



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

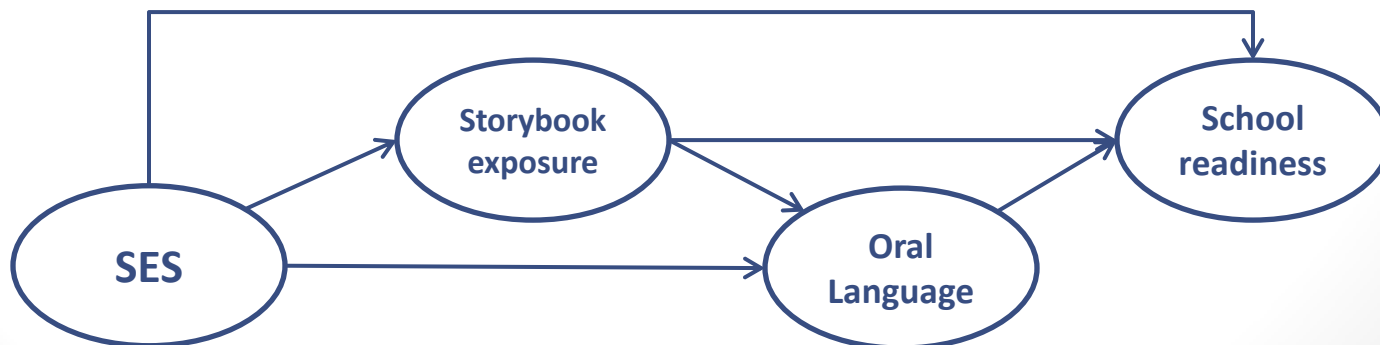
Lorna Hamilton, Emma-Hayiou-Thomas, Charles Hulme & Maggie Snowling

Genetic and Environmental Influences in Reading Development

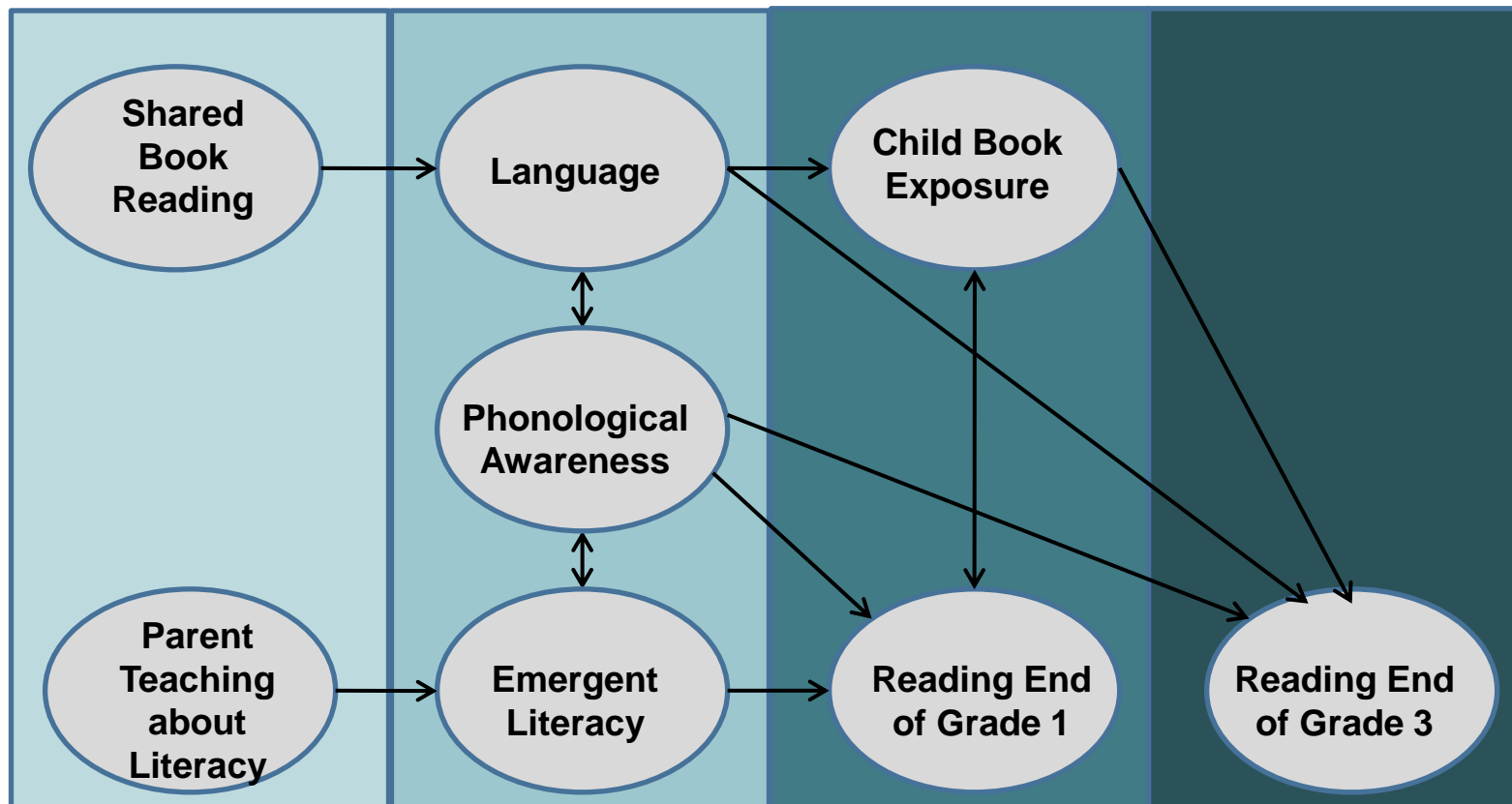
- Both decoding and reading comprehension skills are substantially heritable.
 - e.g. G2 decoding $h^2=.78$; word recognition $h^2=.81$; reading comprehension $h^2=.61$ (Olson et al., 2011).
- Shared environment exerts an important influence on emergent literacy and the skills which underpin it (Byrne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



