Prevalence of Reading and Related Disorders in Children At Family-Risk

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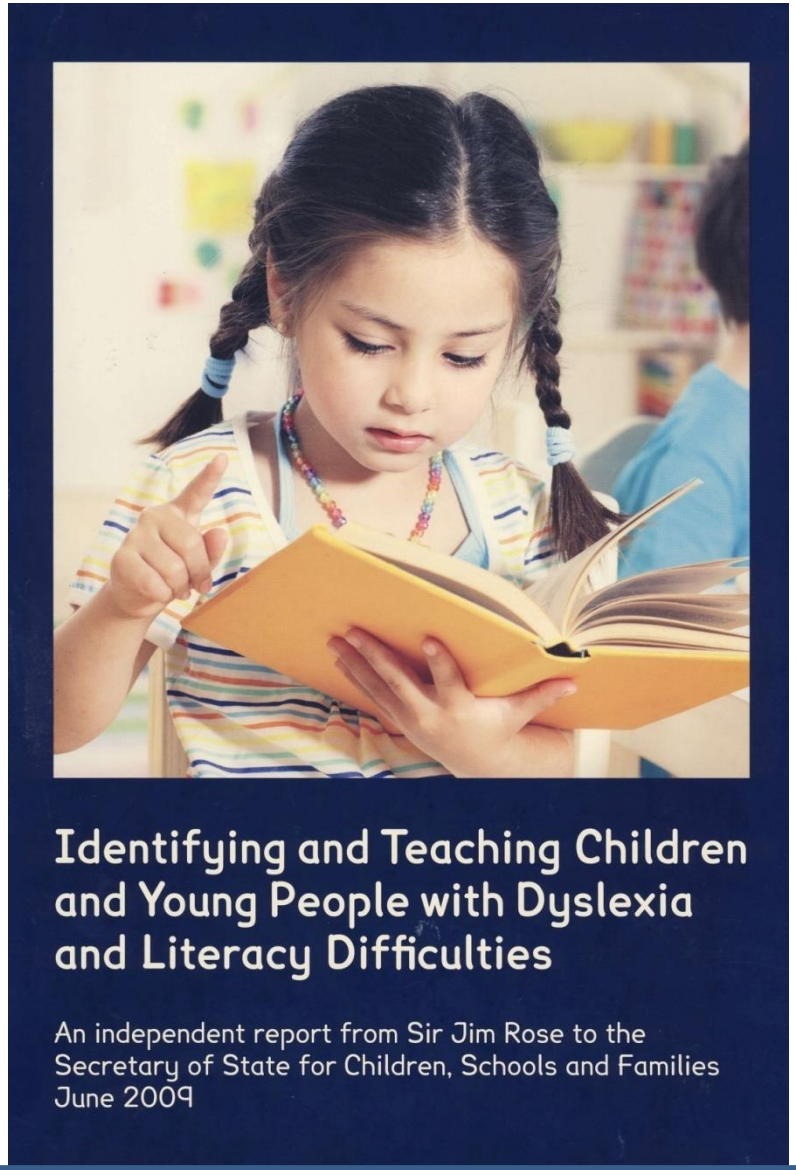
wellcome trust

PEOPLE MARIE CURIE ACTIONS

UNIVERSITY OF OXFORD

Symposium

- Phonology and Language
- Speech
- Literacy and Numeracy
- Executive skills
- Basic auditory and speech processing



Rose Review 2009
Department for Children Family and Schools

Dyslexia as a dimension

"Dyslexia is best thought of as a continuum, not a distinct category, and there are no clear cut-off points"

