights. This research was supported by The Sir Robert Menzies Memorial Research Scholarship in the Allied Health Sciences. The research comprises a portion of the first author’s PhD, supervised by the subsequent authors.

REFERENCES


McAllister, L., McCormack, J., McLeod, S., and Harrison, L. J. 2010: Expectations and experiences of accessing and participating in services for childhood speech impairment. Manuscript in submission.


Rudolph, M., Rosanowski, F., Eysholdt, U. and Kummer, P. 2003: Anxiety and


Conclusion to Part 3

The three research studies presented in part 3 of this doctoral research (papers 7-9) enabled an understanding of the experience of childhood speech impairment as perceived by individuals with speech impairment and significant others in their lives (e.g., families and teachers). The studies used the ICF and/or ICF-CY as a theoretical framework to guide interview questions in order to examine the association between speech impairment and Activities and Participation, and the influence of Environmental and Personal factors.

The use of the ICF and/or ICF-CY enabled a holistic understanding of individual experiences of childhood speech impairment. For instance, in the studies presented in papers 8 and 9, adults described the speech impairment (or “speech problem”) in terms of the child’s articulation difficulties (that is, the Body Function impairment), but also in terms of the child’s corresponding difficulties with life activities (that is, Activity limitations/Participation restrictions). There was consistency across both studies in terms of the Activity limitations reported for children with speech impairment (see Table 1). For instance, participants described Activities related to Learning and applying knowledge (d1), General tasks and demands (d2), Communication (d3), and Interpersonal interactions and relationships (d7), as being difficult for children with speech impairment. The adults in the study in paper 9 also reported Activities associated with Major life areas (d8), and Community, social and civic life (d9) were difficult for children as they got older, while the adults in the study in paper 8 were worried that these could be potential future problems for their children. In contrast, the child participants in the study in paper 7 did not identify themselves as having difficulty with most life Activities. Only one child identified Activities related to Communication were difficult, and other children identified difficulties with Interpersonal interactions and
relationships; however they did not always perceive the difficulties to be associated with their speech impairment.

Table 1. Activities and Participation Domains Associated with Speech Impairment:

Findings from the Three Qualitative Research Studies

<table>
<thead>
<tr>
<th>Chapter / Component</th>
<th>Examples of Specific Domains</th>
<th>Paper 7: Child drawings</th>
<th>Paper 8: Child/Other interviews</th>
<th>Paper 9: Adult/Parent interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning and applying knowledge (d1)</td>
<td>Learning to read/reading (d140, d166) Learning to write/writing (d145, d170) Focussing attention (d160) Calculating (d172)</td>
<td>✗ ✔ ✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General tasks and demands (d2)</td>
<td>Undertaking a single task (d210) Undertaking multiple tasks (d220) Managing behaviour (d235) Handling stress and other psychosocial demands (d240)</td>
<td>✗ ✔ ✔ 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication (d3)</td>
<td>Communicating with - receiving spoken messages (d310) Speaking (d330) Conversation (d350)</td>
<td>✔ 1 ✔ 1 ✔ 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility (d4)</td>
<td>Fine hand use (d440) Hand and arm use (d445) Walking (d450)</td>
<td>✗ ✔ ✔ ✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self care (d5)</td>
<td>Eating (d550) Drinking (d560) Looking after one’s health (d570)</td>
<td>✗ ✔ ✔ ✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Life (d6)</td>
<td>Assisting others (d660)</td>
<td>✗ ✔ ✔ ✔ 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpersonal interactions and relationships (d7)</td>
<td>Relating with persons in authority (d7400) Informal relationships with friends (d7500) Informal relationships with peers (d7504) Parent-child relationships (d7600) Sibling relationships (d7602)</td>
<td>✔ ✔ ✔ 1 ✔ 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major life areas (d8)</td>
<td>School education (d820) Acquiring, keeping and terminating a job (d845)</td>
<td>✗ ✔ ✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community, social and civic life (d9)</td>
<td>Recreation and leisure (d920) Play (d9200)</td>
<td>✗ ✔ ✔</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Tick indicates an association between speech impairment and activity limitation was described/pictured by participants in the research study, cross indicates no association was described/pictured.

