Predicting persistent speech disorder in the early years: Findings from a population study

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Background

- Natural variation in development of speech

- Full range of vowels and consonants – age 8
  (Smit, 1993; Dodd et al, 2003; James et al, 2001)

- Analysis of referrals to SLP in UK
    (Broomfield and Dodd, 2004)
    - 6.6% with SSD aged 7-11

- Persistent Speech Disorder (PSD) *(Pascoe, Stackhouse and Wells, 2006; Shriberg et al, 2010)*

Background- impact of PSD

- Low intelligibility
- Literacy difficulties
- Poor academic outcomes
- Psycho-social development
- Mental health problems

(Anthony et al, 2011; Bishop and Clarkson, 2003; Felsenfeld et al, 1994; Knox and Conti-Ramsden, 2003; Law et al, 2009; Lindsay et al, 2002; Nathan et al, 2004; Peterson et al, 2009)

Introduction to ALSPAC

- Avon Longitudinal Study of Parents and Children

- Prospective population study - 14,676 children

- Mothers recruited when pregnant in 1990/1991

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Introduction to ALSPAC

- Data collection methods
    - Questionnaire (parents, children)
    - Direct assessment
        - Subgroup – under age 7
        - All children invited – from age 7

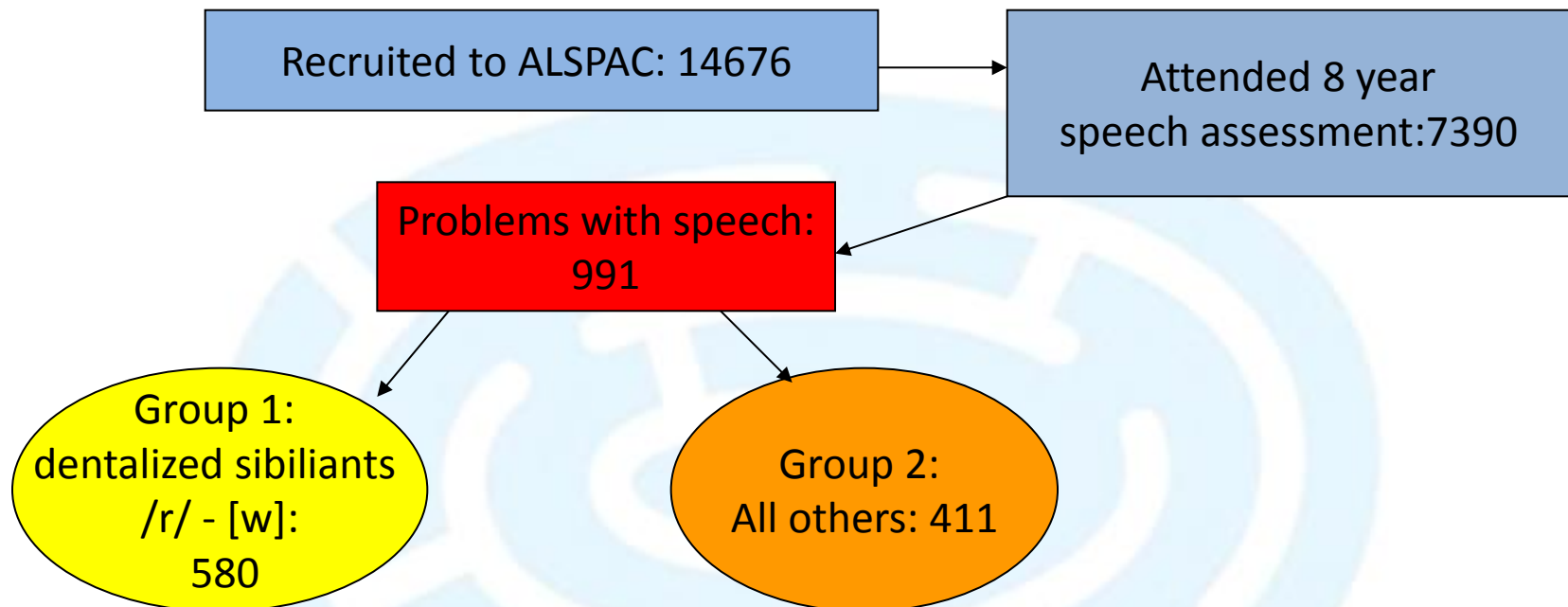- Connected speech samples taken at age 8 from 7390 children during WOLD