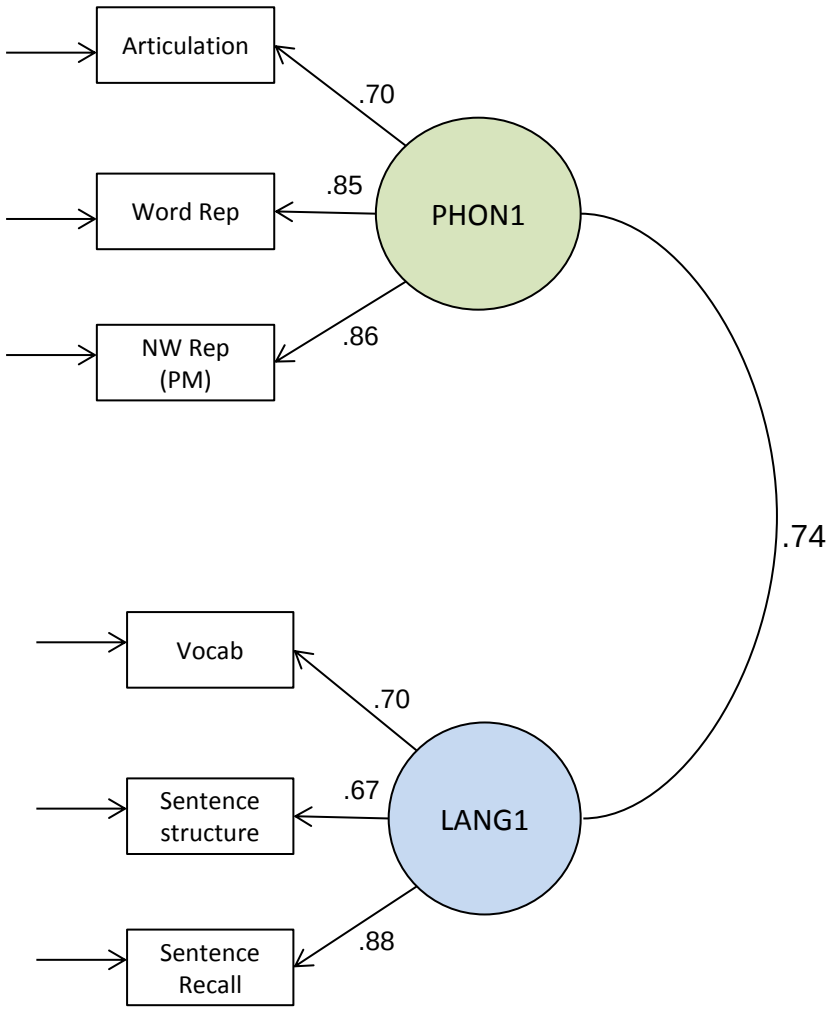
Q1: Can 'Phonology' be separated from 'Language'?

Phonology

- Articulation (pcc)
- Word repetition
- Nonword repetition (PM)

