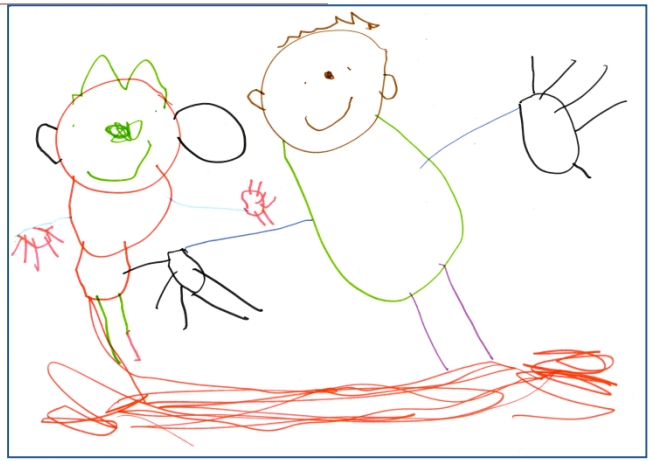
Impact of speech and language impairment at 4- to 5-years on literacy, numeracy, and learning at 6- to 7-years

A/Prof. Linda J. Harrison[1]
Prof. Sharynne McLeod[1]
Prof. Donna Berthelsen[2]
Dr. Sue Walker[2]
[1]Charles Sturt University, Australia
[2]Queensland University of Technology, Australia



The 2nd Longitudinal Study of Australian Children (LSAC) Research Conference,
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Prevalence: International systematic review

- Communication impairment in children is a "high prevalence condition" (Law et al., 2000)
  - speech delay only = 2.3 to 24.6%
  - language delay only = 2.0 to 19.0%
  - combined speech/language delay = 1.4 to 8.0%

- For most children, there is **no known cause for their communication impairment** (hearing loss, cleft lip and palate etc. are **rare**)

Prevalence of communication impairment: Australian data

- ELVS study: Reilly, Bavin, Bretherton, Conway, Eadie, Cini, Prior, Ukoumunne, & Wake (2009)
  - 1,911 children at 8, 12, 24 months
  - **19.7%** "delayed expressive vocabulary or were late to talk"
- Zubrick, Taylor, Rice & Slegers (2007)
  - 1,766 children at 24 months
  - **13.4%** "late language emergence"
- McLeod & McKinnon (2007)
  - 14,514 school students in grades K- Year 12
  - **13.0%** "communication disorders"

Prevalence of additional needs in school-age children (Yr1, Yr2)

	Year 1 n= 1433	Year 2 n= 1553
Specific learning difficulties	21.8%	22.2%
Communication disorders	**15.8%**	**14.3%**
Behavioural/emotional difficulty	5.1%	6.4%
English as second/other language	6.9%	5.3%
Early achievers/advanced learners	6.2%	7.5%
Physical/medical disability	0.9%	1.0%
Intellectual disability	0.8%	1.4%
Hearing impairment	0.8%	1.6%
Visual impairment	0.6%	0.6%

McLeod, S. & McKinnon, D. H. (2009, in press). Required support for primary and secondary students with communication disorders and/or other learning needs. *Child Language Teaching and Therapy*.

Associations between speech-language impairment and learning outcomes at school-age

- Children "are likely to find it difficult to process incoming language, to initiate communication with others and to formulate their responses appropriately. Accordingly they … are most likely to find difficulty in coping with the demands of school" (Law et al., 2000)
- Shown to have difficulties with
  - **literacy** (Leitao & Fletcher, 2004; Lewis et al., 2000; Nathan et al., 2004); Wise et al., 2007)
  - **numeracy** (Hall & Segarra, 2007; Koponen et al., 2006)
- Less likely to be high achievers (McLeod & McKinnon, 2007)

Aims

- Whilst the majority of studies report poorer outcomes in tests of literacy/numeracy for children with speech-language impairment, findings are mixed.
- The majority of studies are based on small, clinical samples .
- Studies do not consider the multi-dimensional nature of school-age achievement.

- **To examine speech-language impairment status at age 4-5 as a predictor of school achievement in a representative sample**

LSAC Methods:

Sample

- N = 3632 who provided Wave 1 (4-5 years) and Wave 2 (6-7 years) parent interview and teacher questionnaire data
  - Boys = 50.5%; girls = 49.5%; Spoke a language other than English at home = 10.0%; Aboriginal and/or Torres Strait Islander = 3.4%

Identification of speech-language impairment

- PEDS: parent identified concerns about how their child "talks and made speech sounds" (yes, a little = 24.4%)
  - 83.3% match to speech pathology assessment (McLeod et al 2009)
- PEDS: parent identified concerns about how child "understands what you say to him/her" (yes, a little = 8.3%)
- Received speech-language pathology (SLP) services (14.0%)
- PPVT (short-form): (≥ 1 SD below the mean = 13.3%)