1Children and/or parents identified activities within this domain were also limited for parents of children with speech impairment (i.e. third-party effects of disability)
Most of the child participants in the studies reported in papers 7 and 8 did not identify themselves with speech impairment, and adults with a history of childhood speech impairment (paper 9) described their first recognition of a problem once they reached school. Thus, findings from these studies emphasised the difference between views held by preschool children and others in their environment regarding the experience of speech impairment, but suggested children’s perceptions of speech impairment develop over time to become more consistent with adult views.

The studies in papers 8 and 9 also revealed the way in which speech impairment is experienced by those who interact with children with speech impairment, as well as the children themselves; that is, the third party effects of speech impairment (cf. Scarinci, Worrall, & Hickson, 2009). For instance, child and adult participants described the listening problem experienced by communication partners (paper 8), while mothers described the battles they experienced as a result of having children with speech impairment (paper 9). That is, parents of individuals with speech impairment identified an association between their child’s speech impairment and limitations to their own life Activities. Specifically, they described themselves as having difficulty with Activities related to General tasks and demands (d2), Communication (d3), Domestic Life (d6), and Interpersonal interactions and relationships (d7) (see Table 1).

Participants in the studies in papers 8 and 9 described a range of Environmental and Personal Factors that contributed to their experience of speech impairment, and mediated the association between speech impairment and difficulties with life Activities. For instance, the child’s temperament, and the listener’s familiarity with the child and responsiveness to the child were identified as contributing to the success (or otherwise) of Activities associated with Communication (d3) and Interpersonal interactions and relationships (d7) (paper 8). Other factors (such as the health and wellbeing of other family members) contributed to the Activity limitations experienced
by individuals with speech impairment and their parents, and their ability to access and engage in intervention (paper 9).

**Summary and Future Directions**

Findings from the three studies presented in part 3 of this doctoral research demonstrated the advantages of multi-modal data collection when working with children, and specifically, with children who experience communication difficulties. Children provided valuable insights into the experience of childhood speech impairment, which differed from the views held by others in their environment.

This research revealed the way in which speech impairment is experienced by those interacting with children with speech impairment, as well as the children themselves. Thus, there is a need for management of speech impairment to extend beyond the individual to encompass family members (and significant others) who interact with the child with speech impairment. Further investigation of the battles/struggles experienced by families of children with speech impairment would be useful, including an evaluation of the Environmental and Personal Factors that act as barriers/facilitators to their health and wellbeing.

In the studies reported in papers 8 and 9, parents described their search for solutions and their desire to do something about the problems experienced by their children and themselves. However, it seems that children may not identify a need for assistance until they are much older (paper 9). Future research could investigate the factors that contribute to children’s recognition of their speech impairment, and their decision to seek intervention.

**Reference**

CONCLUSION AND RECOMMENDATIONS
This doctoral research has significantly increased current knowledge about childhood speech impairment, and provides strong evidence to support advocates seeking to improve speech-language pathology services for children with speech impairment and their families. The innovative research design, comprising a series of research studies framed by a common theoretical lens (the ICF and/or ICF-CY), combined quantitative and qualitative strategies of inquiry and multiple perspectives, which gave breadth, complexity, richness and depth to the findings (Denzin & Lincoln, 2000). While the research studies had unique aims, two overarching research objectives ensured the purpose and direction for all studies remained constant. The objectives were: 1) To investigate the extent and direction of the association between childhood speech impairment and life activities, and 2) To understand the experience of childhood speech impairment from the perspective of individuals and significant others in their lives.

