The role of the Home Literacy Environment in the early literacy development of children at family-risk of dyslexia

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Language and Reading Project

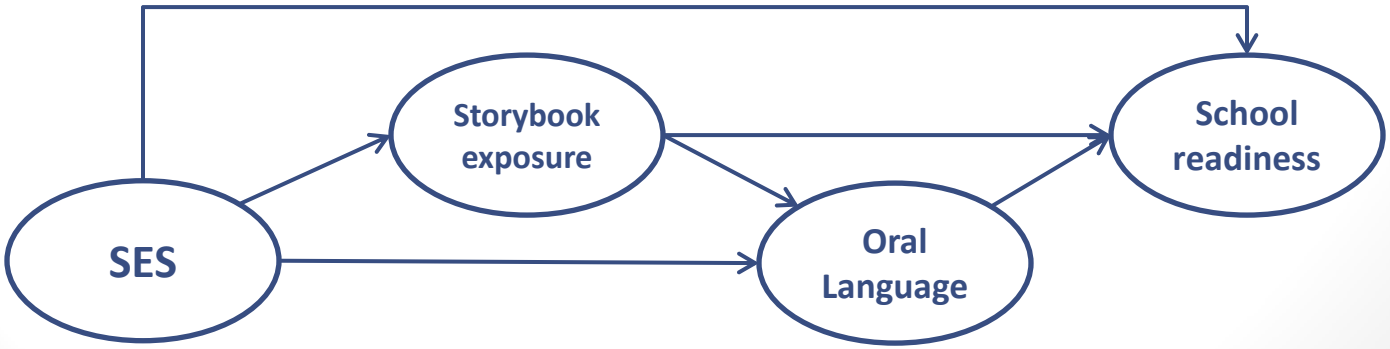
wellcome trust

Genetic and Environmental Influences in Reading Development

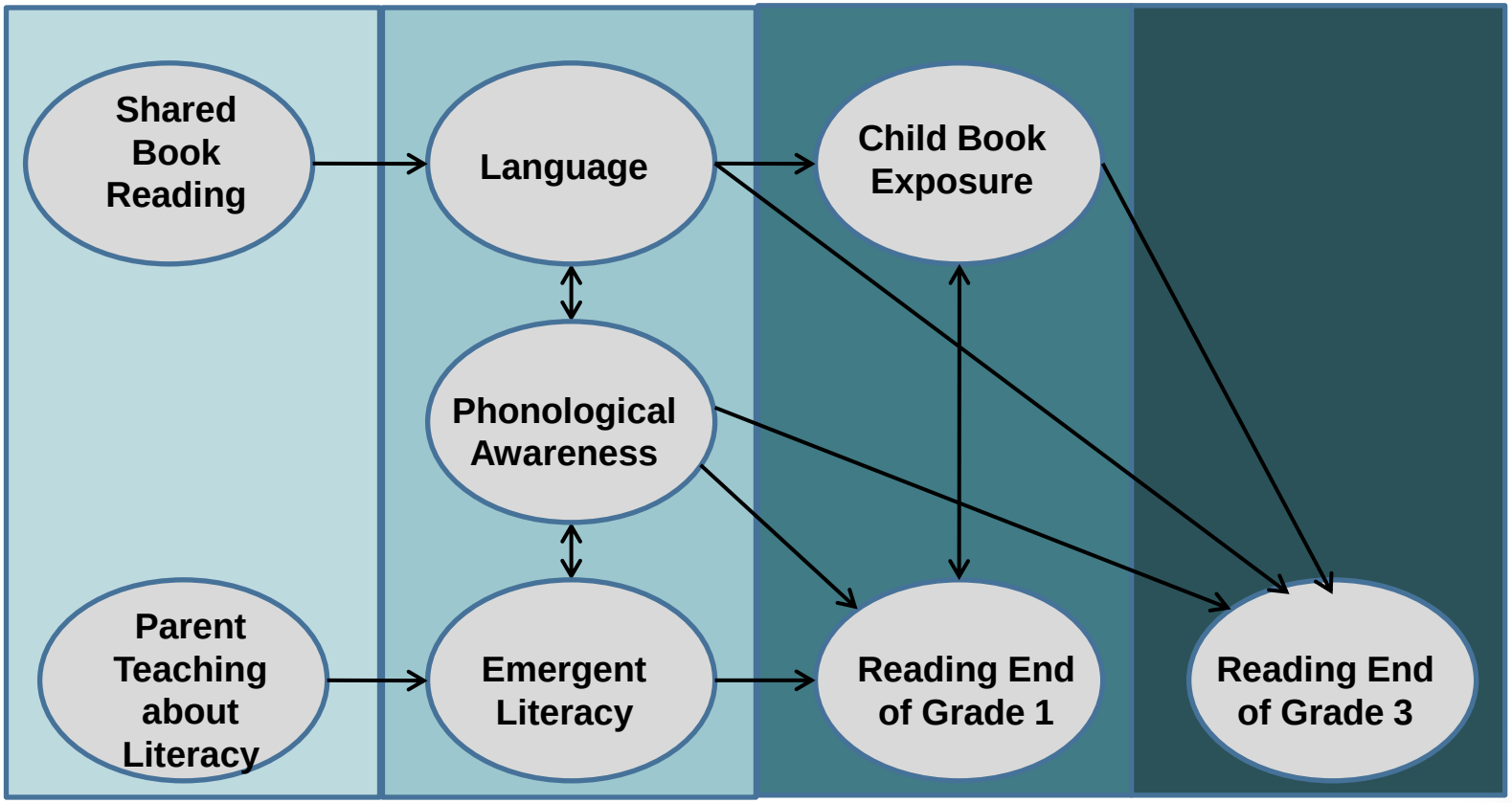
- Both decoding and reading comprehension skills are substantially heritable.
  - e.g. G2 decoding h^2=.78; word recognition h^2=.81; reading comprehension h^2=.61 (Olson et al., 2011).
- Shared environment exerts an important influence on emergent literacy and the skills which underpin it (Byrne et al., 2005; Samuelsson et al., 2005).
  - Vocabulary, print knowledge; more modest in phonological awareness.

The Home Literacy Environment

- Early storybook exposure in the home predicts oral language skills (Scarborough & Dobrich, 1994; Whitehurst et al., 1988).
- Parental teaching of orthographic forms predicts print knowledge (Martini & Sénéchal, 2011; Piasta et al., 2012).
- It is likely that much of the influence of early HLE on reading development operates through multiple indirect pathways.
  - Double mediation (Forget-Dubois et al., 2009).



Theoretical Framework (from Sénéchal & LeFevre, 2002)



The Wellcome Language & Reading Project

Sample

- 250 children tracked from age 3 to age 7
- Current analyses focus on children at family risk of dyslexia (FR; n=116) and controls (TD; n=72)

Research questions

- Does the HLE at age 4 predict pre-reading skills?
  - oral language, phonological awareness, orthographic knowledge
- Does the HLE at age 4 predict reading skills at age 6?
- Do HLE influences operate in the same way for children at developmental risk of reading difficulties as for TD children?

Measures

SES

- Maternal Education
- Maternal Occupation
- Paternal Education
- Paternal Occupation

Storybook Exposure (t2)

- Children's Title Checklist (CTC)
- Children's Author Checklist (CAC)

Direct Instruction (t2)

- Teaching Letters
- Teaching Reading
- Teaching Writing

T2 (age 4)

Receptive Language
ROWPVT; Sentence Structure (CELF)

Phoneme Awareness
Alliteration Matching; Phoneme Isolation

Print Knowledge
Letter-sound knowledge (YARC); Letter Writing

T3 (age 5)

Oral Language
Expressive Voc; Sentence Structure (CELF)

Phoneme Awareness
Phoneme Isolation; Phoneme Deletion (YARC)

Emergent Decoding
Early Word Reading; Single Word Reading (YARC)

T4 (age 6)

Decoding
EWR, SWR (YARC); GNWRT; Spelling

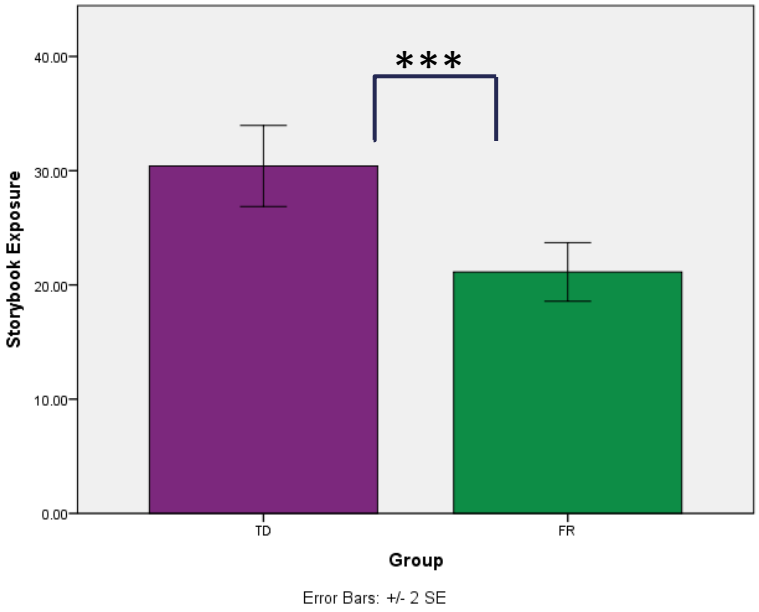
Reading Comprehension
Primary passage reading (YARC)