*Home Literacy
Environment
Age 4*

Beginning of Grade 1

End of Grade 1

End of Grade 3

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

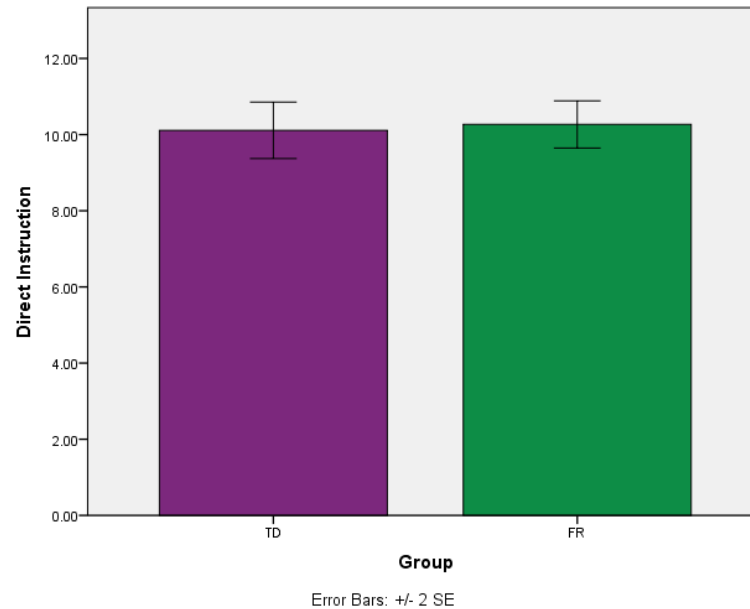
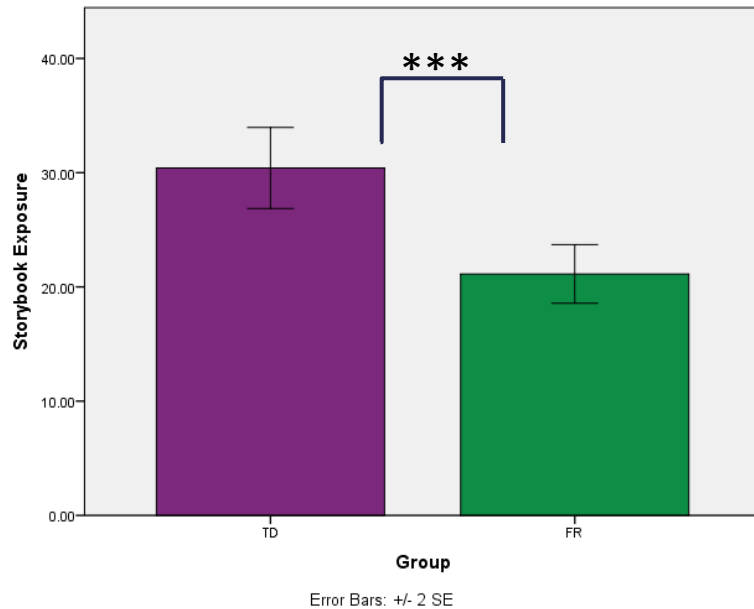
Reading Comprehension
Primary passage reading (YARC)

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

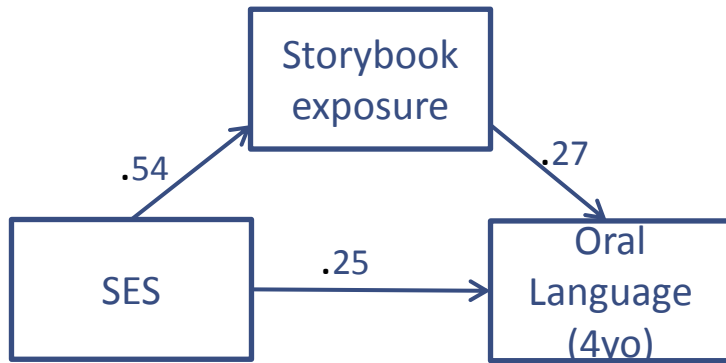
* $p < .05$; *** $p < .001$

HLE at age 4



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

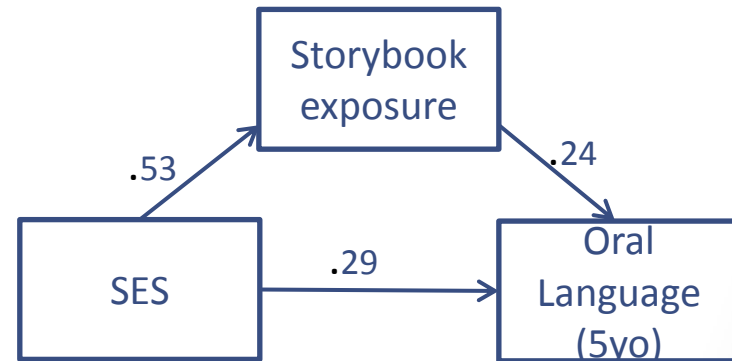
SES, HLE and oral language



Concurrent relationships

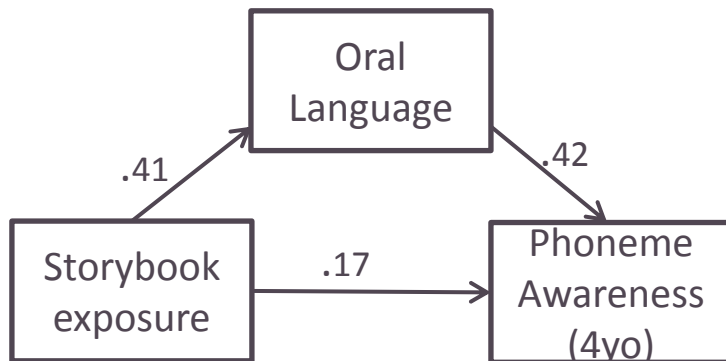
Partial mediation in both groups
(Sobel's $t= 3.40, p<.001$)

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

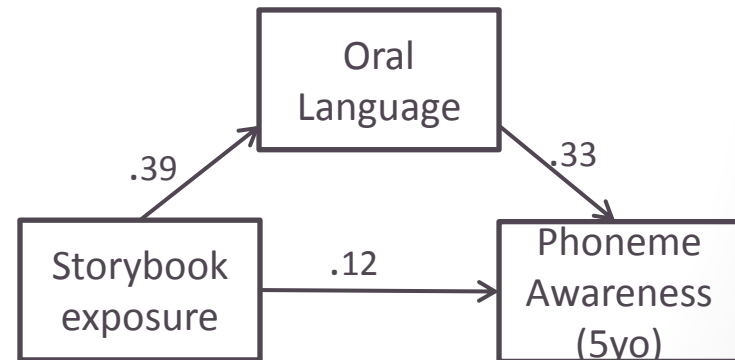
Complete mediation in FR group
(Sobel's $t= 2.53, p=.006$)