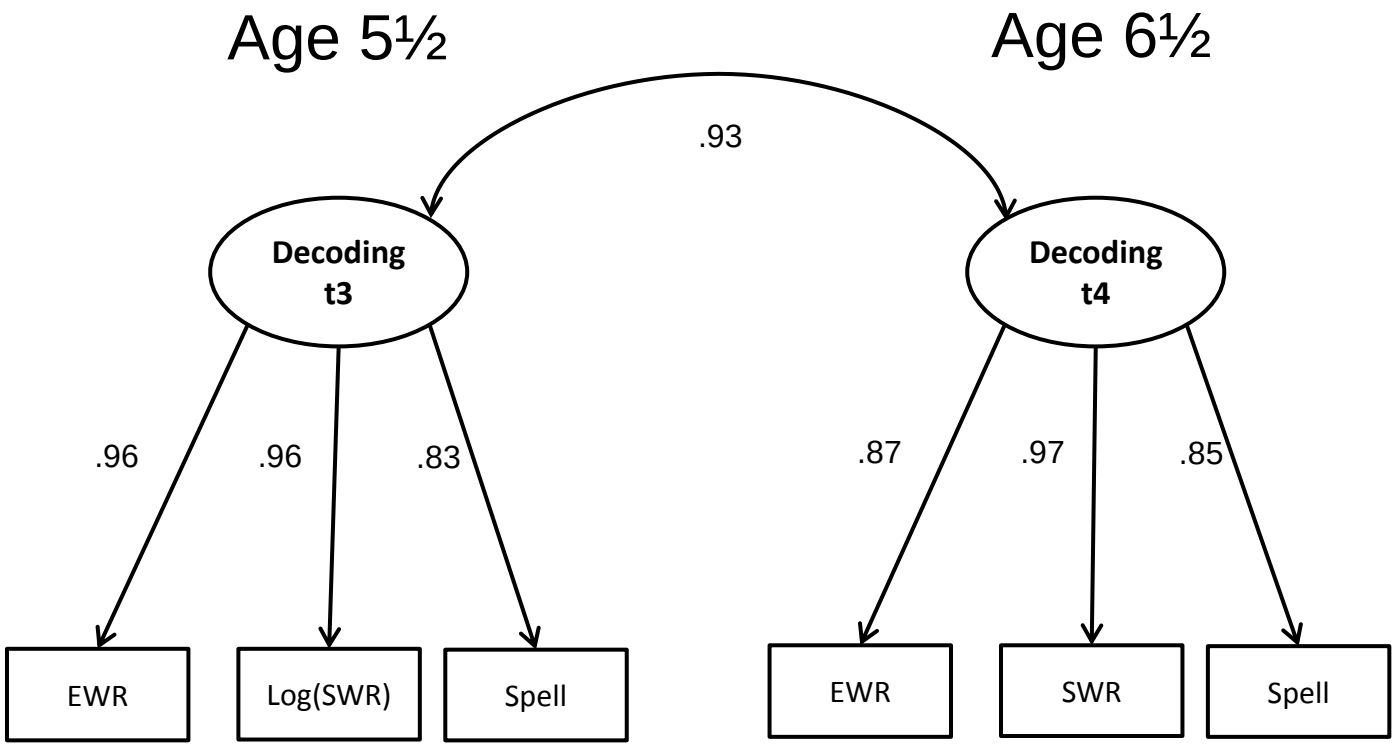
Language

- Vocabulary
- Grammar understanding
- Sentence recall

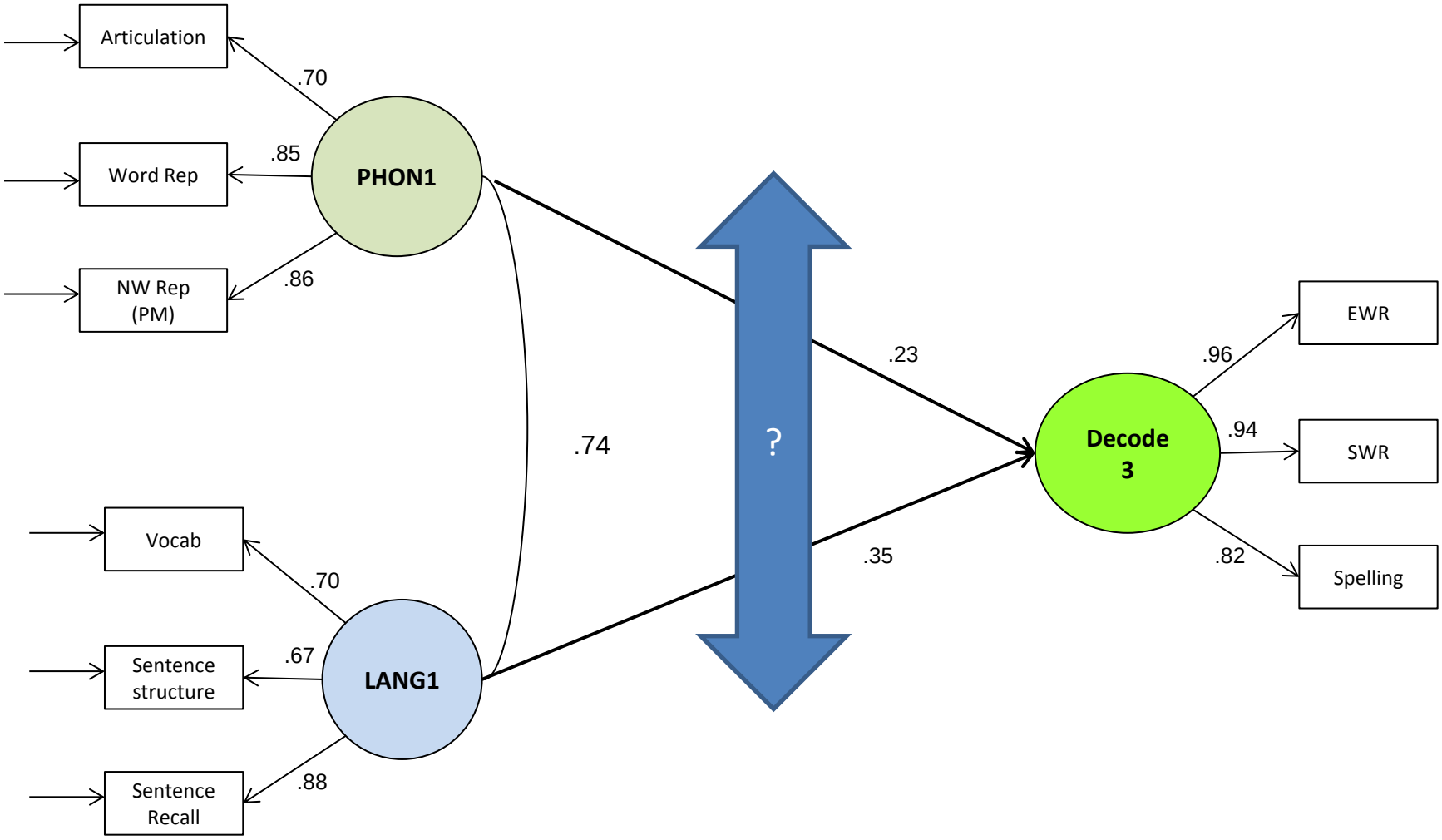


Chi2 (7) = 13.11,
p = 0.0695
RMSEA = 0.060 (0.000-0.109)