Case Identification

- Children with questionable speech identified

  – Problems with dentalized sibilants or /r/ to [w]
  = group 1

  – All other problems = group 2

- Group 2 samples – narrow transcription using PROPH on Computerized Profiling (CP) *(Long et al, 07)*
- Process repeated - control group 50 children

Case identification

Recruited to ALSPAC: 14676

Attended 8 year speech assessment: 7390

Problems with speech: 991

Group 1: dentalized sibiliants /r/ - [w]: 580
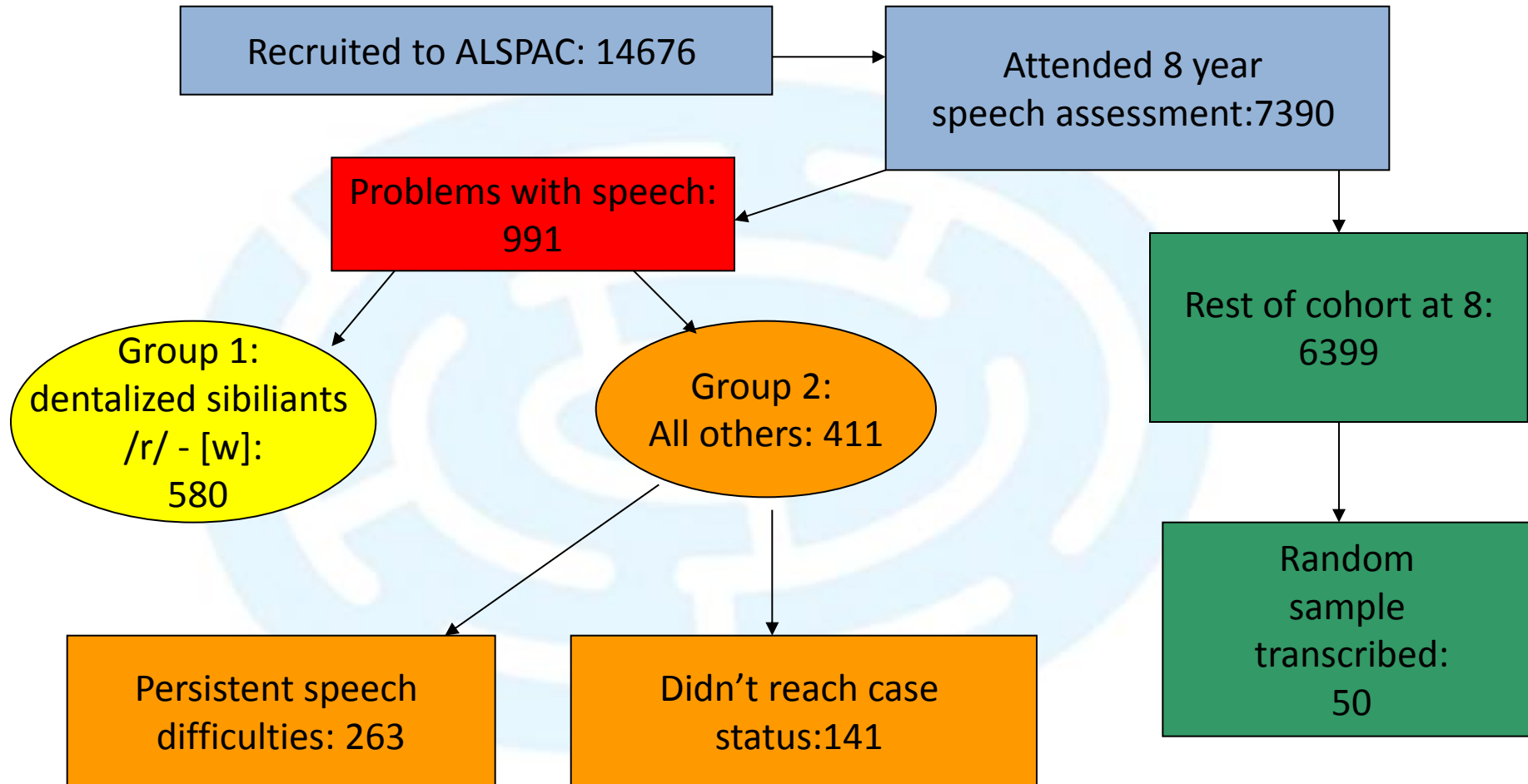
Group 2: All others: 411