Direct effect only in TD group

Longitudinal relationships

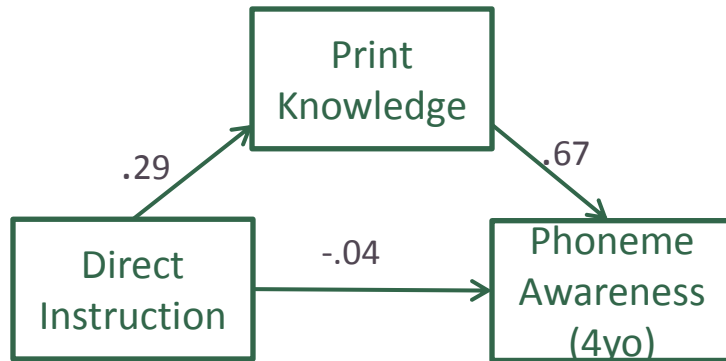
Partial mediation in FR group
(Sobel's $t= 2.53, p=.006$)

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.

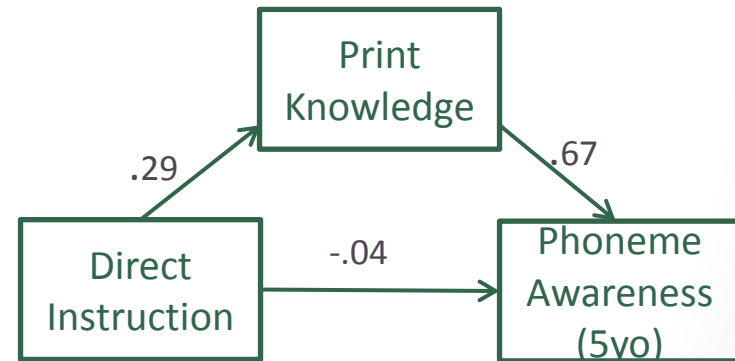
Direct instruction and phoneme awareness



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

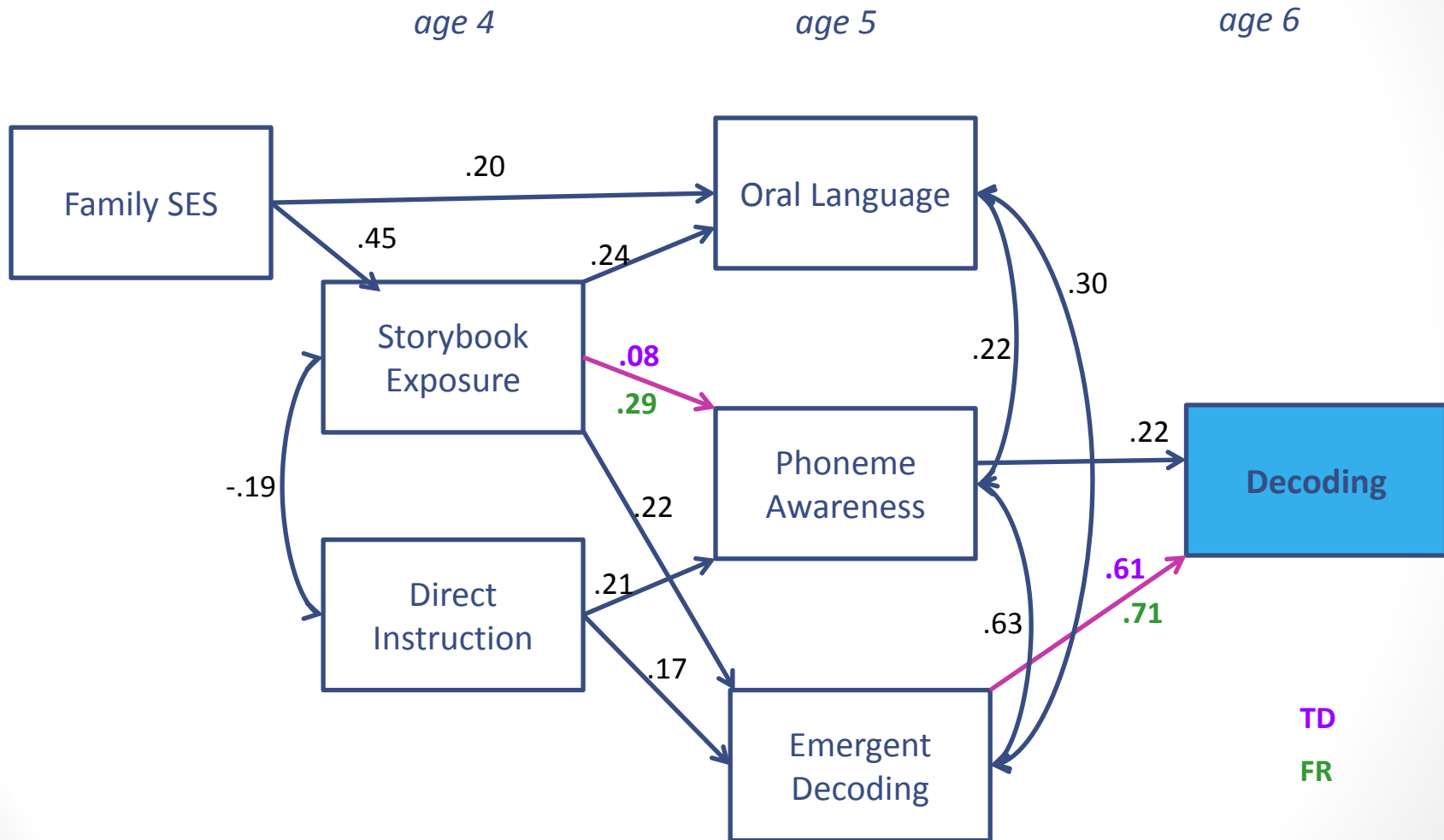


Direct instruction of orthographic forms in the home influences phoneme awareness indirectly via letter knowledge, for both FR and TD children.