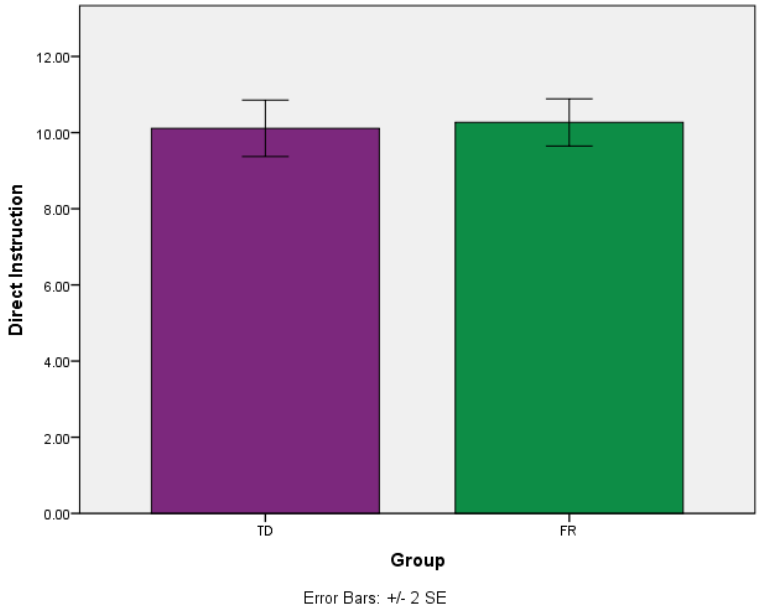
Participants

	FR	TD	Total
N	116	72	188
% boys	60%	50%	56%
Age at t2* (months)	57.01 (3.91)	55.78 (3.46)	56.53 (3.79)
NVIQ***	104.16 (17.05)	116.75 (17.30)	108.98 (18.32)
Maternal Education***	Vocational qualification	Degree	Vocational qualification

**p<.05; ***p<.001*

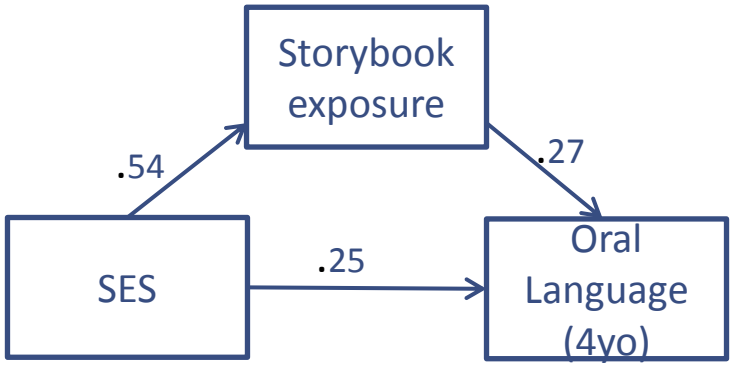
HLE at age 4





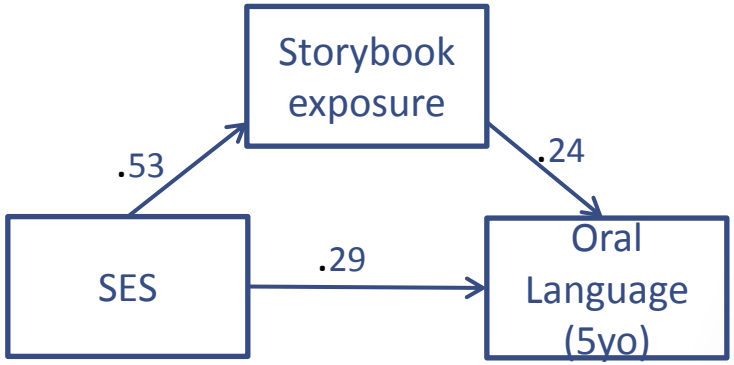
- TD group significantly higher storybook exposure scores.
- No group differences in direct instruction of print forms.

SES, HLE and oral language



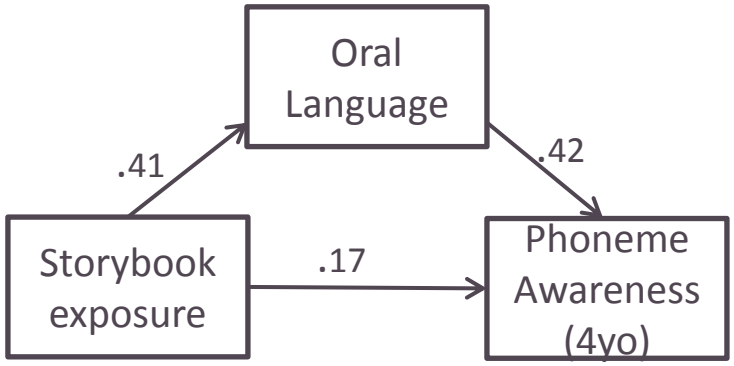
Concurrent relationships
Partial mediation in both groups
(Sobel's t= 3.40, p<.001)

Longitudinal relationships
Partial mediation in both groups
(Sobel's t= 2.92, p<.001)



Storybook exposure in the home partially mediates the association between socio-economic status and oral language for both FR and TD children.

Storybook exposure and phoneme awareness



Concurrent relationships

Complete mediation in FR group

(Sobel's *t*= 2.53, *p*=.006)

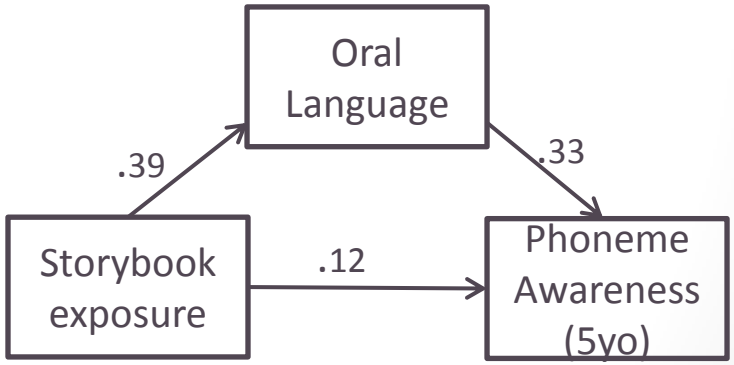
Direct effect only in TD group

Longitudinal relationships

Partial mediation in FR group

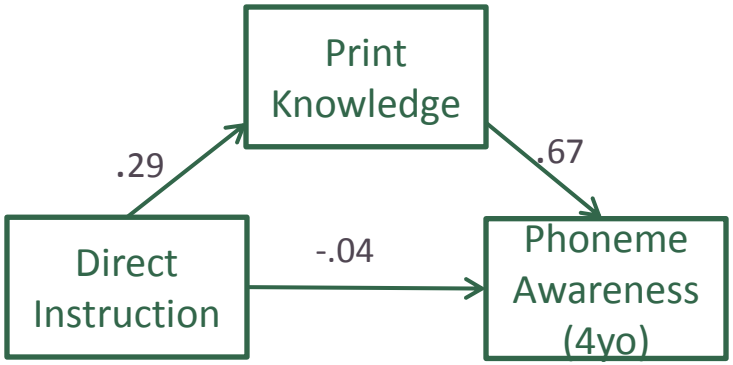
(Sobel's *t*= 2.53, *p*=.006)

No longer any relationship in TD group



Storybook exposure in the home predicts phoneme awareness concurrently for TD children; relationship emerges one year later for FR children.

Direct instruction and phoneme awareness



Concurrent relationships

Complete mediation in both groups

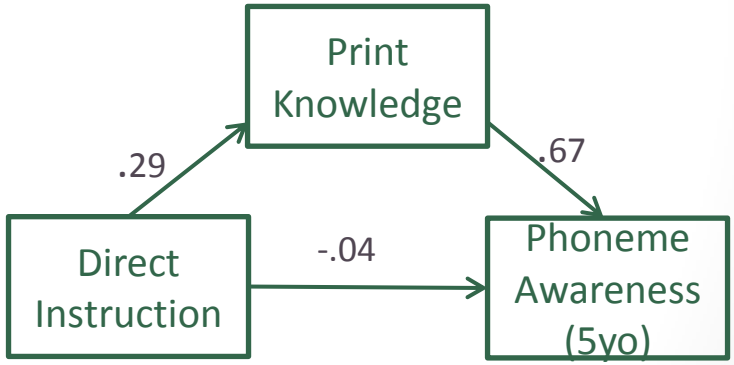
(Sobel's t= 3.75, p<.001)

Longitudinal relationships

Complete mediation in FR group

(Sobel's t= 2.04, p=.020)

No longer an effect in TD group

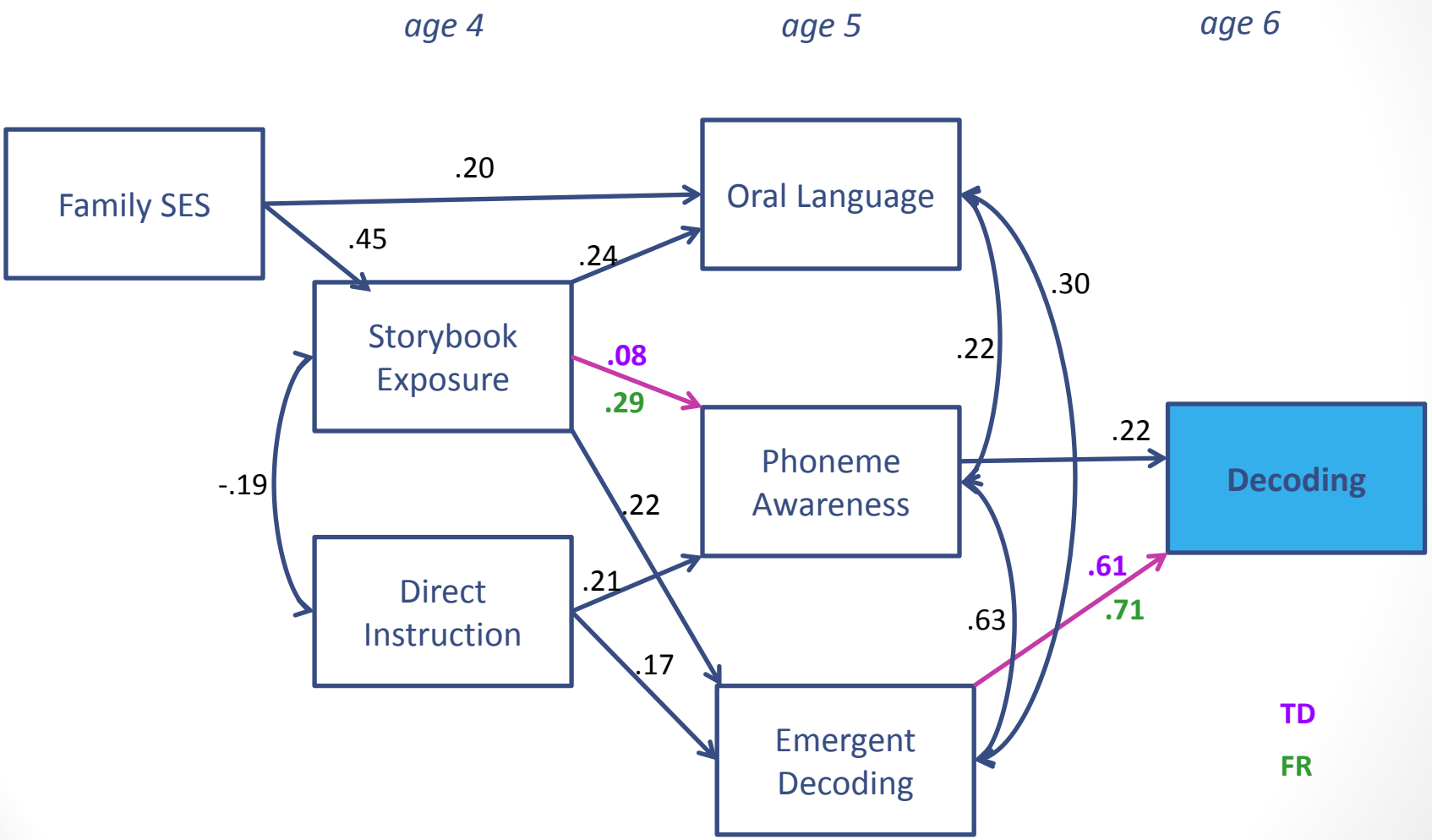


Direct instruction of orthographic forms in the home influences phoneme awareness indirectly via letter knowledge, for both FR and TD children.