Research studies guided by the first objective were presented in part 2. In those studies, the ICF and ICF-CY were used in a top-down, quantitative approach to data collection and analysis. That is, an association between speech impairment and life Activities was presupposed, and the ICF and ICF-CY were used to guide the systematic review (paper 4), development of questionnaire items (paper 5), and selection of outcome measures (paper 7) in order to examine the extent and direction of that association. Research studies guided by the second objective were presented in part 3, where the ICF and ICF-CY were used in a qualitative, bottom-up approach to data collection. That is, they were used to guide the formation of interview questions, but questions were open-ended to enable individuals to present their own perspectives and a phenomenological approach to analysis was used to understand individual experience. In the following sections, the findings of the studies in relation to the two research objectives are reviewed.
Objective 1: The Extent and Direction of the Association between Speech Impairment and Life Activities

The three research studies presented in part 2 of this doctoral research (papers 4-6) examined the association between speech impairment and life Activities during childhood and across the lifespan. The studies presented in the three papers were all guided by a quantitative strategy of inquiry; however, all utilised different research methods. Despite the use of different methods, there was consistency in the results obtained across the studies: namely, that childhood speech impairment is linked to limitations performing a range of everyday life Activities which extend beyond communication-based Activities, and beyond childhood.

In paper 4, the systematic review revealed childhood speech impairment may be associated with limitations to the following everyday life Activities (taken from the Activities and Participation component of the ICF) during childhood and/or across the lifespan: learning to read/reading, learning to write/writing, focussing attention and thinking, calculating, communication, mobility, self-care, relating to persons in authority, informal relationships with friends/peers, parent-child relationships, sibling relationships, school education, and acquiring, keeping and terminating a job. Many of these Activities were also identified by speech-language pathologists (SLPs) and parents as being difficult for preschool children with speech impairment in the study presented in paper 5. In that study, both SLPs and parents rated Activities related to verbal communication (e.g., conversation and discussion) and those related to advanced learning (e.g., learning to read, learning to write) as the most difficult Activities for preschool children with speech impairment. However, other limitations were identified, including children’s difficulty handling stress and other psychosocial demands. In the study presented in paper 6, children identified with speech and/or language impairment during their preschool years (aged 4-5) were found to perform significantly less well at
school (aged 7-9 years) on a similar range of life Activities as those reported in the other

It is acknowledged in all studies that other variables may have contributed to the results obtained; that is speech impairment was not the sole influence on Activity limitations identified. The influence of other factors (both Environmental and Personal) would be a useful direction for future research. However, in this doctoral research, when other important child and family variables were considered (in paper 6), the effect of communication (speech and/or language) impairment remained significant. This suggests communication (speech) impairment contributes to difficulties with a range of life Activities.

The use of the ICF and ICF-CY (WHO, 2001; 2007) as a theoretical lens in each study proved a unique, and comprehensive, way of considering the extent and direction of the association between speech impairment and life Activities. The consistency of the findings from the three studies provides strong evidence of the broad and lasting ways in which speech impairment interacts with Activities and Participation, and strong evidence of the need for holistic and ongoing intervention for children with speech impairment. Furthermore, the findings provide justification for evaluating and managing the everyday life effects of speech impairment as a component of clinical practice, rather than focusing solely on the functional impairment (e.g., articulation or phonological errors). Thus, the usefulness of the ICF and ICF-CY as frameworks for guiding clinical practice was demonstrated.

**Objective 2: The Experience of Childhood Speech Impairment**

The three studies in part 3 of this doctoral research (papers 7-9) presented the experience of childhood speech impairment as described and understood by individuals with speech impairment and significant others in their lives (e.g., family members and teachers). The studies presented in the three papers were all guided by a qualitative
strategy of inquiry, and are the first published, qualitative descriptions of the communication and life stories of individuals living with childhood speech impairment.

In the studies described in these papers, consideration was given to the views of both children and adults, and data was collected in verbal and non-verbal forms (e.g., drawings), in accordance with Articles 12 and 13 of the United Nations Convention on the Rights of the Child (UNICEF, 1989). Findings from these studies supported the inclusion of children in this research, and demonstrated the usefulness of a multi-modal approach to data collection in order to understand children’s views, particularly when they have difficulty with verbal communication.

The results from all three qualitative studies were consistent in demonstrating the way in which difficulties associated with speech impairment extend beyond the individual with the impairment, affecting their families (and other communication partners) as well. The studies revealed children and adults had different perspectives about their communication experiences, and difficulty producing sounds was not the only difficulty they experienced.