LSAC Methods:

School-age achievement - Teacher report (Wave 2)

- ARS Language and Literacy (α = .96)
  - 10 item scale proficiency in communication and early literacy skills
  - e.g., contributes to class discussion; understands story /text that is read to him; reads words; writes sentences; uses computer; etc

  (not yet = 1; beginning = 2; in progress = 3; intermediate = 4; proficient = 5)
- ARS Mathematical Thinking (α = .95)
  - 8 item scale competencies for numeracy, understanding of measurement and spatial concepts
  - e.g., continue a pattern of 3 items; understands place value; graphs data

- SSRS: Approach to Learning (α = .91)
  - 6 item scale (never = 1; sometimes = 2, often = 3; very often = 4)
  - attentiveness, persistence, eagerness to learn, learning independence, flexibility, organisation

Analysis plan

- Univariate comparisons
  - Examine differences in school achievement at age 6-7 for each of the four identifiers of speech-language impairment at age 4-5 years
- Multivariate analyses
  - Examine unique and combined effects on school achievement of the identifiers of speech-language impairment at age 4-5 years after controlling for child and family characteristics
- Longitudinal speech-language impairment status
  - Examine the additional impacts of sustained impairment as predictors of school achievement

Univariate Results: School achievement age 6-7 yrs

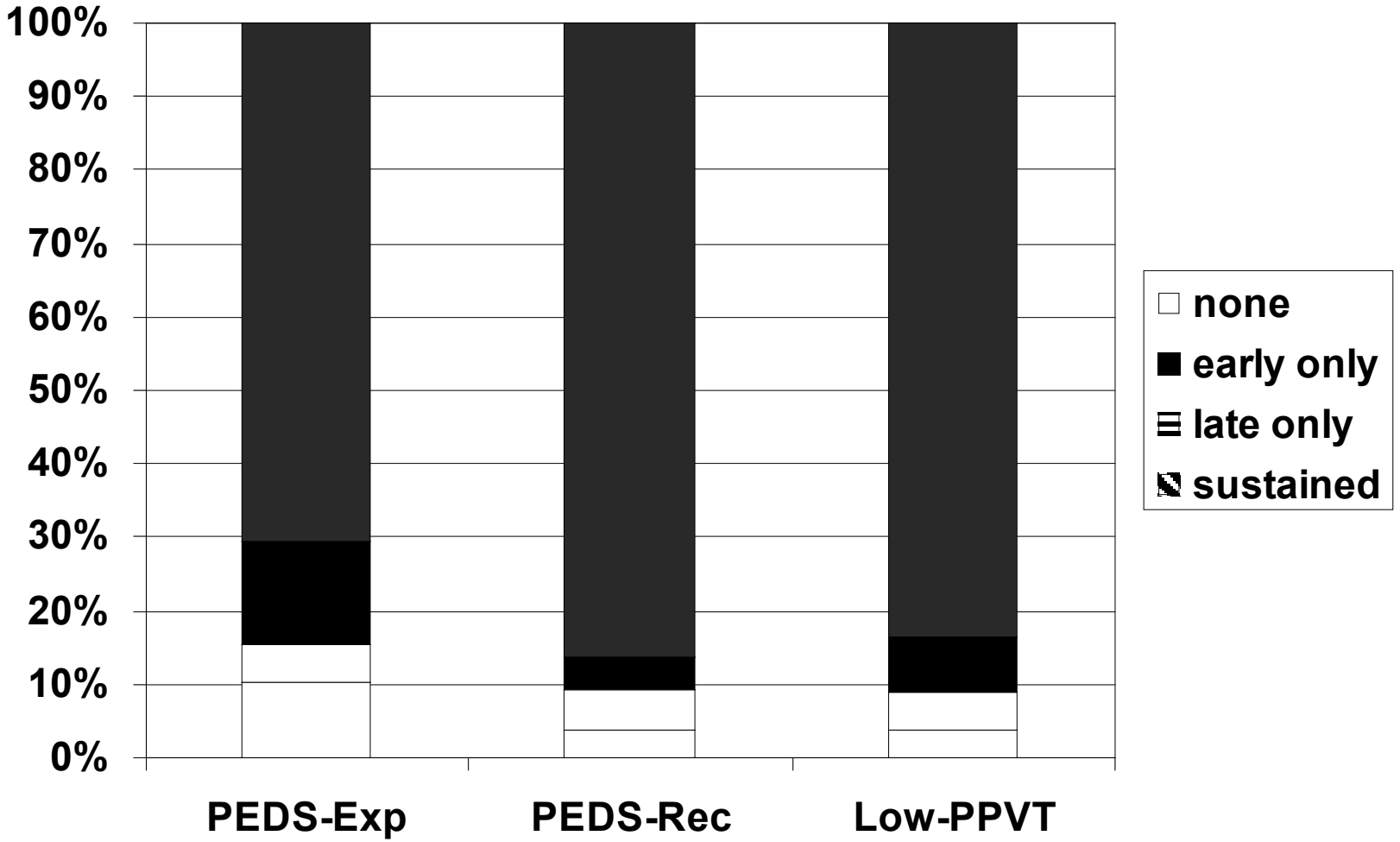
Early predictors of speech-language impairment	Language & Literacy (1-5 scale)	Mathematical thinking (1-5 scale)	Approach to Learning (1-4 scale)
PEDS: Expressive			
concern	3.30	3.28	3.07
no concern	3.74	3.63	3.30
PEDS: Receptive			
concern	3.01	2.95	2.81
no concern	3.69	3.55	3.28
SLP services			
received	3.20	3.20	3.02
did not receive	3.74	2.62	3.29
PPVT:			
1SD below mean	3.09	3.08	2.98
average or above	3.78	3.66	3.31