Interim Summary

- FR children are of lower family SES and receive lower storybook exposure scores than TD children.
- No group difference in amount of teaching of print forms by parents in FR and TD groups.
- Storybook exposure partially mediates the effect of family SES on oral language skills.
- Storybook exposure is also associated with phoneme awareness (not predicted by Home Literacy Model).
- Direct instruction predicts early print knowledge; relationship with phoneme awareness completely mediated by print knowledge (in line with Home Literacy Model).

HLE as a predictor of decoding

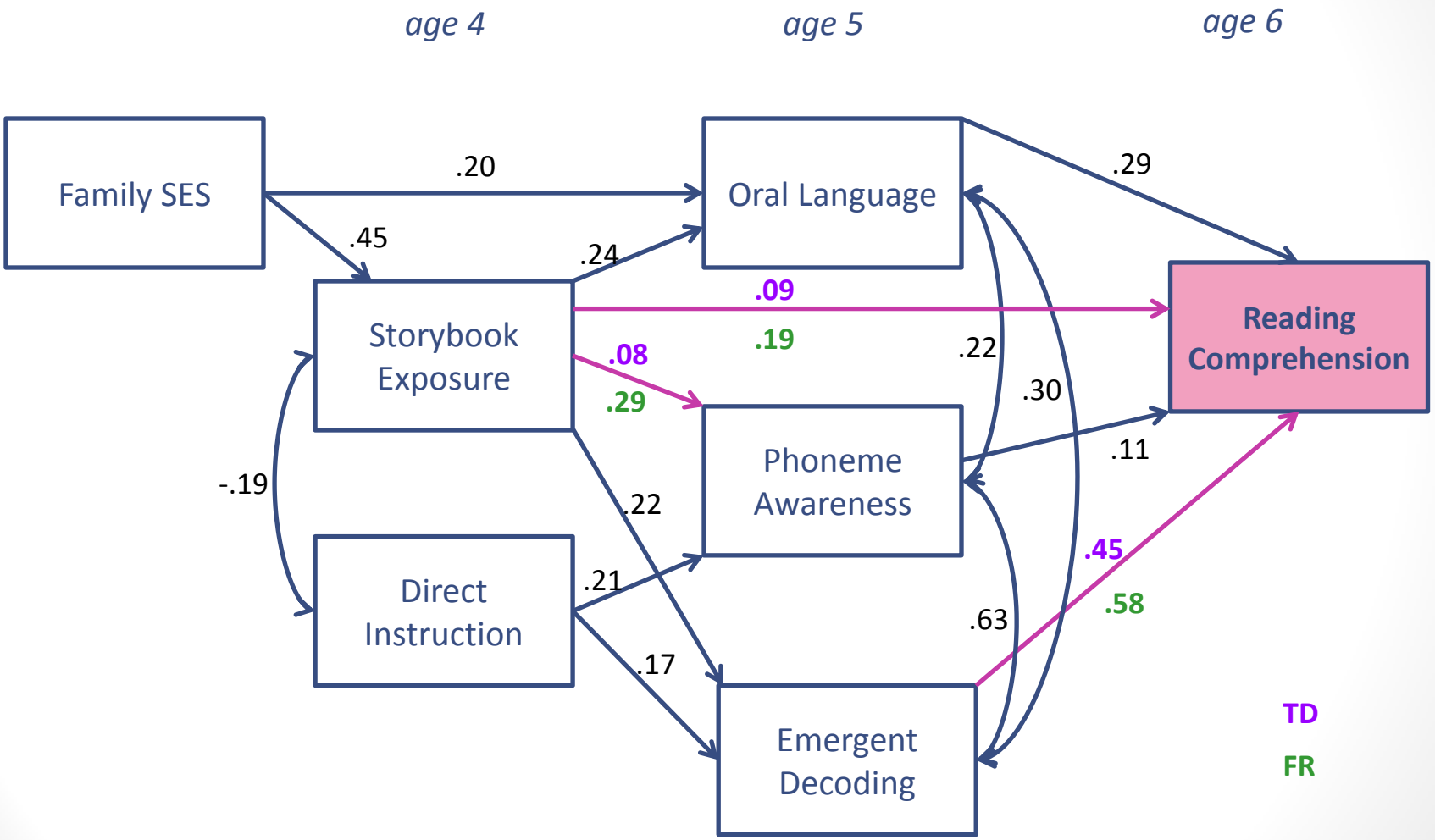


χ^2 (25) = 33.29, p=.124; CFI = .98; RMSEA = .06 (.00-.11)

Pathways to decoding

- In both FR and TD groups:
  - Storybook exposure predicts decoding via emergent decoding;
  - Direct instruction predicts decoding via emergent decoding;
  - Direct instruction predicts decoding via phoneme awareness.
- For FR children only:
  - **Storybook exposure predicts decoding via phoneme awareness.**
- **No direct effects of SES on decoding; indirect effects via storybook exposure.**

HLE as a predictor of reading comprehension



χ^2 (21) = 29.89, p=.094; CFI = .98; RMSEA = .06 (.00-.12)

Pathways to reading comprehension

- In both FR and TD groups:
  - SES predicts reading comprehension via storybook exposure and oral language.
  - Storybook exposure predicts reading comprehension via oral language and emergent decoding.
  - Direct instruction predicts reading comprehension via emergent decoding.
- For FR children only:
  - **Storybook exposure shows an additional direct effects on reading comprehension, after controlling oral language**.
- **No direct effects of SES on reading comprehension; indirect pathways via storybook exposure and oral language.**

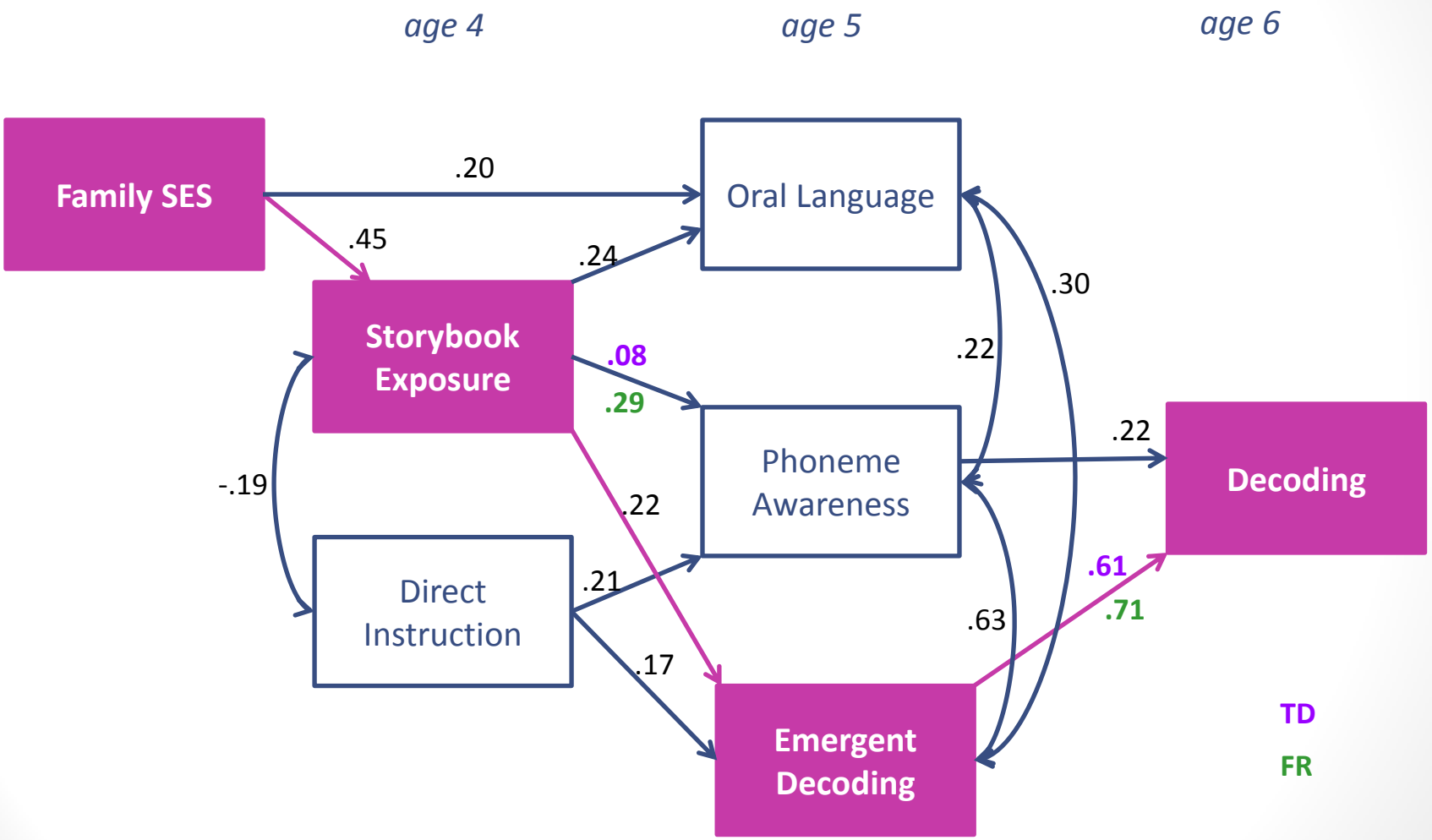
Conclusions

- HLE measured at age 4 shows multiple indirect effects on decoding and reading comprehension at age 6.
- All of the effects of family SES on reading outcomes are explained by the HLE and children's oral language skills.
- Early literacy interactions in the home may be particularly important in the reading development children at risk of dyslexia.