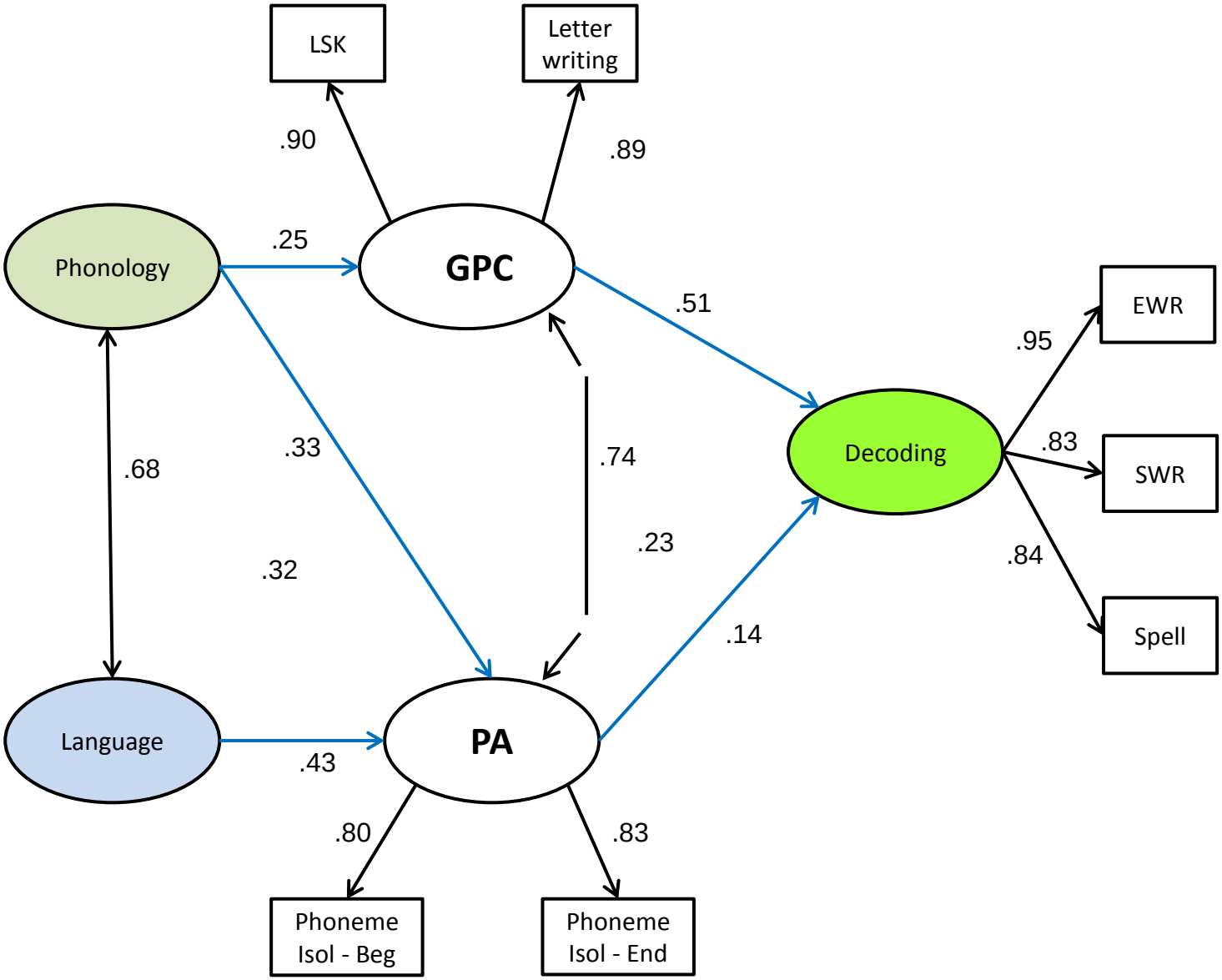
Q2: Is decoding a stable trait?



Q3: Do Phonology and Language in preschool predict decoding at school entry?