Multivariate Results: Hierarchical Regression

Predictor	Language & Literacy		Math. Thinking		Approach Learning	
	ΔR^2	β	ΔR^2	β	ΔR^2	β
Child - Gender	**.032**	.20	**.030**	.02	**.074**	.34
Age		.02		.01		-.01
Language other than English		.10		.15		.10
Aboriginal/Torres Strait Islander		-.41		-.36		-.16
Family – Socio-Economic Position	**.053**	.37	**.040**	.32	**.027**	.14
Speech-Language Impairment						
1. PEDS Exp concern at 4-5 years	**.025**	.38	**.019**	.32	**.009**	.16
2. PEDS Rec concern at 4-5 years	**.023**	.57	**.025**	.57	**.023**	.39
3. Received SLP at 4-5 years	**.026**	.47	**.019**	.39	**.010**	.20
4. PPVT below average at 4-5	**.032**	.59	**.025**	.50	**.016**	.29
5. All four SLI predictors	**.054**		**.043**		**.026**	

Longitudinal Results: speech-language impairment

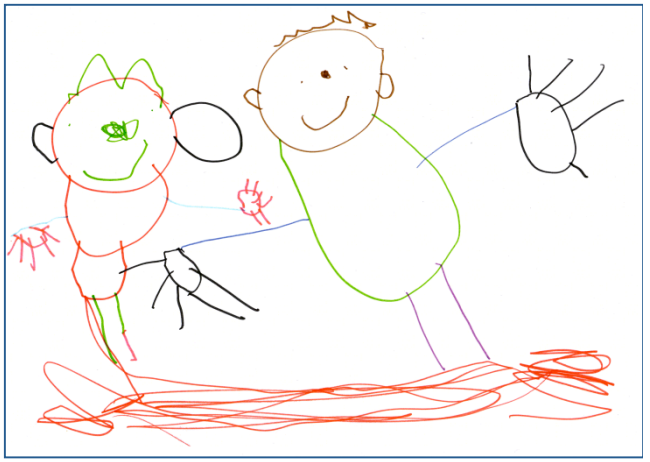
age 4-5 years = early; age 6-7 = late; ages 4-5 and 6-7 = sustained



Longitudinal Results: Hierarchical Regression

Predictor	Language & Literacy Δ R^2	β	Math. Thinking Δ R^2	β	Approach Learning Δ R^2	β
Child – gender, age, background	**.032**		**.030**		**.074**	
Family – Socio-Economic Position	**.053**		**.040**		**.027**	
Speech-Language Impairment						
1. PEDS Exp concern at 4-5 years	**.025**		**.019**		**.009**	
1A. PEDS Exp concern – sustained	**.015**	.51	**.017**	.53	**.009**	.28
2. PEDS Rec concern at 4-5 years	**.023**		**.025**		**.023**	
2A. PEDS Rec concern – sustained	**.011**	.75	**.008**	.63	**.010**	.48
3. PPVT below average at 4-5	**.032**		**.025**		**.016**	
3A PPVT below average - sustained	**.007**	.54	**.007**	.44	**.003**	.23

Summary of results



- A significant proportion (8-24%) of Australian 4- to 5-year-olds have speech-language impairment
- At school-age (Year 1-2), these children are doing less well than their peers in language/literacy, mathematical thinking and approaches to learning
- The predictive effects of early speech-language impairment on school achievement are similar to the effects of family socio-economic position
- Early (versus sustained) identification of speech-language concern is the stronger predictor

Conclusions and Implications

- These data confirm that communication impairment is a **high prevalence condition** in Australian 4- to 5-year-old children with negative consequences for children's achievement at school

- Children need **early identification** that takes accounts of and extends parent reported concern

- Children and families need **targeted support services** before school-age

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contact: lharrison@csu.edu.au

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