Thank you …

- to the Wellcome Team:
  - Maggie Snowling, Charles Hulme, Emma Hayiou-Thomas, Hannah Nash, Debbie Gooch, Fiona Duff, Ruth Leavett, Katy Grainger, Sam Hardwick, Isobel Chadwick
- to the Wellcome children and families
- to you for listening.

Pathways to Decoding



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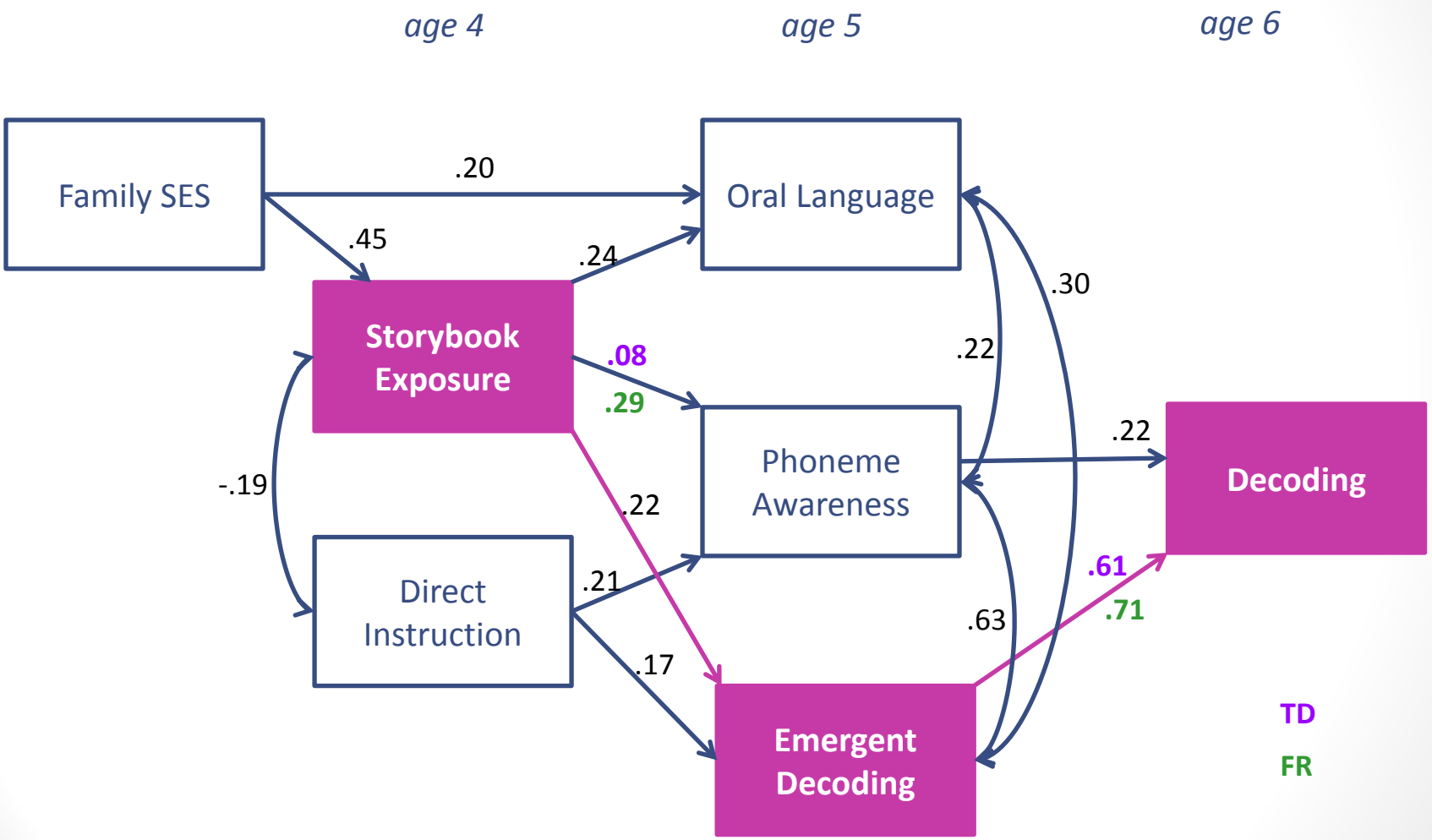

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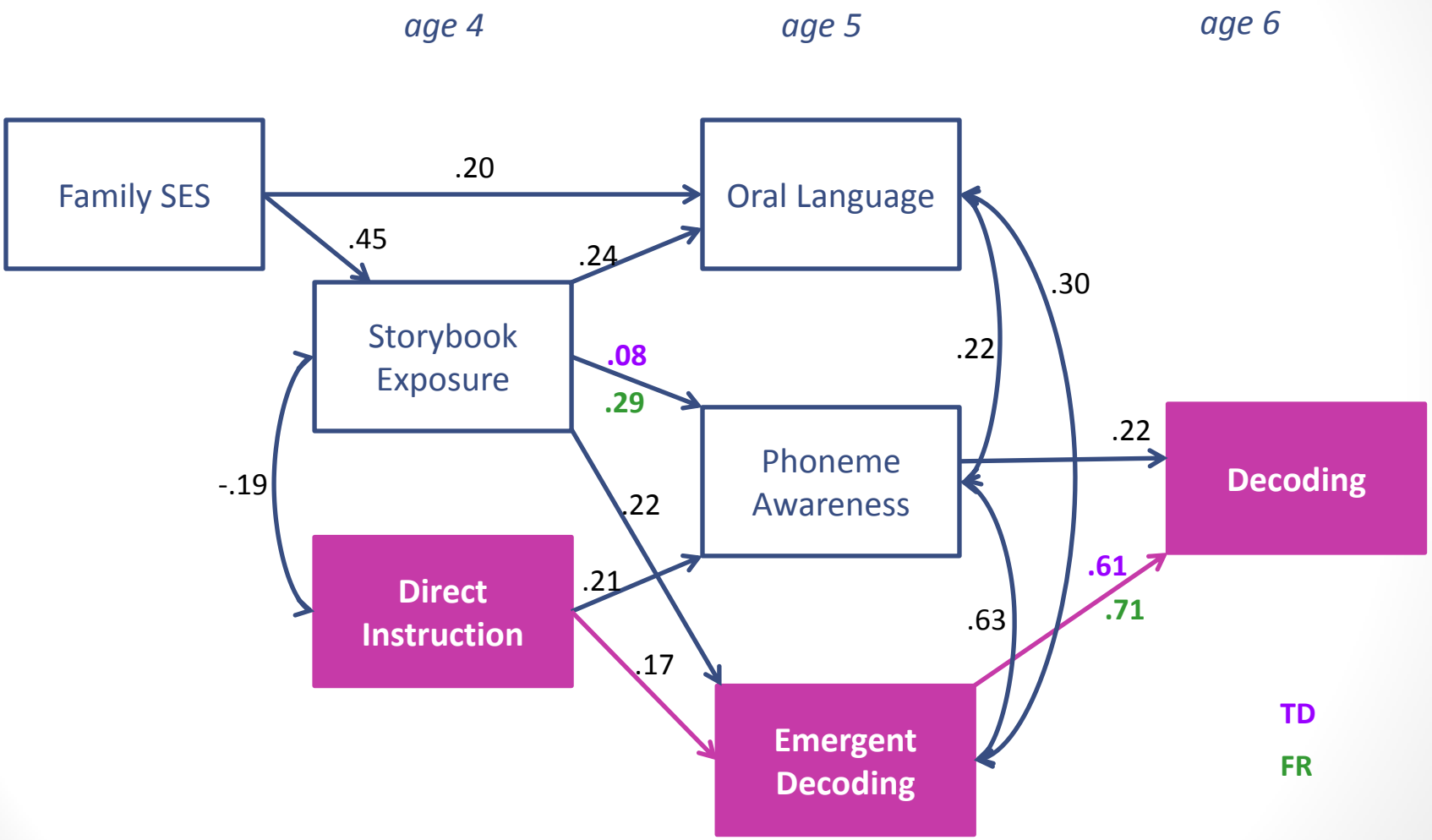