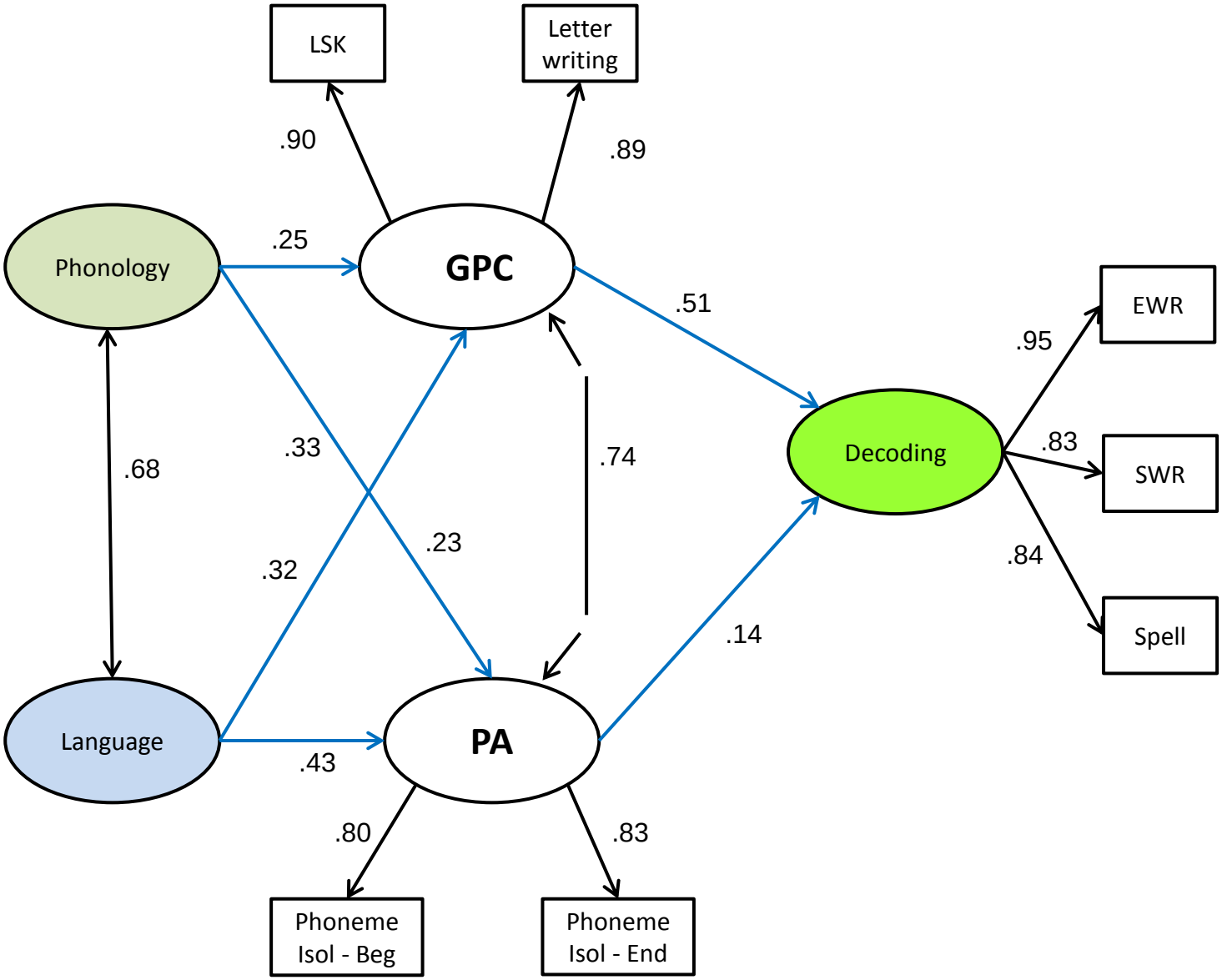


Q4: What is the impact of phonology on decoding?