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

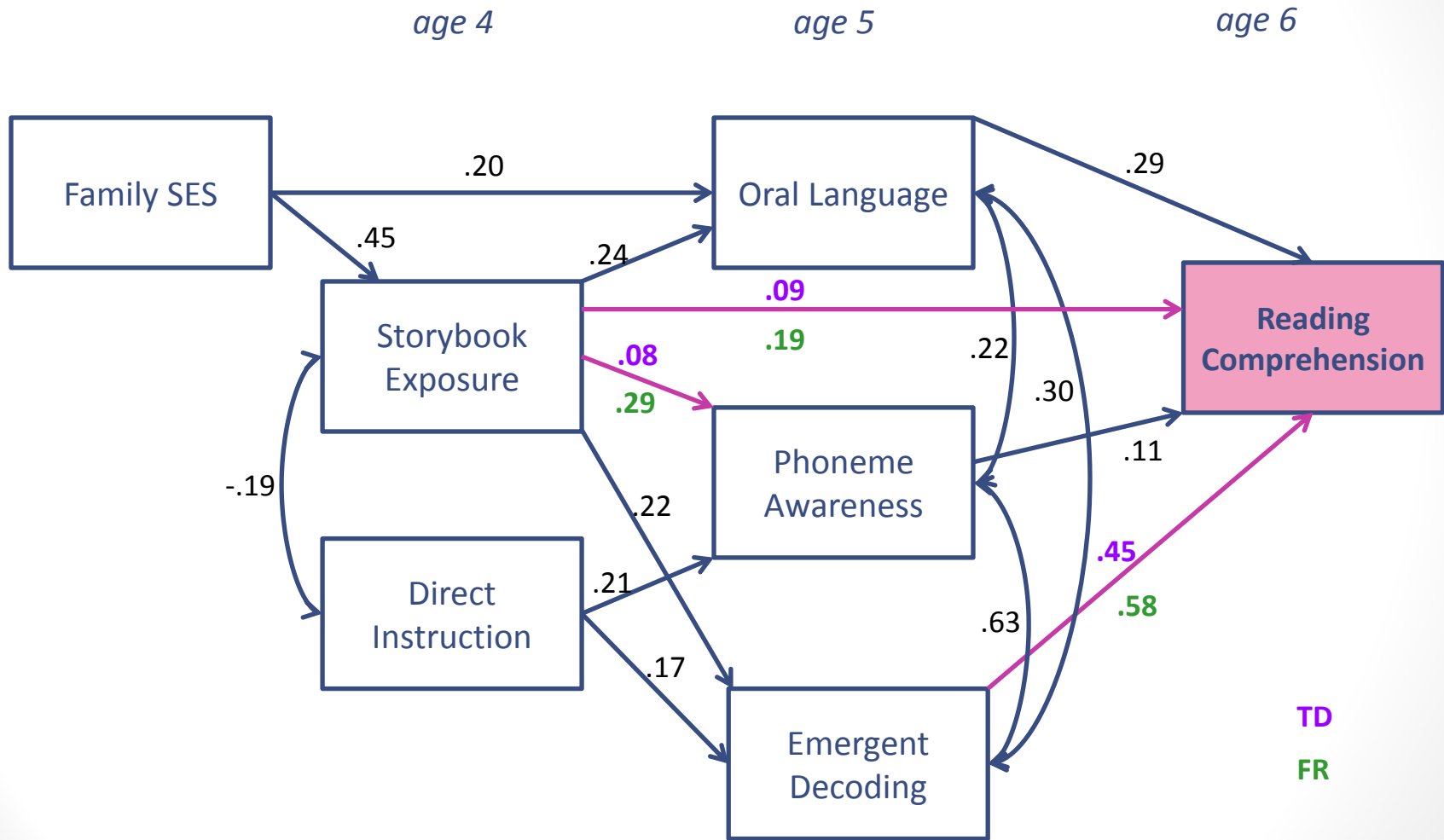


$\chi^2 (25) = 33.29, p=.124; CFI = .98; RMSEA = .06 (.00-.11)$

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



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

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



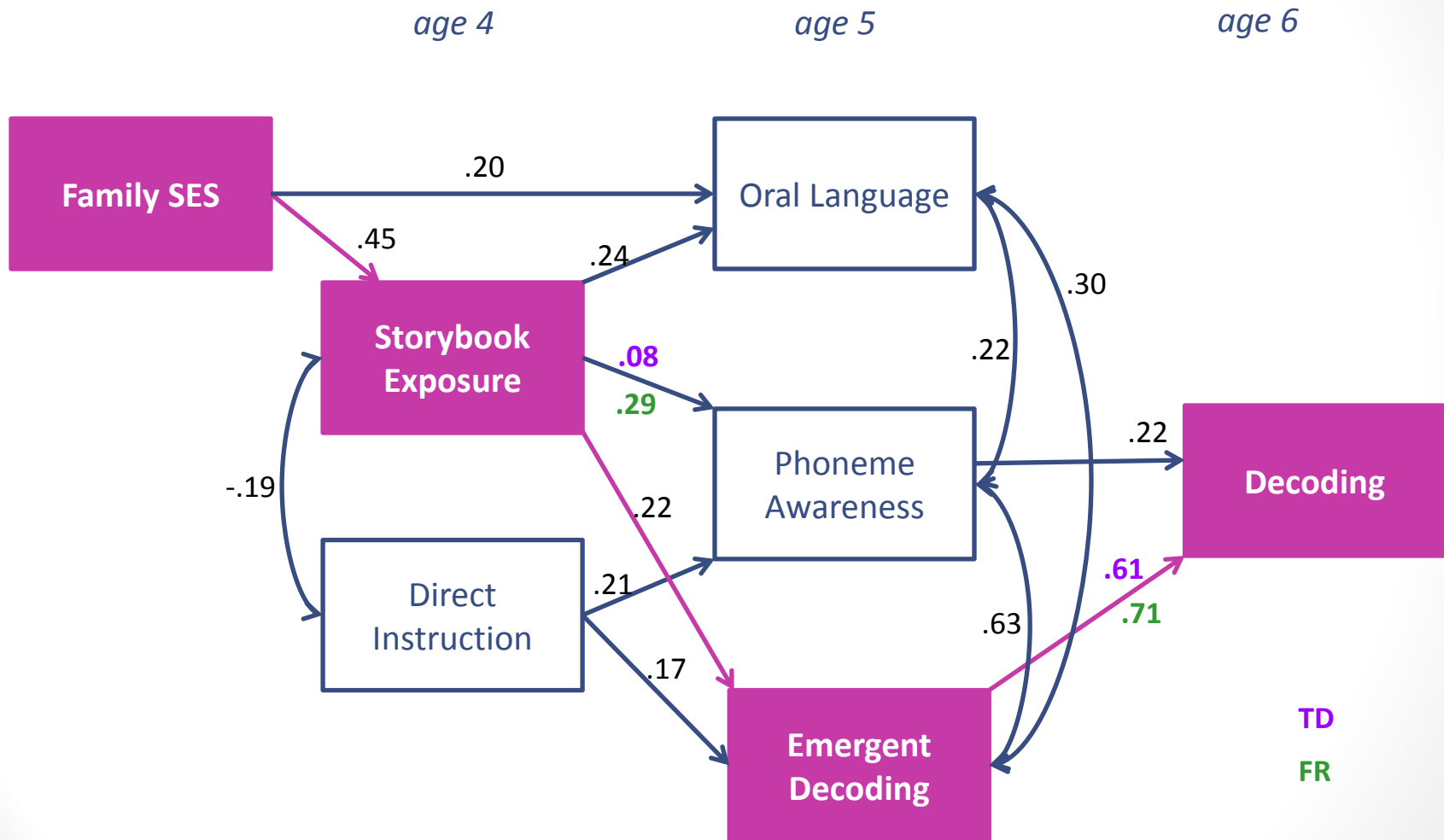
- HLE measured at age 4 shows multiple indirect effects on decoding and reading comprehension at age 6.
- All of the effects of family SES on reading outcomes are explained by the HLE and children's oral language skills.
- Early literacy interactions in the home may be particularly important in the reading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