Identifying PSD

- Measures based on Percent Consonants Correct –
  - PCC-A – scores all omissions, substitutions and uncommon clinical distortions as errors
  - PCC late eight

- Both measures below -1.2 standard deviations
  - Consistent with Records and Tomblin (1994)

Flow chart for case identification

Recruited to ALSPAC: 14676

Attended 8 year speech assessment: 7390

Problems with speech: 991

Rest of cohort at 8: 6399

Group 1: dentalized sibiliants /r/ - [w]: 580

Group 2: All others: 411

Random sample transcribed: 50

Persistent speech difficulties: 263

Didn't reach case status: 141

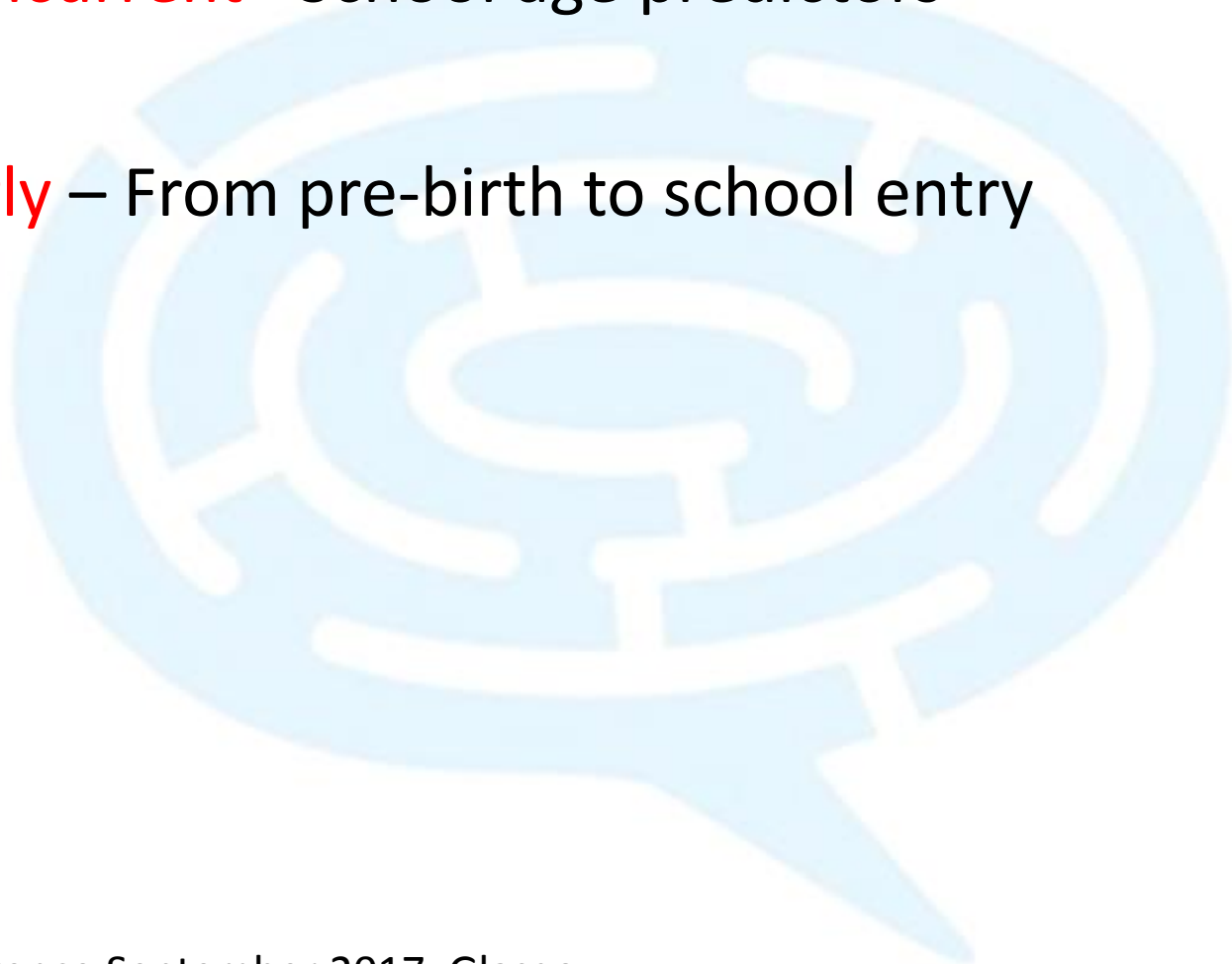RCSLT Conference September 2017, Glasgow

Prevalence

- 263 cases (175 boys, 88 girls)
- Prevalence – 3.6%
- Ratio boys to girls – 1.81:1

- Law et al (2000) review – rates for SSD 2.3% to 24.6%
- Shriberg et al (1999) – 3.8%

Risk factors

- Concurrent –School age predictors

- Early – From pre-birth to school entry

Concurrent Characteristics (school age predictors)

- Demographics
  - Gender, SES, maternal age
- Speech and language performance (concurrent)
  - Comprehension, DDK, phoneme deletion, nonword rep
- Literacy and learning (concurrent)
  - Standardised tests, SATS
- Other developmental (concurrent)
  - Nonverbal IQ, attention, memory, coordination, hearing/grommets, friendships