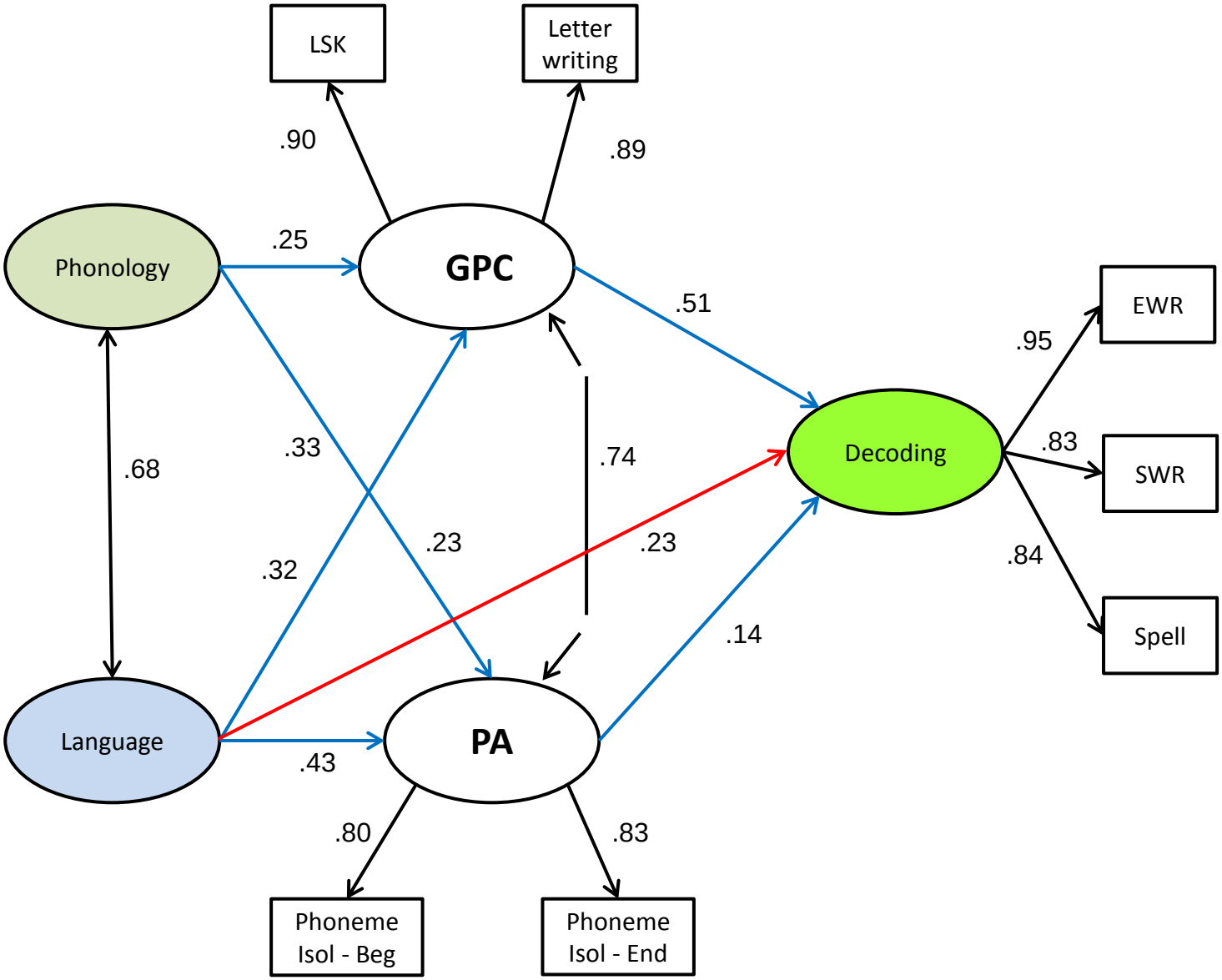
Age 3 ½ Age 4 ½ Age 5 ½

Q5: What is the impact of language on decoding?



Age 3 ½ Age 4 ½ Age 5 ½

Q6: Are there direct effect of phonology and language?



Age 3 ½ Age 4 ½ Age 5 ½

- The effect of phonology at t1 on individual differences in decoding/dyslexia is *fully mediated* by an effect of phoneme awareness (PA) and letter knowledge (GPC) at t2

- The effect of t1 language on decoding/dyslexia is *partially* mediated by PA and GPC but it also has a *direct effect* on decoding at t3

Dyslexia as a categorical disorder

"Co-occurring difficulties may be seen in aspects of *language*, motor co-ordination, *mental calculation*, concentration and personal organisation, but these are not, by themselves, markers of dyslexia"

Dyslexia

- Pattern of learning difficulties characterized by problems with accurate or fluent word recognition, poor decoding and poor spelling abilities
- Important to specify additional difficulties with reading comprehension or math reasoning

Language Disorder

- Persistent difficulties with the acquisition and use of language across modalities …due to deficits in comprehension or production that include:
  - Reduced vocabulary
  - Limited sentence structure (grammar/morphology)
  - Impairments in discourse (to explain/ describe a topic or have a conversation)

Classification at T5

- Research Criteria (DSM-V)
  - Dyslexia: …'poor decoding and poor spelling abilities'
    - -1.5SD below the mean of the TD group on a composite of word reading/spelling (SS <= 88)
  - LI: 'language abilities substantially and quantifiably below age expectation'
    - -1SD below age mean on 2/4 language tests (TROG; Formulated sentences; ROWPT; Exp vocab)

Outcomes by risk group 1

	Dyslexia	LI
Low risk (TD)	7%	4%
FR	26%	12%
LI	26%	63%
FRLI	40%	40%

Outcomes by risk group 2

	Dyslexia	LI
Low risk (TD)	7%	4%
FR	26%	12%
LI	26%	63%
FRLI	40%	40%

Outcomes by risk group 3

	Dyslexia	LI	Dyscalculia
Low risk (TD)	7%	4%	7%
FR	26%	12%	16%
LI	26%	63%	40%
FRLI	40%	40%	40%