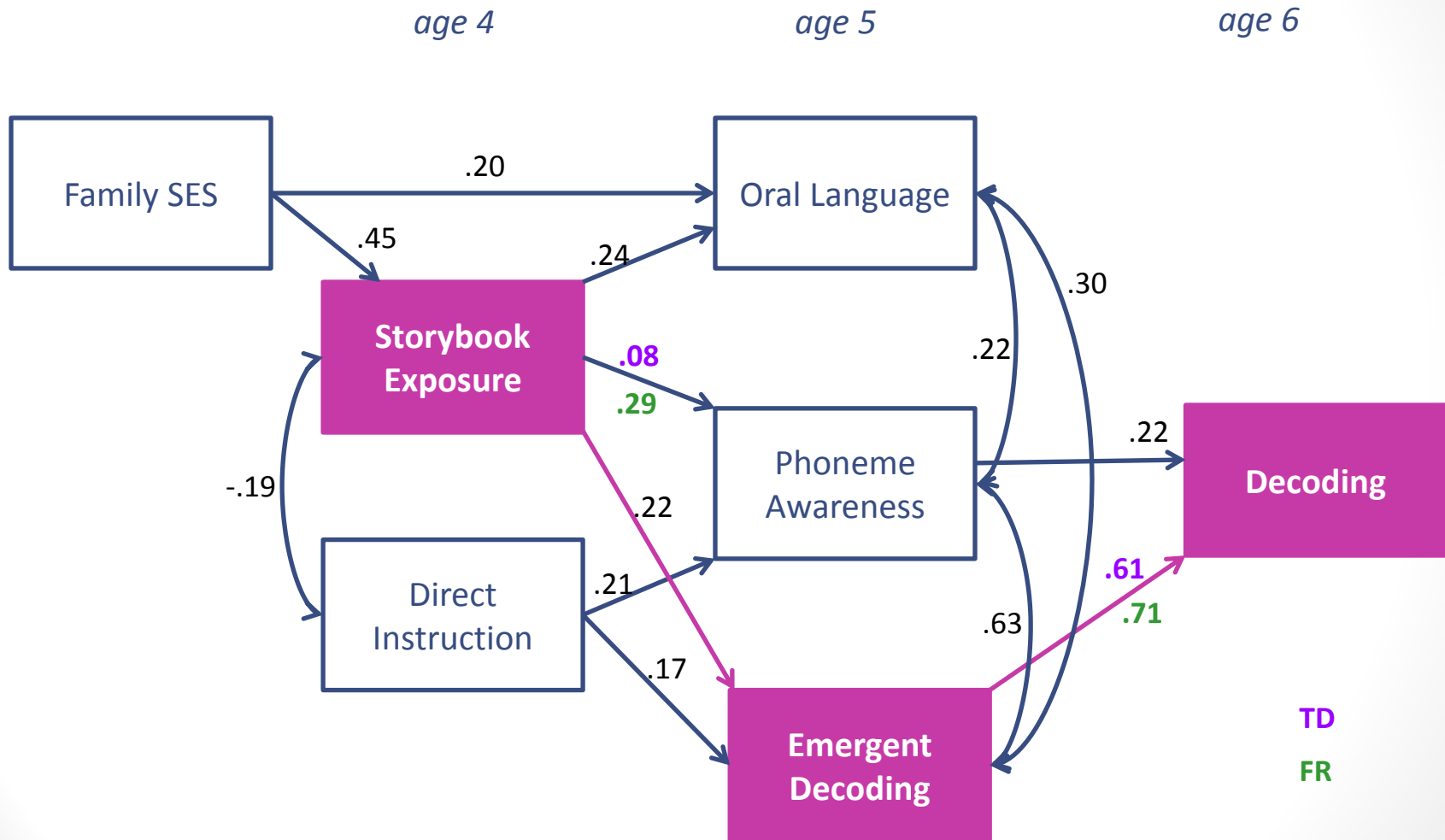


Pathways to Decoding



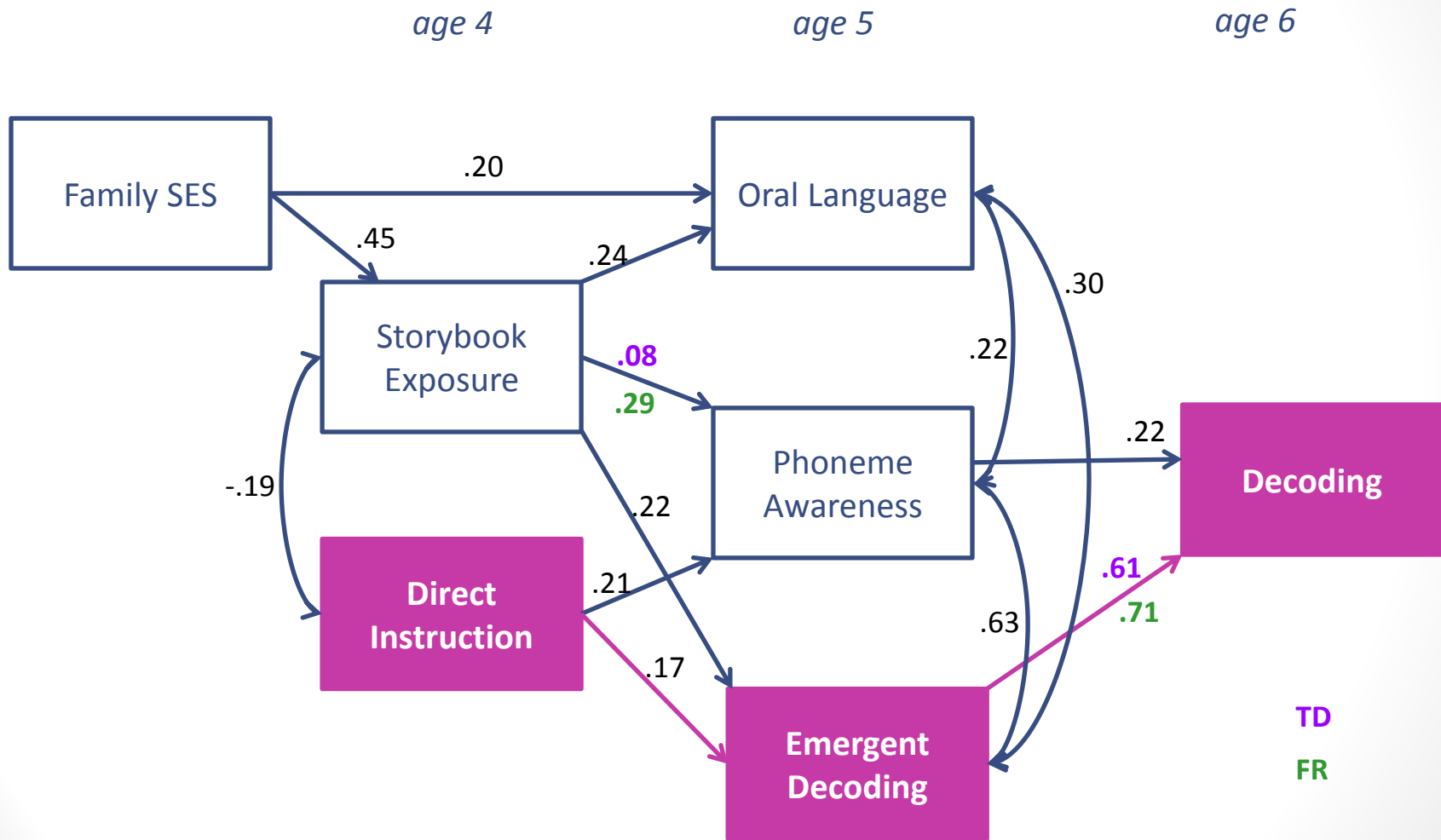
$\chi^2 (25) = 33.29, p=.124; CFI = .98; RMSEA = .06 (.00-.11)$