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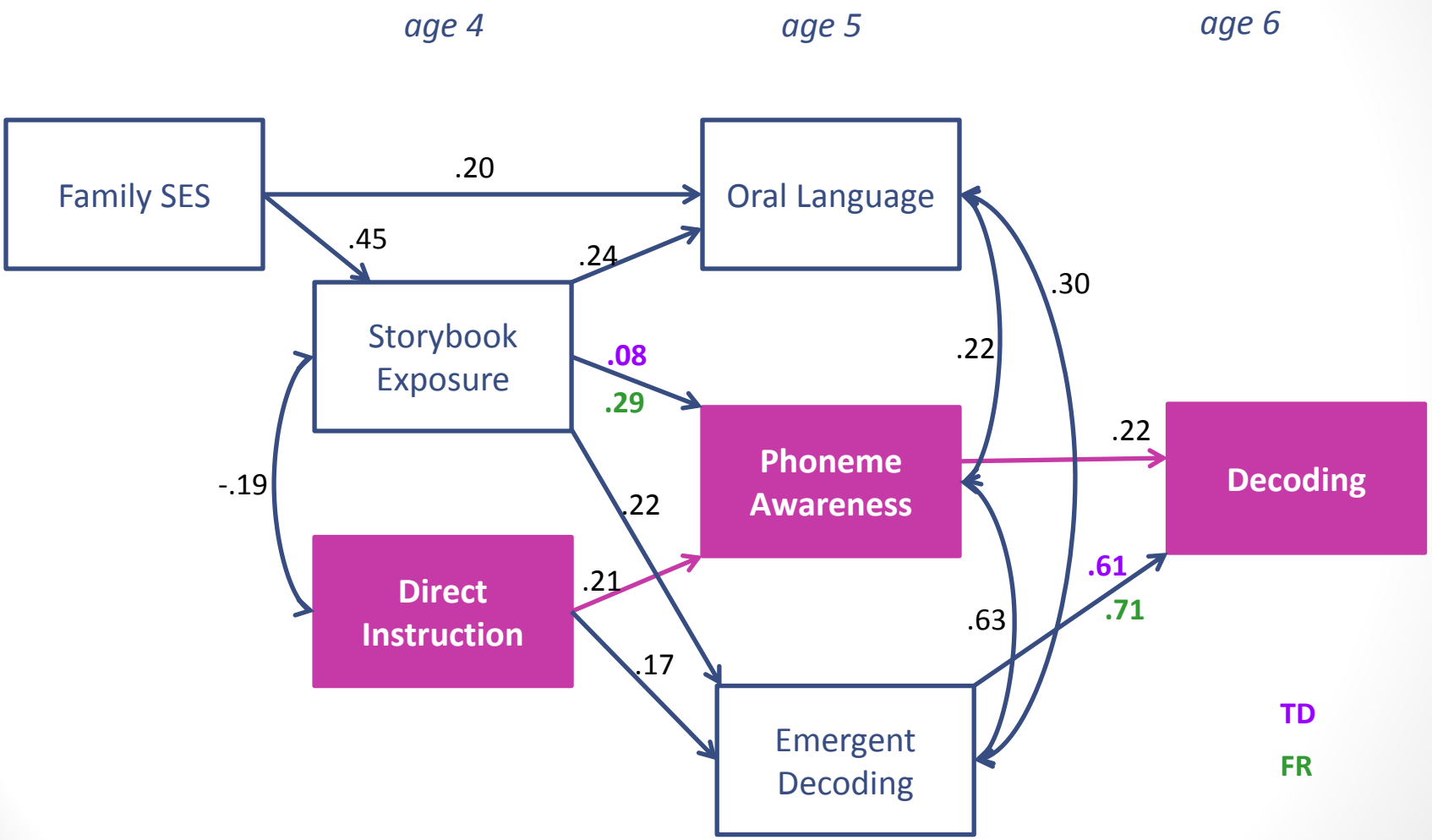

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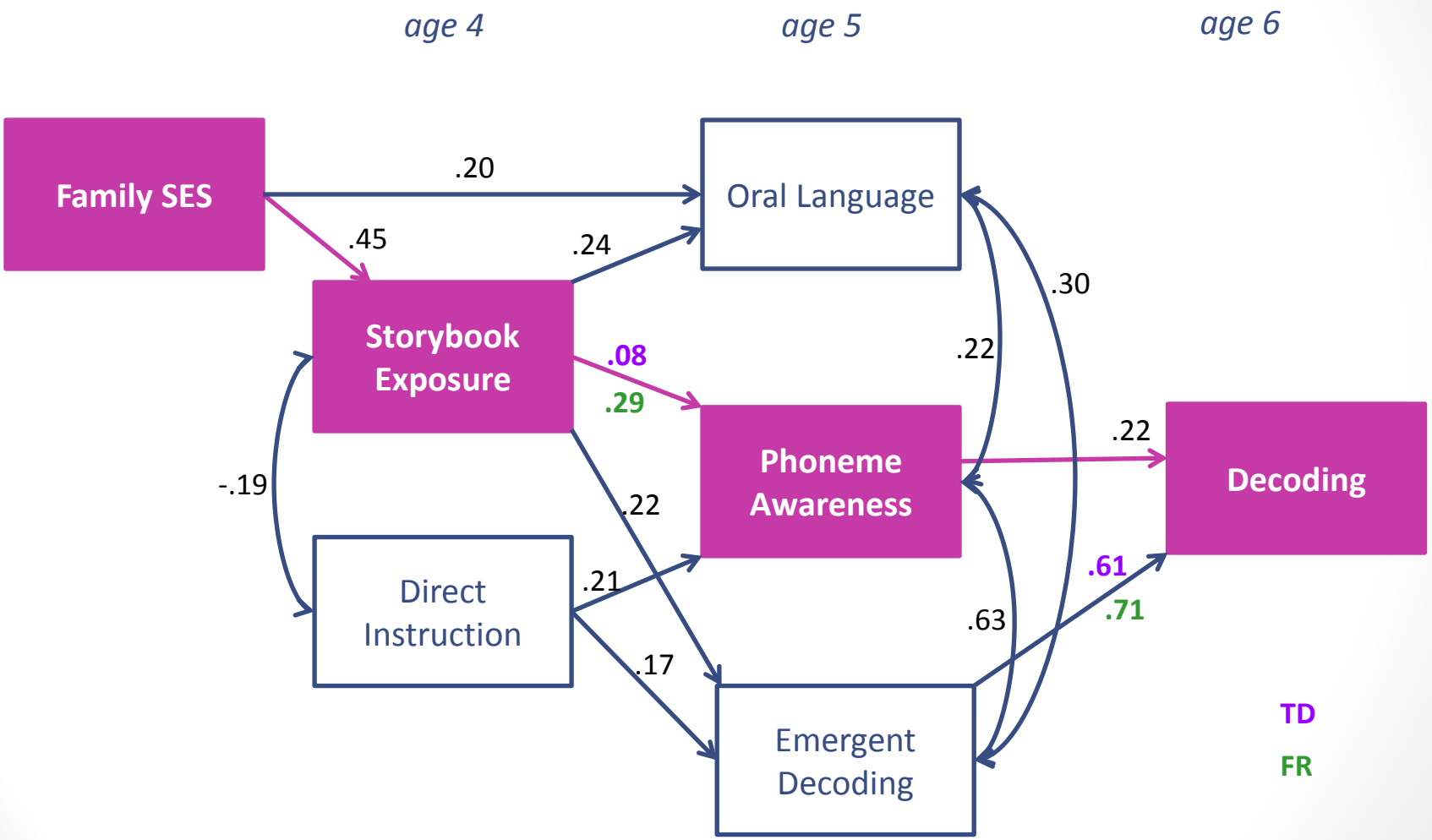
Pathways to Decoding: FR only



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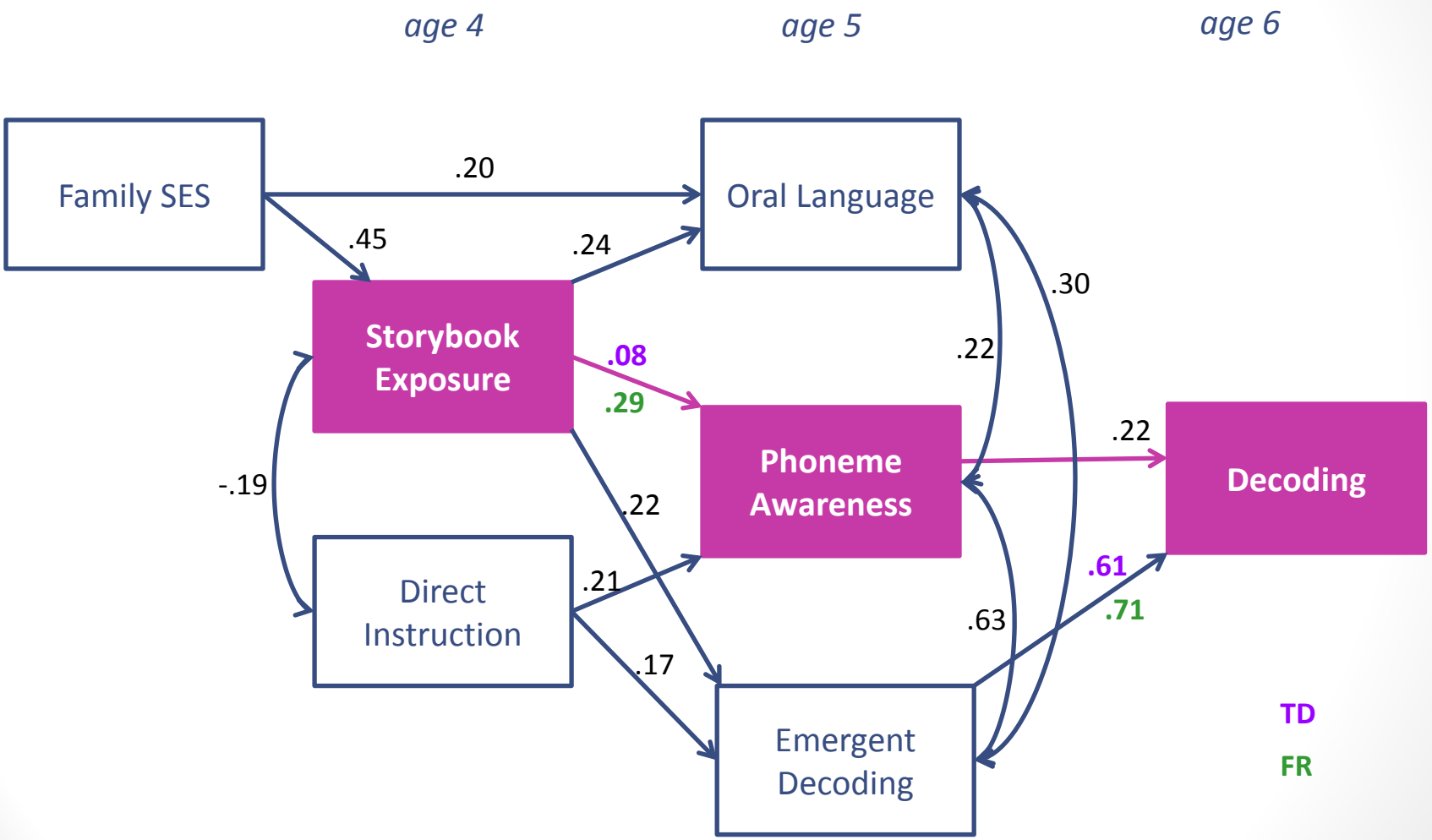