In the study presented in paper 8, children with speech impairment and their communication partners revealed two global themes in their experience of childhood speech impairment: the problems they experienced in their communication interactions, and the solutions they used to overcome the problems. The adults identified 3 problems: the child’s speech problem, their own listening/understanding problem, as well as the child’s frustration problem. The children often perceived only the adult’s listening problem. Similarly, the analysis of children’s drawings and questionnaire responses in paper 7 found children were generally happy about talking and about the way they talk, and most did not perceive themselves as having speech difficulties.

In the study presented in paper 9, the two young adults with a history of childhood speech impairment revealed their knowledge of speech impairment developed
in later childhood, when they *had* difficulties with life Activities (e.g., social interactions, academic skills, and career progression). However, parents reported *knowing* a problem existed and trying to *do* something in response to the problem much earlier. Parents also identified they experienced difficulties in living with their child’s speech impairment, in the same way as parents in the study in paper 8. Difficulties included balancing the demands of having a child with speech impairment (e.g., working on home programs) with the demands of life, as well as the lack of information and support for family members.

The use of the ICF and ICF-CY (WHO, 2001; 2007) as a theoretical lens in each study provided a holistic perspective of child and family wellbeing, enabling insight into the third-party effects of speech impairment as well the effects on a range of life Activities. The findings from the three studies provide strong evidence of the relationship between speech impairment and life experiences for both families and children, and thus, strong evidence of the need for intervention that supports families as well as children (i.e., listeners and speakers).

It is acknowledged that other contextual factors may have contributed to the descriptions of living with childhood speech impairment described by the children and families in this doctoral research, which highlights the heterogeneity of children with speech impairment and their families. It reinforces the need to consider each individual (child and family unit), and understand their life experiences and context when making clinical decisions, in addition to using standardised or normative measures.

**Implications for Policy and Practice**

Integration of results from all the papers presented in this doctoral research reveal the significance of this body of work, and raise implications for SLPs and policymakers. The implications may be considered transformative in that they suggest, and provide evidence for, an agenda for change; specifically, changes in the access to, and
provision of, Australian speech-language pathology services for children with speech
impairment and their families.

There is a clear need for early and ongoing intervention for all children with
speech impairment in order to minimise the impact on social, academic, and
employment outcomes (e.g., papers 4, 6 and 9). However, in Australia at the present
time, not all children with speech impairment have access to necessary speech-language
pathology services. This is due, in part, to government policies within the disability,
health and education departments which fail to allocate sufficient resources and funding
to children identified with speech difficulties. It is exacerbated by government policies
in some states of Australia which do not enable employment of SLPs within the
education system (McLeod, Press & Phelan, 2010). This doctoral research provides
evidence of the need for collaboration between health, education and disability sectors
to update current service provision policies, and to ensure holistic and appropriate care
is available to support all children with speech impairment and their families for as long
as required. The benefits of timely and appropriate speech-language pathology
intervention far outweigh the cost to individuals, families and society if speech
impairment is left untreated (Ruben, 2000).

In order to be most effective, the intervention needs to address the breadth of
difficulties that children with speech impairment and their families experience in
everyday life. This doctoral research has shown childhood speech impairment may limit
a range of life Activities for children (e.g., papers 4-6), yet intervention for speech
impairment continues to focus on the level of the impairment, primarily targeting
articulation or phonological errors (Williams, McLeod & McCauley, 2010). This
doctoral research provides evidence of the need for a more holistic model of practice
which incorporates intervention targeting a range of life Activities, rather than only a
traditional impairment-based approach.
Holistic practice also needs to ensure the needs of families, as well as children with speech impairment, are addressed. This doctoral research enabled insight into the experience of living as a parent of a child with speech impairment (papers 8 and 9), and revealed parents encounter a range of difficulties or battles in their everyday lives. Thus, the effects of childhood speech impairment not only extend beyond communication, and beyond childhood, but also beyond the individual with the impairment. This doctoral research provides evidence of the need for clinical practice which ensures families receive adequate information about their children’s difficulties and ways to assist them, as well as access to support groups or organisations where parents can discuss their experiences with others and minimise their feelings of isolation.