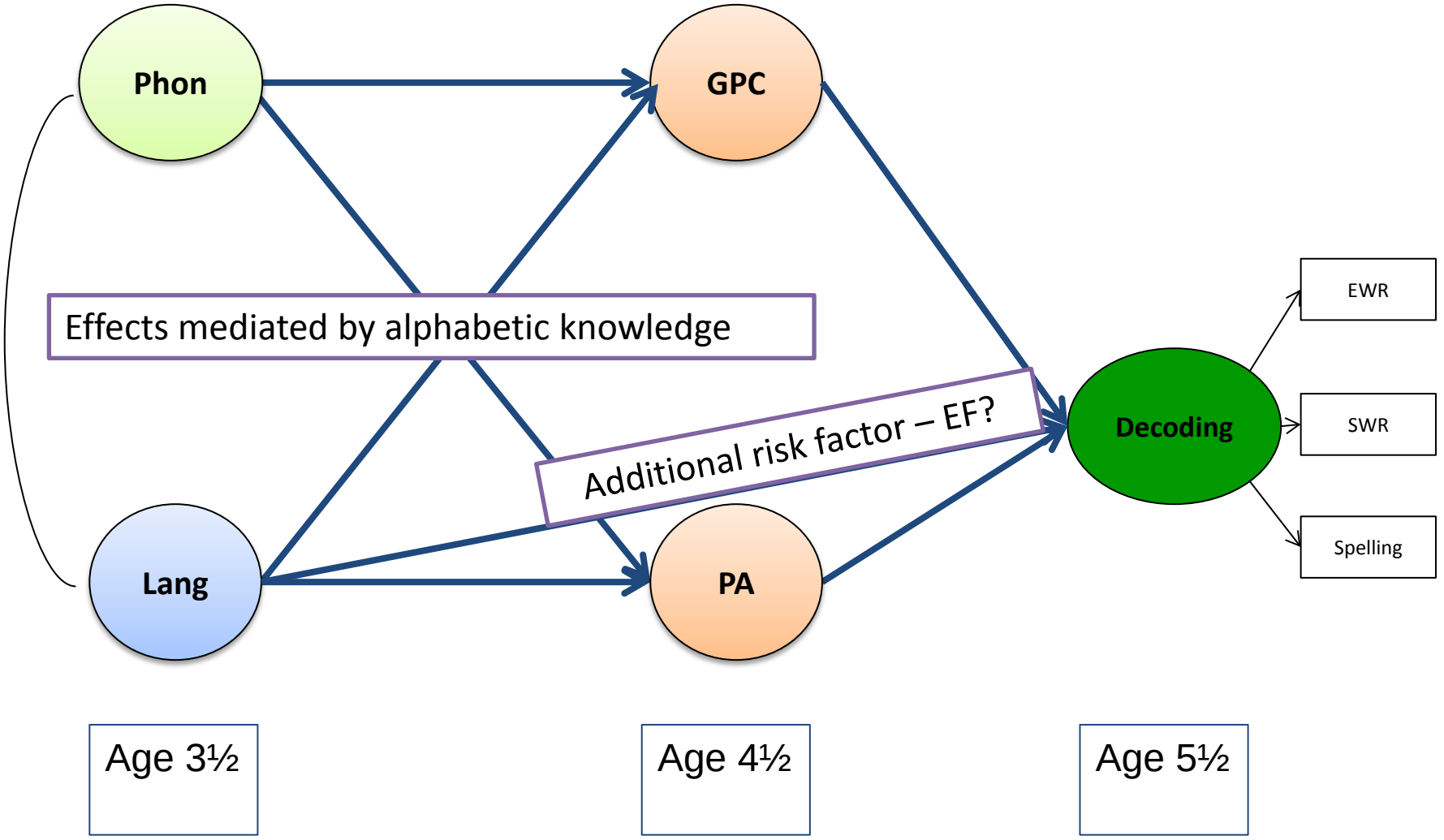
Dyscalculia
Difficulties mastering number sense, number facts or calculation
Difficulties with mathematical reasoning