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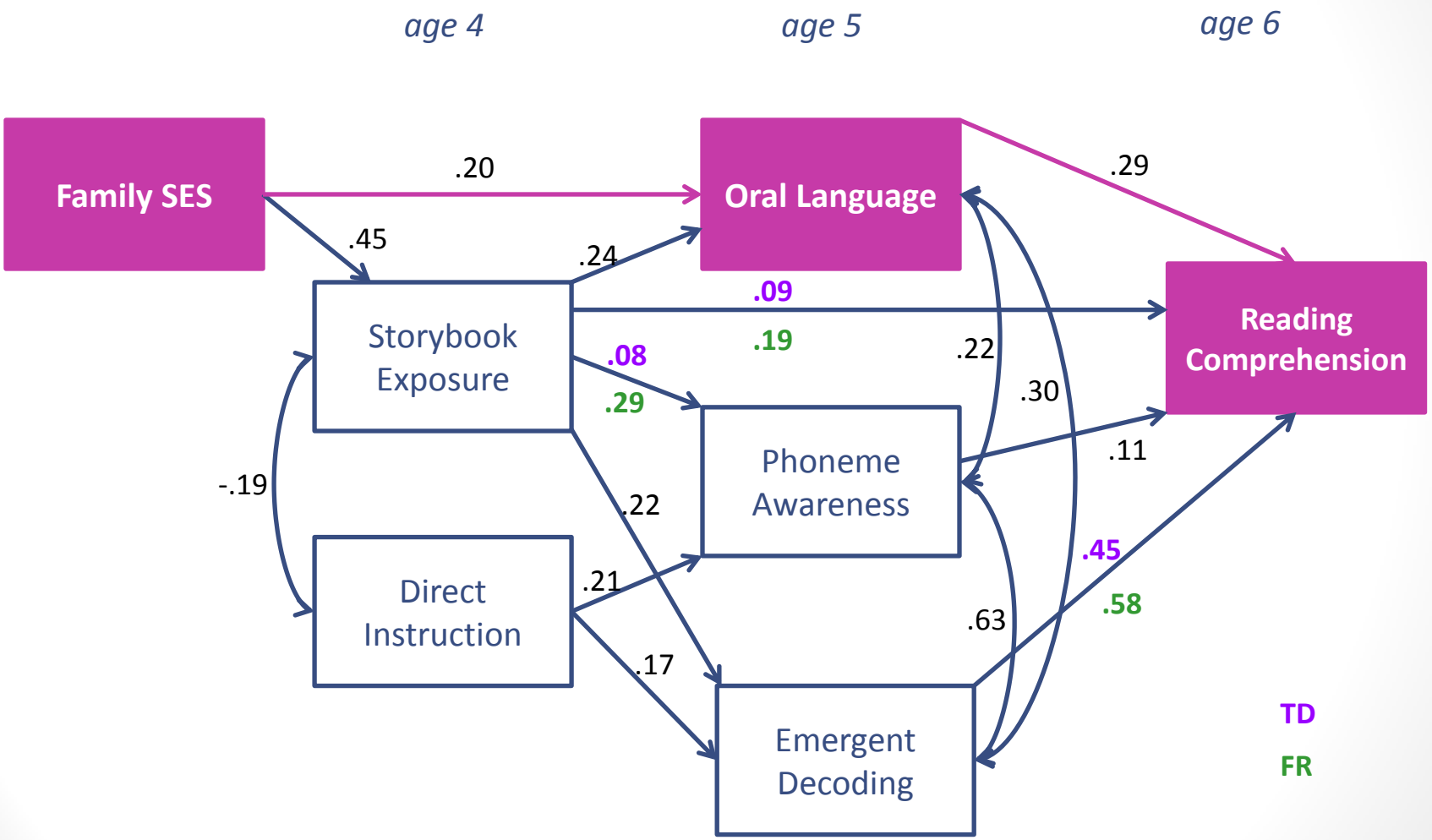
Pathways to Comprehension



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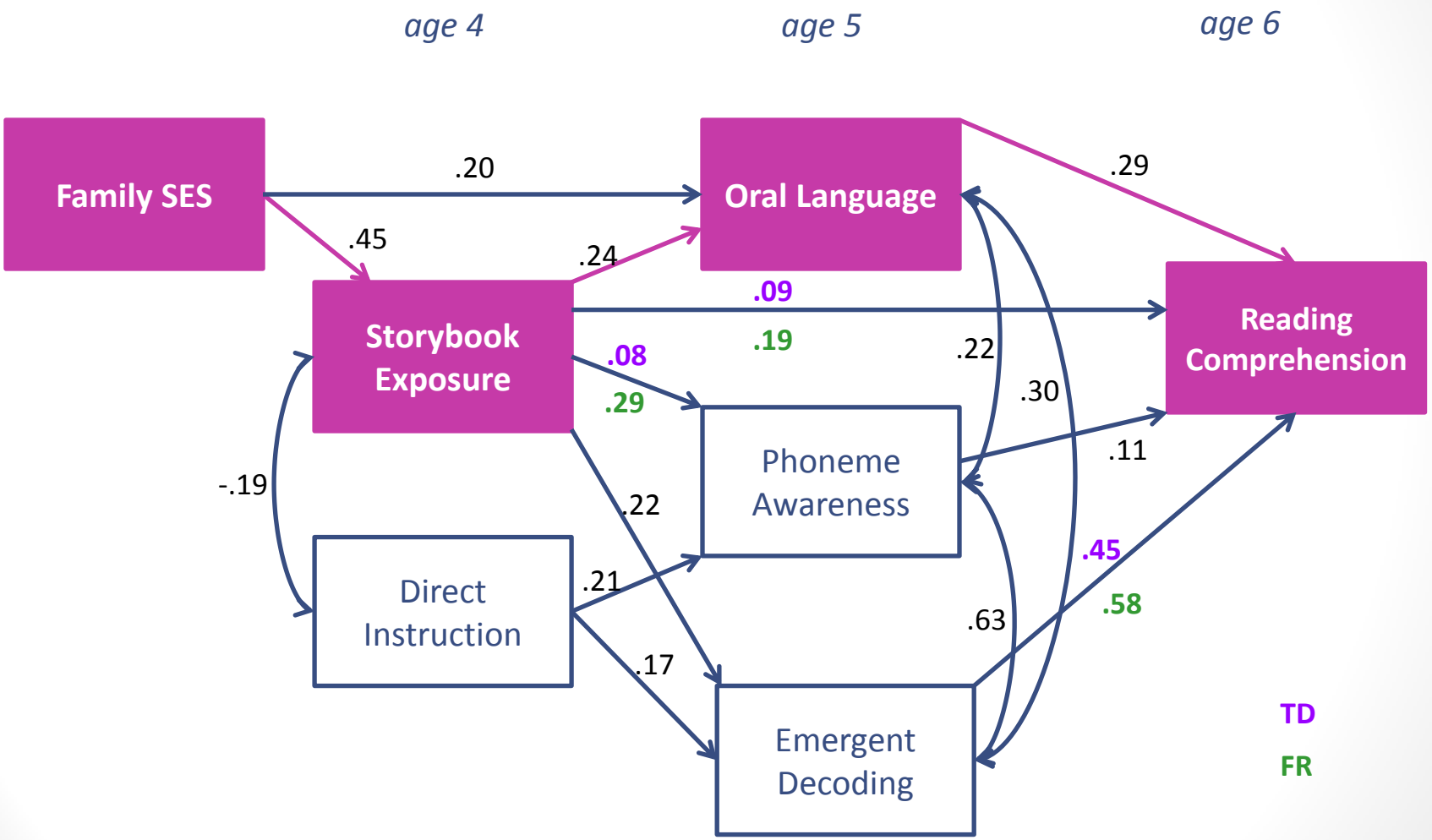
Pathways to Comprehension



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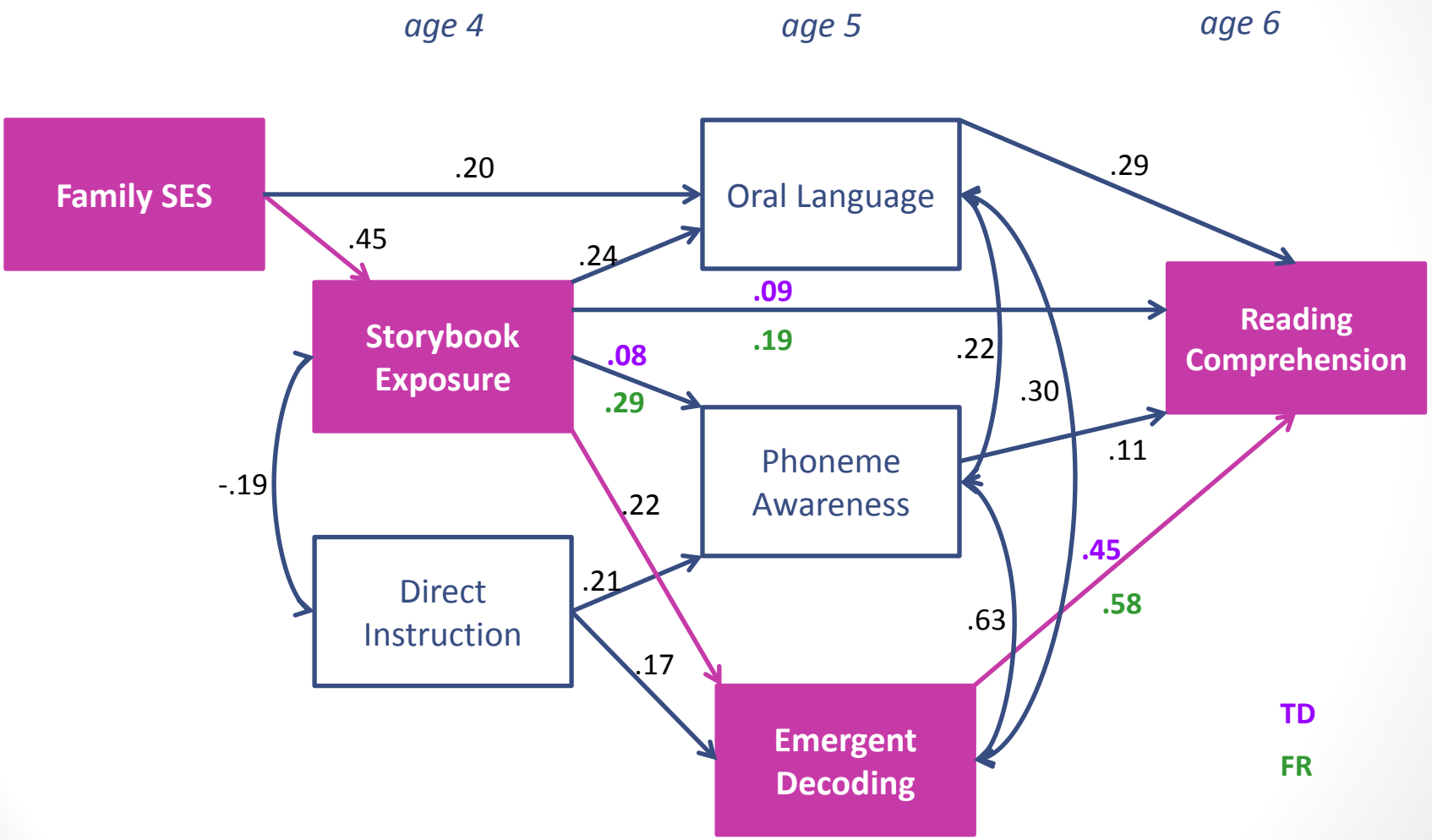