Pathways to Decoding



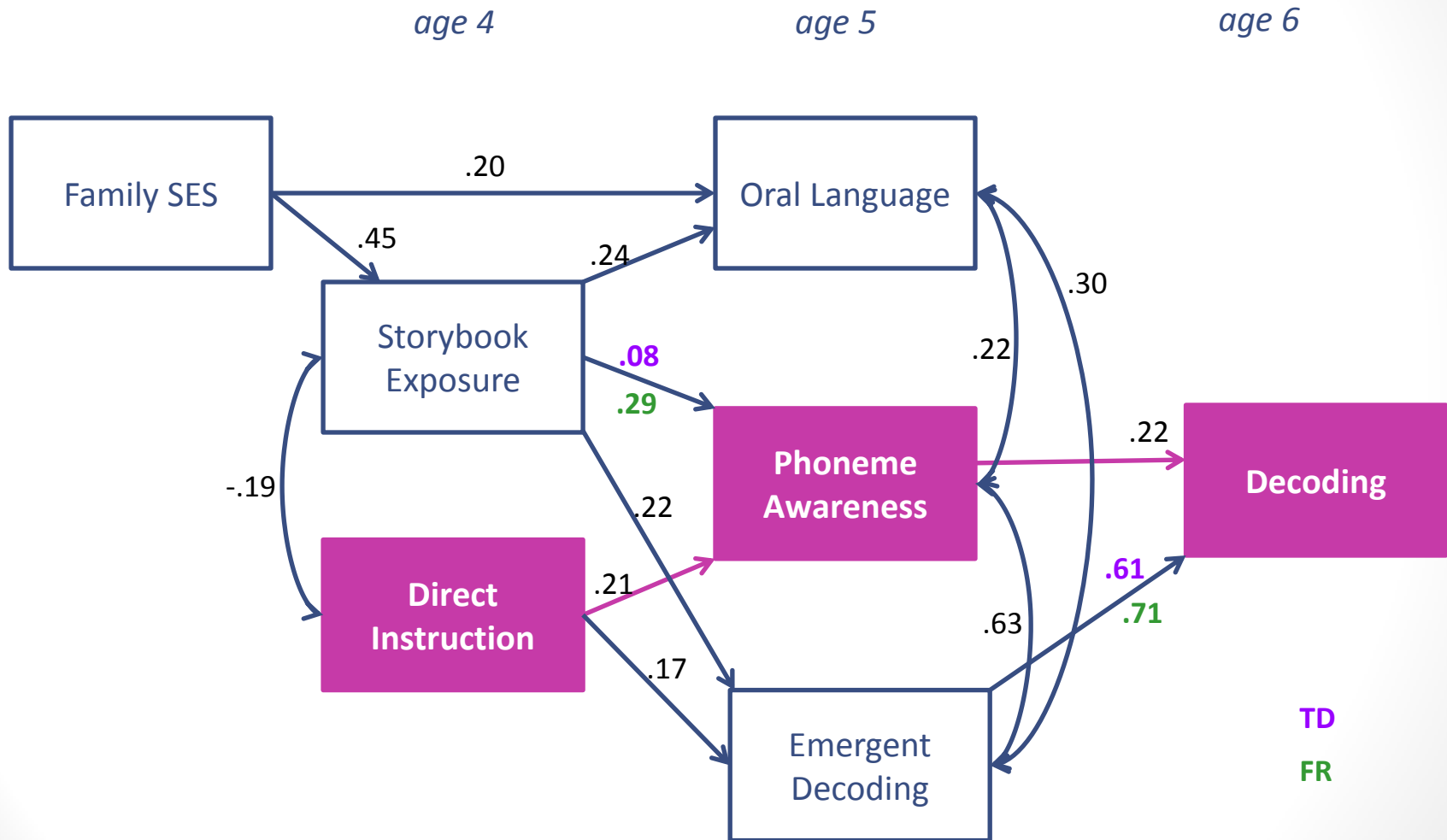
$\chi^2 (25) = 33.29, p=.124; CFI = .98; RMSEA = .06 (.00-.11)$