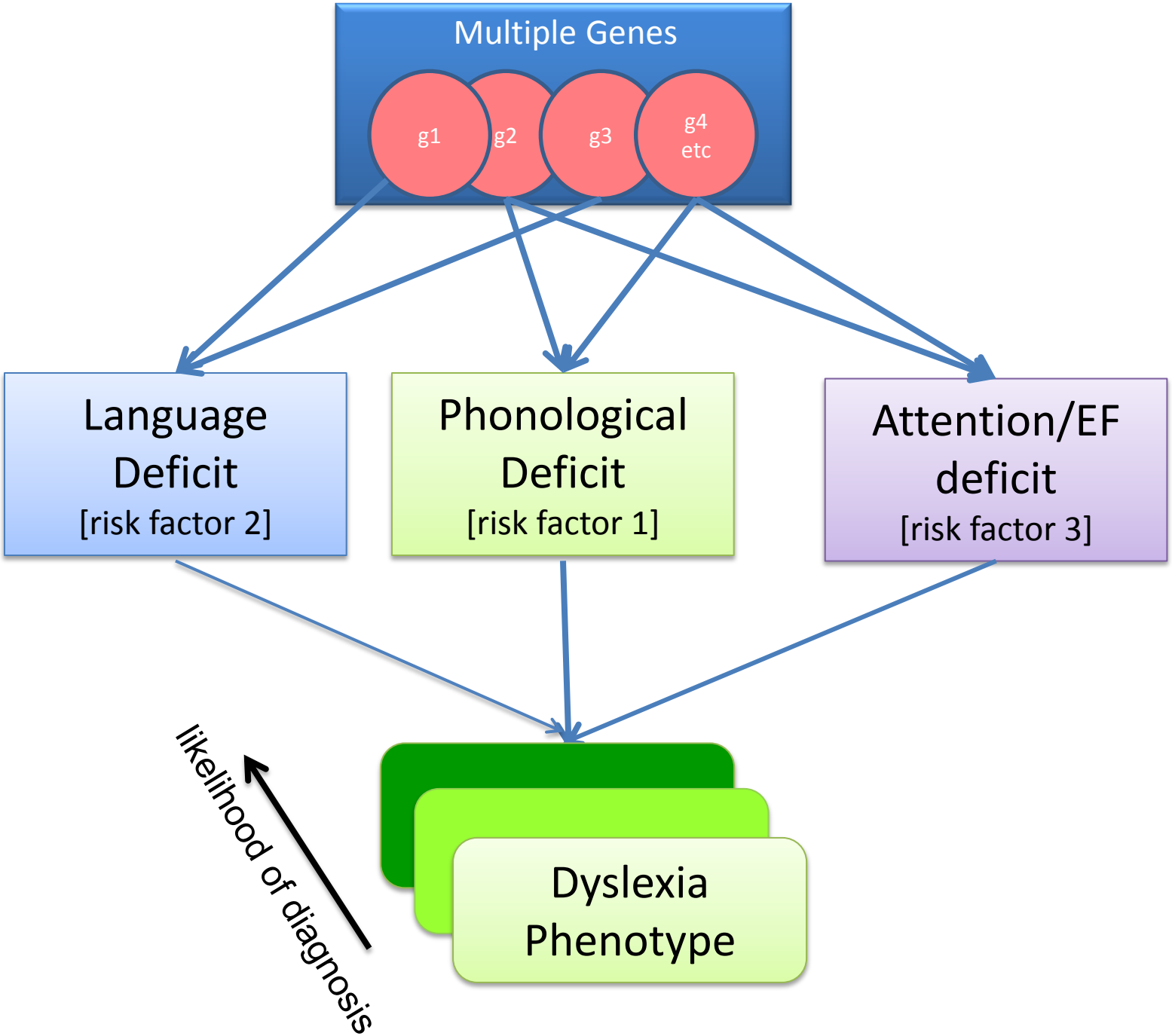
- Risk of dyslexia is approximately equal in those at FR (phonological language impairments) and in those with preschool LI (impairments in broader language)
- Co-morbid FR-LI carries much higher risk
- Being at 'FR of dyslexia' doubles risk of poor arithmetic (dyscalculia) but having a preschool LI -> 6 fold increased risk

A disorder on the language continuum

TOWARD A CAUSAL MODEL OF DYSLEXIA

Causal model




Multiple Genes
g1
g2
g3
g4
etc
Language Deficit
[risk factor 2]
Phonological Deficit
[risk factor 1]
Attention/EF deficit
[risk factor 3]
likelihood of diagnosis
Dyslexia Phenotype

Conclusions

- Dyslexia is a language learning impairment; some but not all children with dyslexia have co-occurring LI
- Phonological *and* broader language skills predict individual differences in word-level reading skills
- The risk of dyslexia (and dyscalculia) is elevated in children at family risk and children with preschool LI
  - FRLI carries higher risk of literacy problems

Dyslexia and SLI are related but distinct disorders which share risk factors (endophenotypes)

Credits!

Children, Families and Schools – thank you!

Wellcome Team

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- Emma Hayiou-Thomas
- Hannah Nash
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- Debbie Gooch
- Lorna Hamilton
- Ruth Leavett
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- Samantha Hardwick
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- Sarah Watson
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