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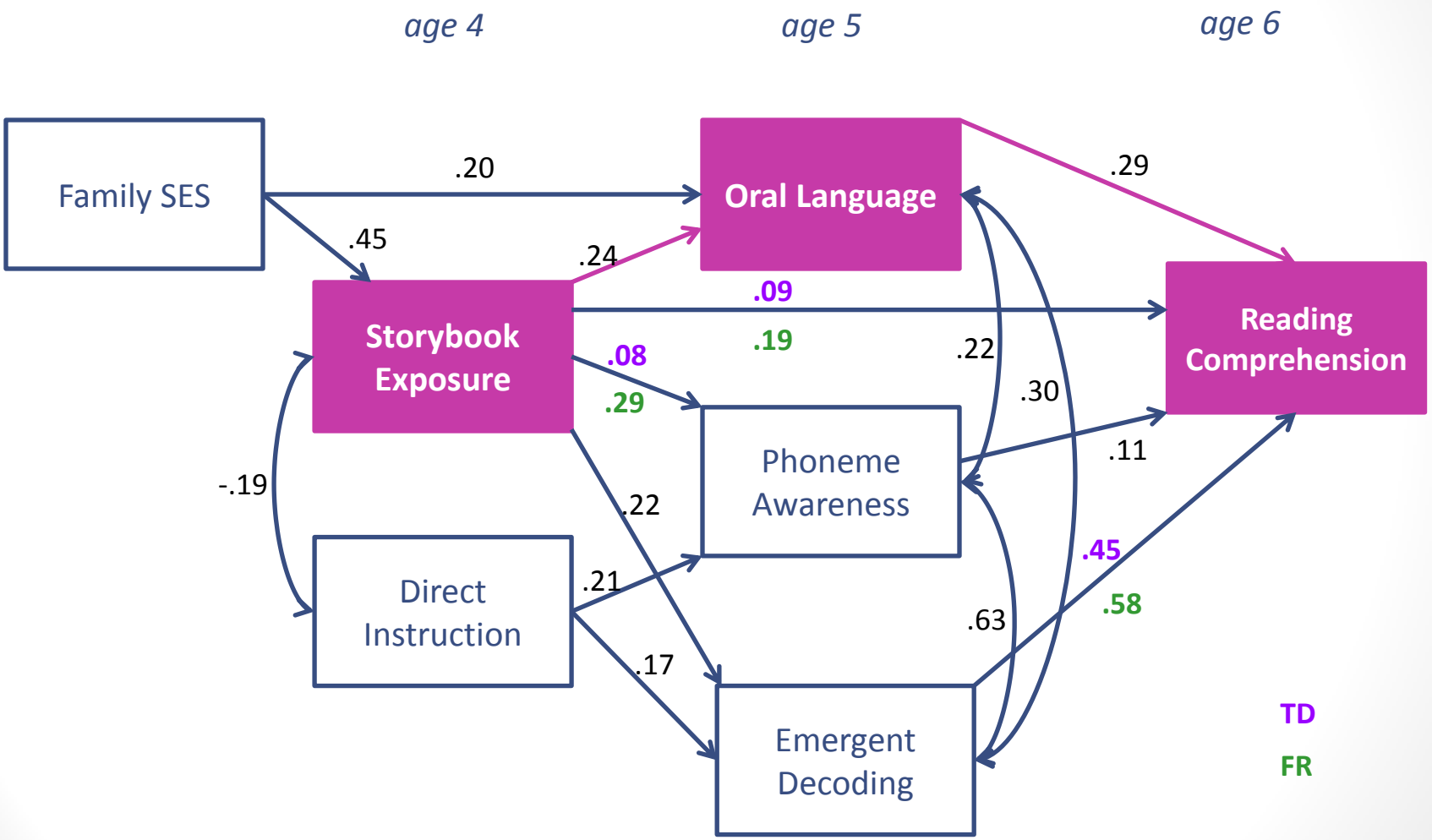

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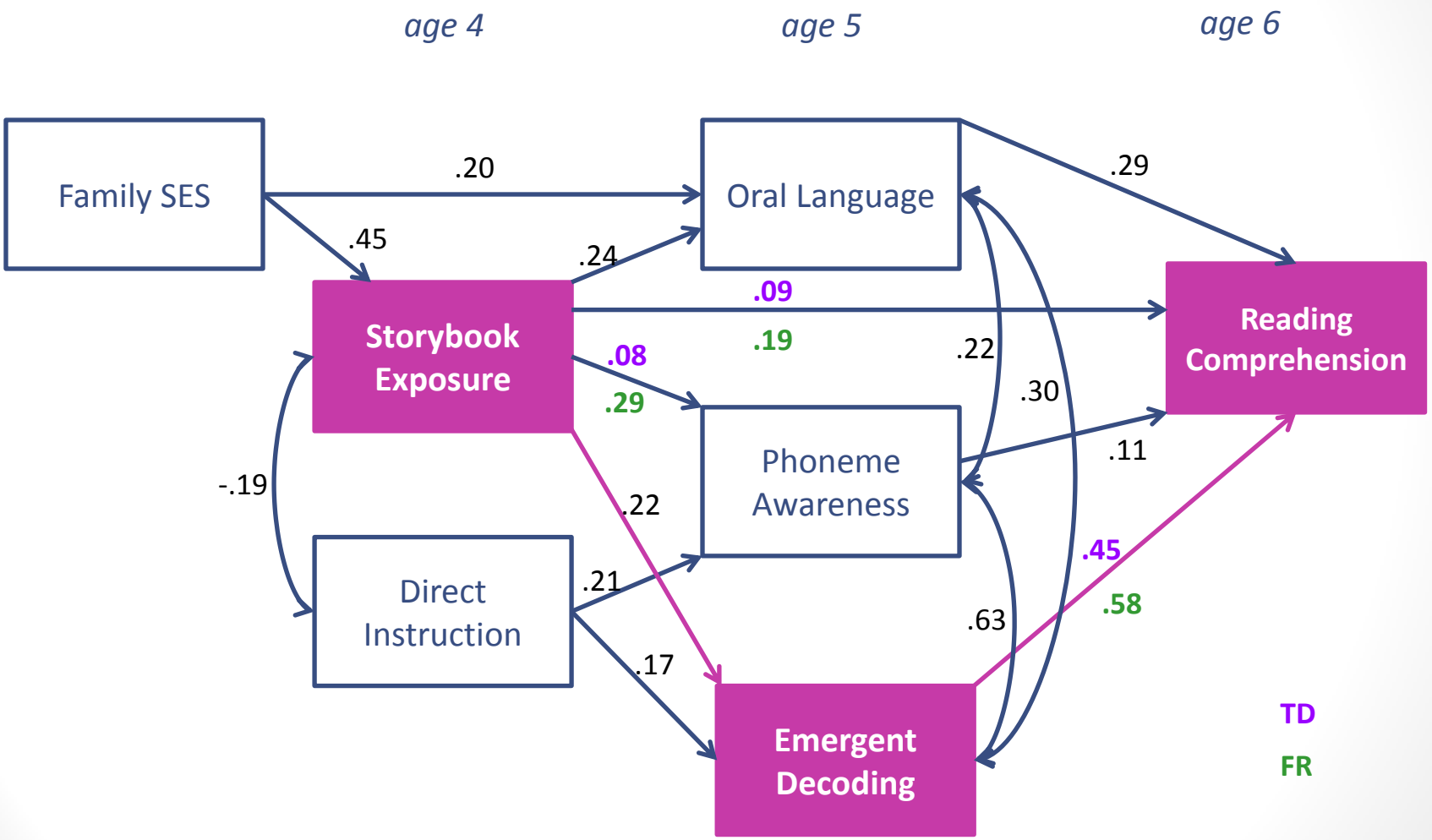