Pathways to Decoding



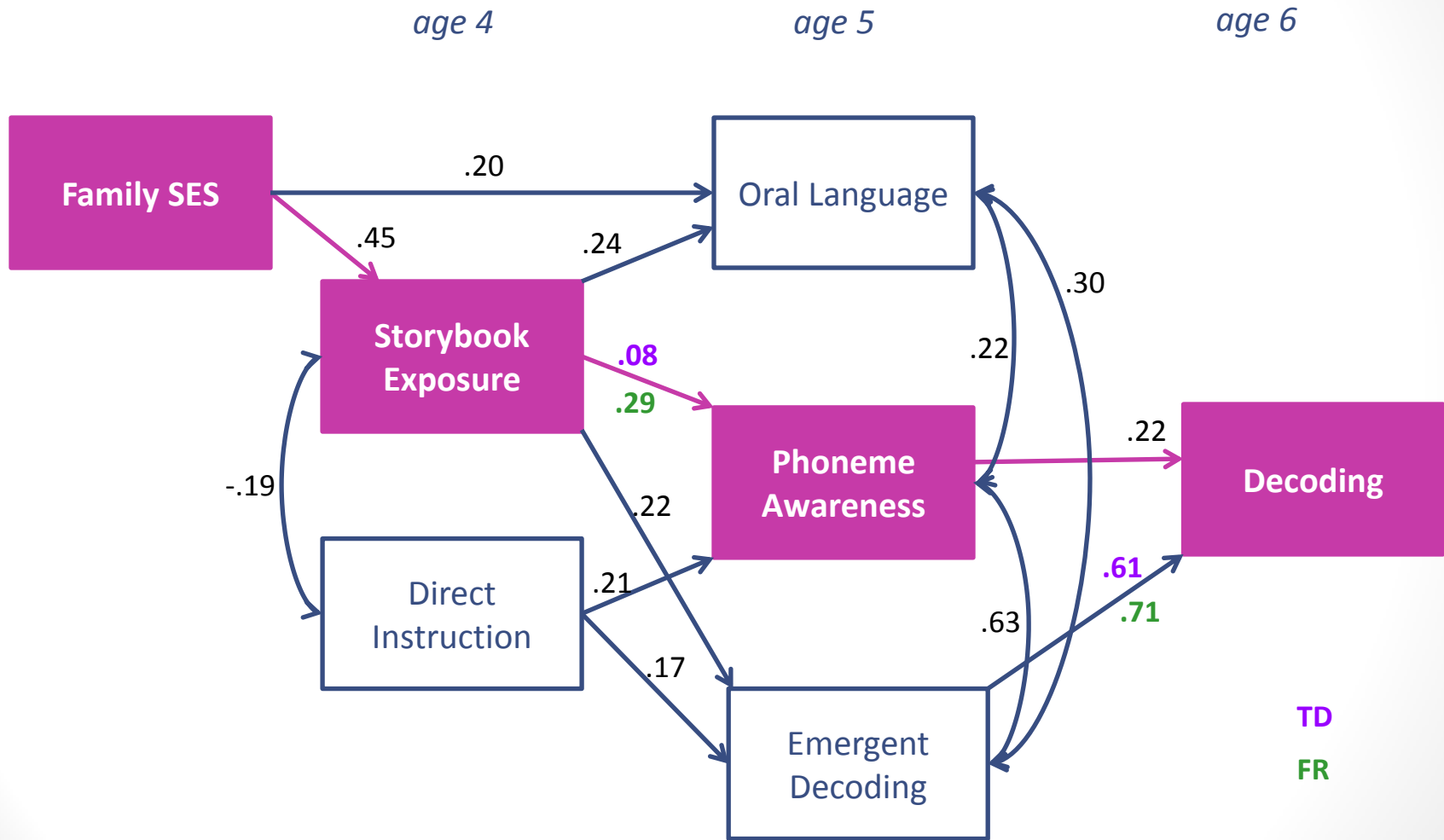
$\chi^2 (25) = 33.29, p=.124; CFI = .98; RMSEA = .06 (.00-.11)$