Family-centred practice should also ensure the views and priorities of children and their families are incorporated throughout the management process. Families of children with speech impairment have unique knowledge of their children outside of the clinic environment and provide valuable insights into living with speech impairment. In this doctoral research, parent’s perceptions of the association between speech impairment and life Activities were somewhat different to that of SLPs. There is a need to ensure SLPs’ goal selection for therapy matches parent priorities. This doctoral research provides evidence of the value of seeking parent (and family) input in the assessment of children with speech impairment, and also in the selection of intervention goals, prioritisation of goals, and the intervention process.

Similarly, children with speech impairment have valuable contributions to make in research and clinical practice. Their contributions in this doctoral research revealed they have different perspectives compared to their adult communication partners regarding the “problems” they experience in living with speech impairment (papers 7 and 8). Most were happy about talking, many did not perceive themselves as having a speech problem, and some perceived their communication partners had a listening
problem instead (paper 8). Such findings have implications for speech-language pathology intervention, which typically focuses on correcting the skills of the child speaker. For instance, children may be reluctant to participate in therapy that aims to address a problem they do not perceive to exist.

Analysis of data from the Longitudinal Study of Australian Children (AIFS, 2009), as well as the systematic review of research studies, revealed difficulties may continue through school and into adulthood (papers 4 and 6). It may not be until these later years that individuals actively seek assistance for speech impairment, and are motivated to participate in intervention, in order to achieve success in education or employment settings (paper 9). Consequently, this doctoral research provides evidence of the need to carefully consider the timing and focus of intervention provided to children with speech impairment and their families. In this doctoral research, adults were equally concerned about their inability to “hear” their children’s message as they were about their children’s speech problems. Findings from this doctoral research suggest the need for a shift in current clinical practice paradigms so that intervention for speech impairment also incorporates ways to enhance listeners’ understanding, and ways to address the frustration experienced by children and their communication partners.

**Future Research**

There is a need for future research to investigate current service provision models and rationales underlying them, and possible inconsistencies between these models and the needs of children with speech impairment and their families.

The ICF and ICF-CY, the theoretical frameworks used to guide this research, also provide a focus for future research, which could involve the integration of other ICF components (e.g., Environmental and Personal Factors). That is, the research could examine the contextual factors that may mediate the influence of speech impairment on
life Activities to further guide clinical practice. Results of papers 4 and 6 showed that a number of children did not go on to experience difficulties in school and later years. Future research could use the ICF-CY to examine the range of factors that contribute to children overcoming communication impairment and associated difficulties, in order to ensure intervention services and resources are distributed most efficiently and effectively.

Furthermore, the ICF framework could guide the development of a clinical assessment tool that could be used to evaluate the association between speech impairment and life Activities, to enhance current assessments which focus on the nature and severity of speech sound errors. Such a tool could be used with children with speech impairment and significant others to determine goals and priorities for intervention. It would be useful to determine whether perceptions of Activities that may be difficult for children with speech impairment differ between children and those with whom they communicate. In addition, it would be useful to determine whether SLPs’ knowledge of the breadth of difficulties associated with speech impairment corresponds to the provision of interventions that aim to lessen the difficulties.

Finally, future research could be conducted with a larger sample of children of different ages, or incorporate a longitudinal design to determine whether the life experiences described by the participants in this study and the themes that emerged can be generalized to others. Such studies would enable an understanding of how individuals’ perceptions of communication skills and their description of living with speech impairment change over time.

**Final Comments**

This doctoral research expanded the current knowledge base about the extent and direction of the association between childhood speech impairment and life activities and provided insight into the experience of living with childhood speech impairment.
The research was unique in presenting data from child speakers as well as adult listeners, and from service recipients (parents/children) as well as service providers (such as SLPs and teachers). The inclusion of a range of participants ensured a range of perspectives was considered and so gave breadth to the findings. The use of a range of data types (questionnaires, interviews and children’s drawings) from a range of sources (including a large-scale nationally representative population sample and small purposive samples) provided depth. The qualitative data enabled the “voices” of the individuals with speech impairment and their families to be heard and understood, and the quantitative data enabled generalisation beyond this research. Taken individually and together, the studies presented in this doctoral research form a new and significant contribution to knowledge of childhood speech impairment.

References


(UNCROC). Available at: http://www2.ohchr.org/english/law/crc.htm