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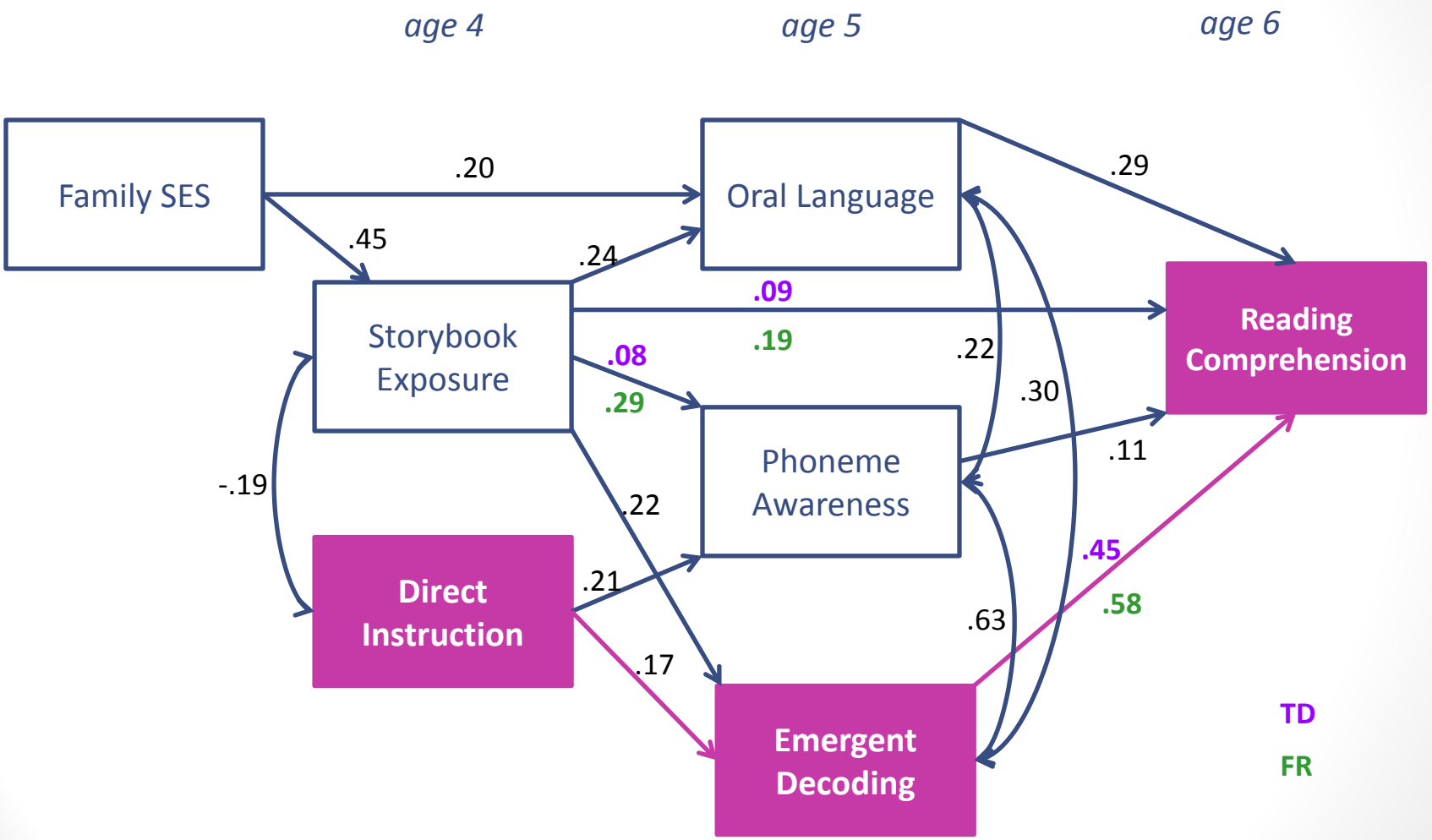

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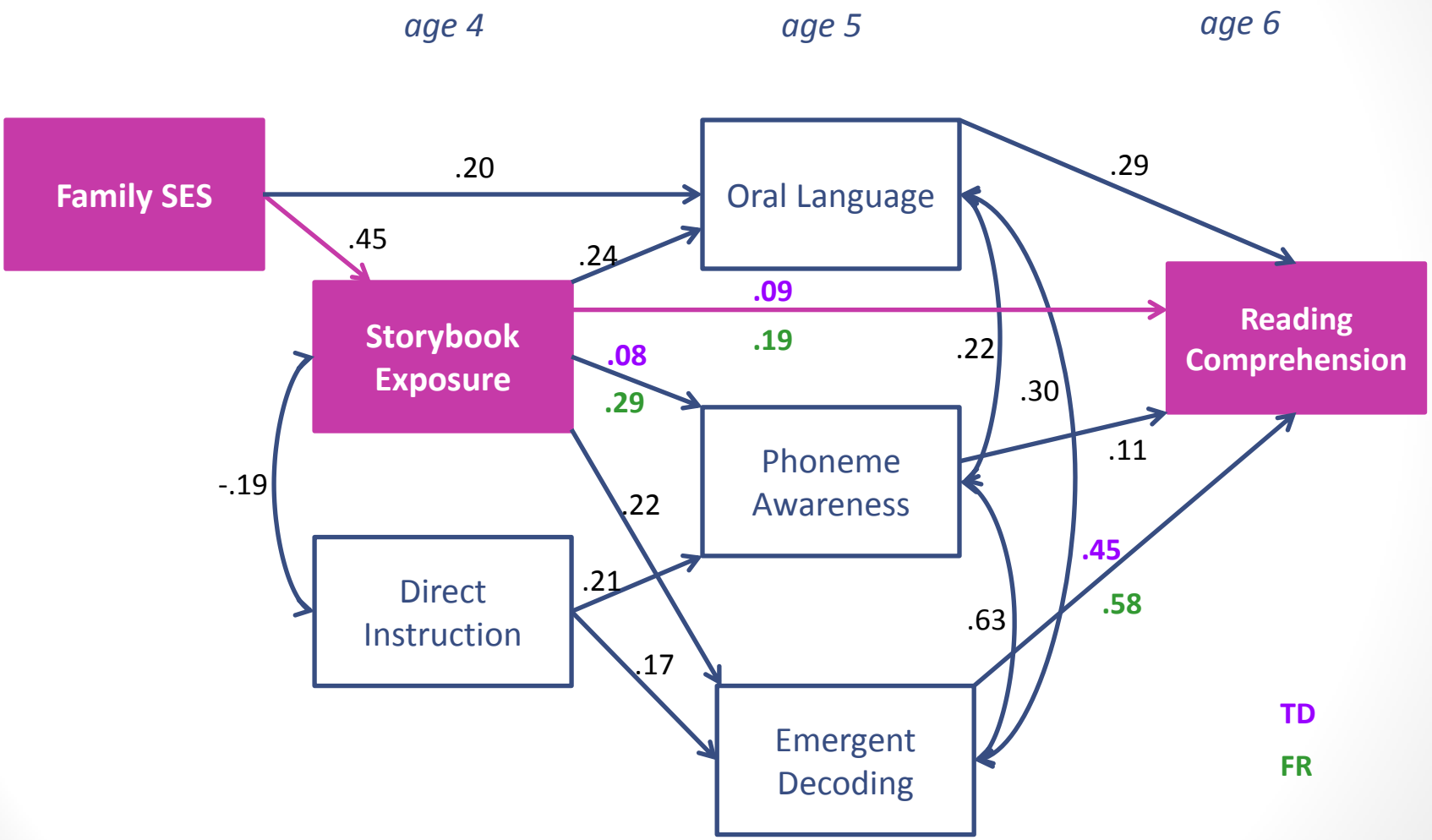
Pathways to Comprehension: FR only



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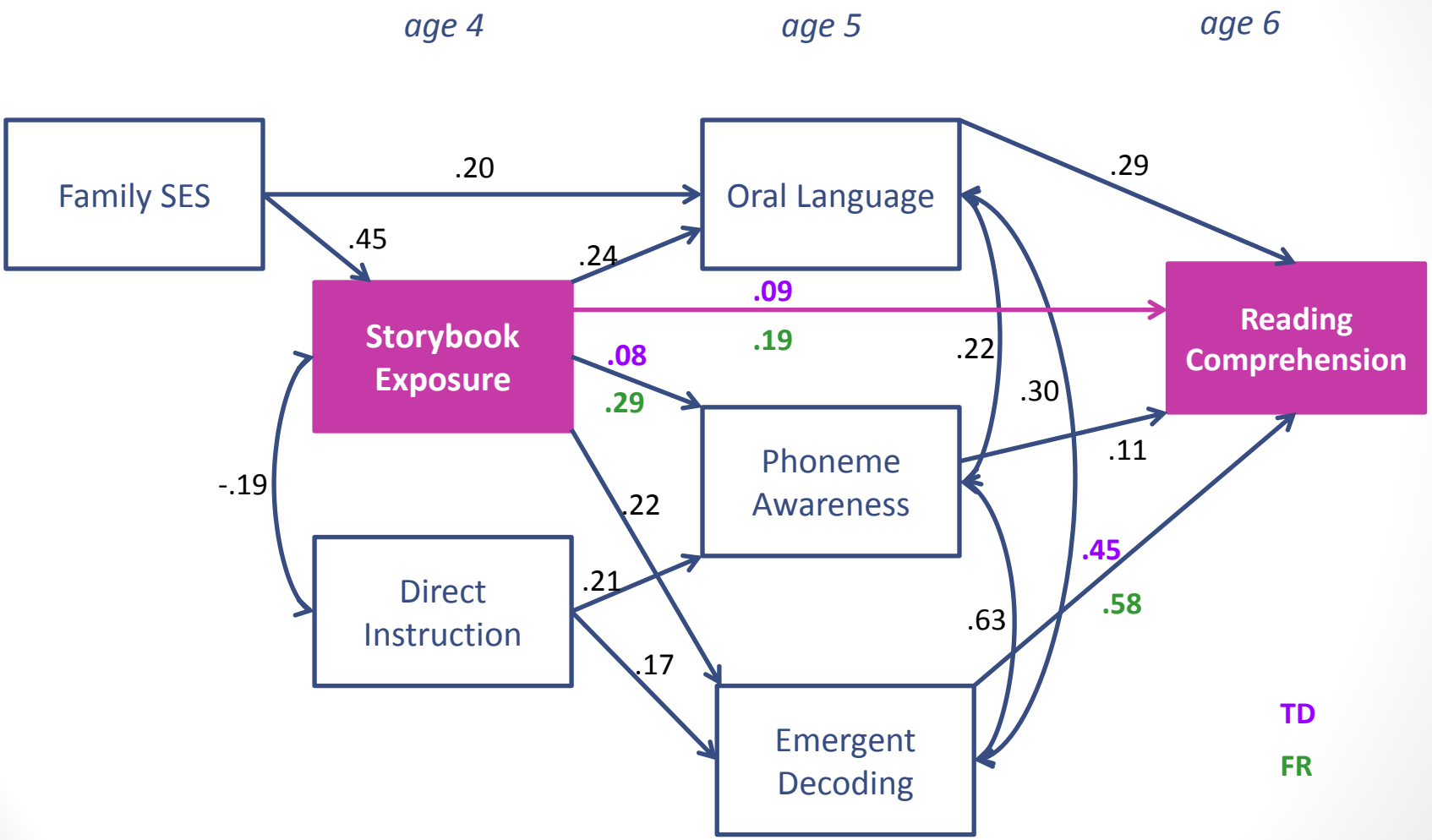

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