Analysis – univariable and multivariable logistic regression

Summary of concurrent characteristics

Demographics:

Speech and Language:

Gender
p=0.003

Difficulty pronouncing certain sounds
p=<0.001

Home ownership
p=0.028

Non-word repetition
p=<0.001

Summary of concurrent characteristics

Literacy and learning   *Other developmental*:

Coordination problem suspected
p=0.011

Grommet insertion
p=0.005
Hearing impairment
p=0.017

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Summary of concurrent characteristics

Odds ratios

- Gender (boys)   1.69
- Home ownership (non-owners)   1.64
- Difficulty pronouncing certain sounds (yes)   5.59
- Non-word repetition   0.82
- Coordination problem suspected (yes)   2.05
- Grommet insertion (yes)   2.18
- Hearing impairment (yes)   1.94

Predictors (early childhood)

- Demographics
  - Gender, SES, maternal age
- Environment
  - Birth order, EAL, reading to child, overcrowding, pregnancy, family history
- Speech and language performance (early)
  - CDI, intelligibility, combining words, grammar
- Literacy and learning (early)
  - School entry assessment
- Other developmental (early)
  - Motor, laterality, feeding

- *Analysis – uni-variable and multivariable logistic regression*

Summary of early predictors

Demographics:

Home ownership

p=0.036

Environment:

Summary of early predictors

Speech and Language:

Intelligibility to others at 38m
p<0.001

Combines words at 24m
p=0.006

Word morphology at 38m
p=0.001

Summary of early predictors

Literacy and learning: *Other developmental:*

Weak sucking at 4w

p=0.05

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Summary – Early Predictors

Odds ratios

- Home ownership (non-owner) 1.52
- Intelligibility to others at 38m (mostly not) 2.38
- Combining words at 24m (not often) 1.81
- Word morphology at 38m (continuous variable) 0.91
- Weak sucking at 4w (continuous variable) 1.45

Summary of important variables

Variable	Odds Ratio
Gender (boys)	1.69
Home ownership (non-owners)	1.64
Difficulty pronouncing certain sounds (yes)	5.59
Non-word repetition	0.82
Coordination problem suspected (yes)	2.05
Grommet (ventilation tube) insertion (yes)	2.18
Hearing impairment (yes)	1.94
Home ownership (non-owner)	1.52
Intelligibility to others at 38m (mostly not)	2.38
Combining words at 24m (not often)	1.81
Word morphology at 38m (continuous variable)	0.91
Weak sucking at 4w (continuous variable)	1.45

Clinical Implications

Children identified with SSD at age 2 or 3

- Who is at risk of PSD?
  - Low SES (50% increased risk)
  - Unintelligible to strangers at age 3 (140% increased risk)
  - Not combining words at age 2 (80% increased risk)
  - History of weak sucking at 4 wks (40% increased risk)
  - Poor with word morphology at age 3 – increased risk

Clinical Implications

- When they are older…
    - More likely to be reported as having had coordination problems (100% increased risk)
    - More likely to have had grommets or hearing impairment (100% increased risk)
    - More likely to struggle with nonword repetition

What does this tell us about the nature of PSD?

PSD more likely to have features of both motor and cognitive (phonological) impairment *(Wren, Roulstone, Miller, 2012)*

Research Article

Prevalence and Predictors of Persistent Speech Sound Disorder at Eight Years Old: Findings From a Population Cohort Study

Yvonne Wren,[a,b] Laura L. Miller,[c] Tim J. Peters,[d] Alan Emond,[e] and Sue Roulstone[f]

Purpose: The purpose of this study was to determine prevalence and predictors of persistent speech sound disorder (SSD) in children aged 8 years after disregarding children presenting solely with common clinical distortions (i.e., residual errors).

Method: Data from the Avon Longitudinal Study of Parents and Children (Boyd et al., 2012) were used. Children were classified as having persistent SSD on the basis of percentage of consonants correct measures from connected speech samples. Multivariable logistic regression analyses were performed to identify predictors.

Results: The estimated prevalence of persistent SSD was 3.6%. Children with persistent SSD were more likely to be boys and from families who were not homeowners. Early

childhood predictors identified as important were weak sucking at 4 weeks, not often combining words at 24 months, limited use of word morphology at 38 months, and being unintelligible to strangers at age 38 months. School-age predictors identified as important were maternal report of difficulty pronouncing certain sounds and hearing impairment at age 7 years, tympanostomy tube insertion at any age up to 8 years, and a history of suspected coordination problems. The contribution of these findings to our understanding of risk factors for persistent SSD and the nature of the condition is considered.

Conclusion: Variables identified as predictive of persistent SSD suggest that factors across motor, cognitive, and linguistic processes may place a child at risk.

ORIGINAL ARTICLE

Distinguishing groups of children with persistent speech disorder: Findings from a prospective population study

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Abstract
As part of a large-scale study of children's development, 7390 children were assessed on a range of speech tasks. These were used to identify three groups of children with speech errors within the sample: persistent speech disorder (PSD); speech errors but below the threshold for classification as persistent speech disorder (non-PSD); and common clinical distortions only (CCD). These three groups were compared on demographic factors, performance on IQ, non-word repetition, and diadochokinetic tests. Findings showed that the PSD group and the non-PSD group were most similar for gender, socio-economic status, IQ, and non-word repetition. In the diadochokinetic tasks, the PSD group and the CCD groups were more similar. Implications for these findings in terms of clinical practice are discussed.

Key words: *ALSPAC, children, disorder, persistent, population, speech*

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