Pathways to Decoding



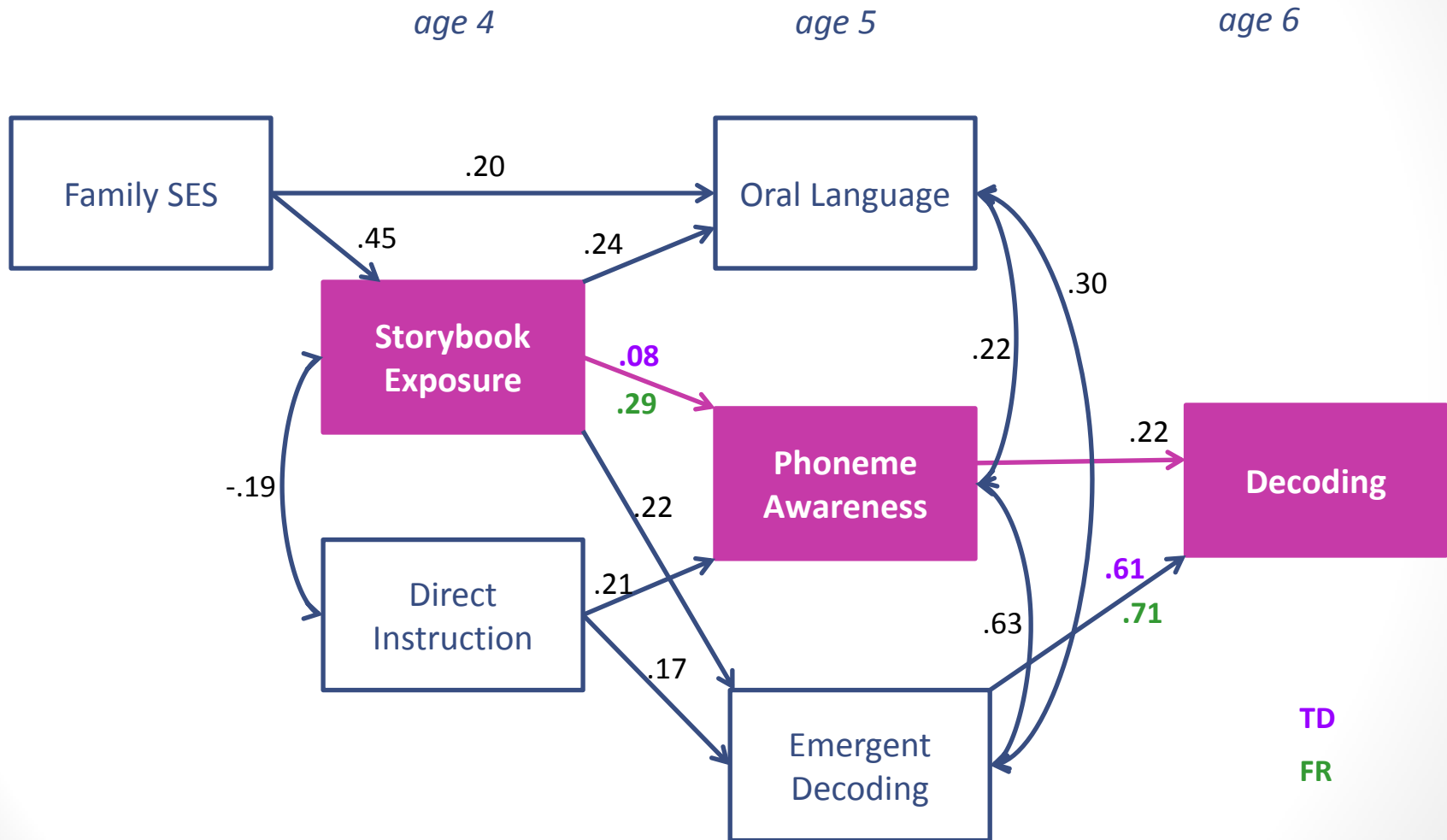
$\chi^2 (25) = 33.29, p=.124; CFI = .98; RMSEA = .06 (.00-.11)$

Pathways to Decoding: FR only



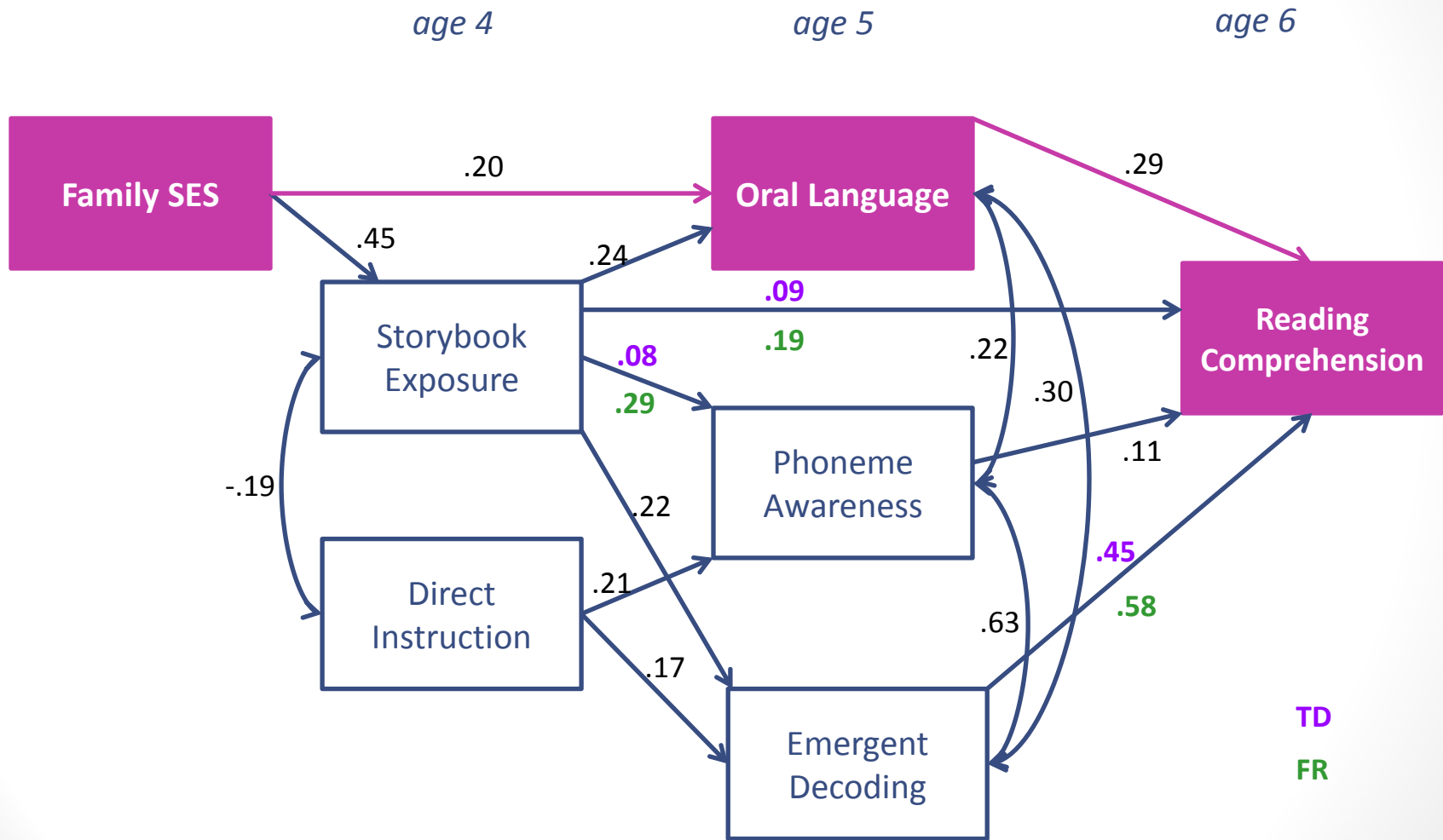
$\chi^2 (25) = 33.29, p=.124; CFI = .98; RMSEA = .06 (.00-.11)$

Pathways to Decoding: FR only



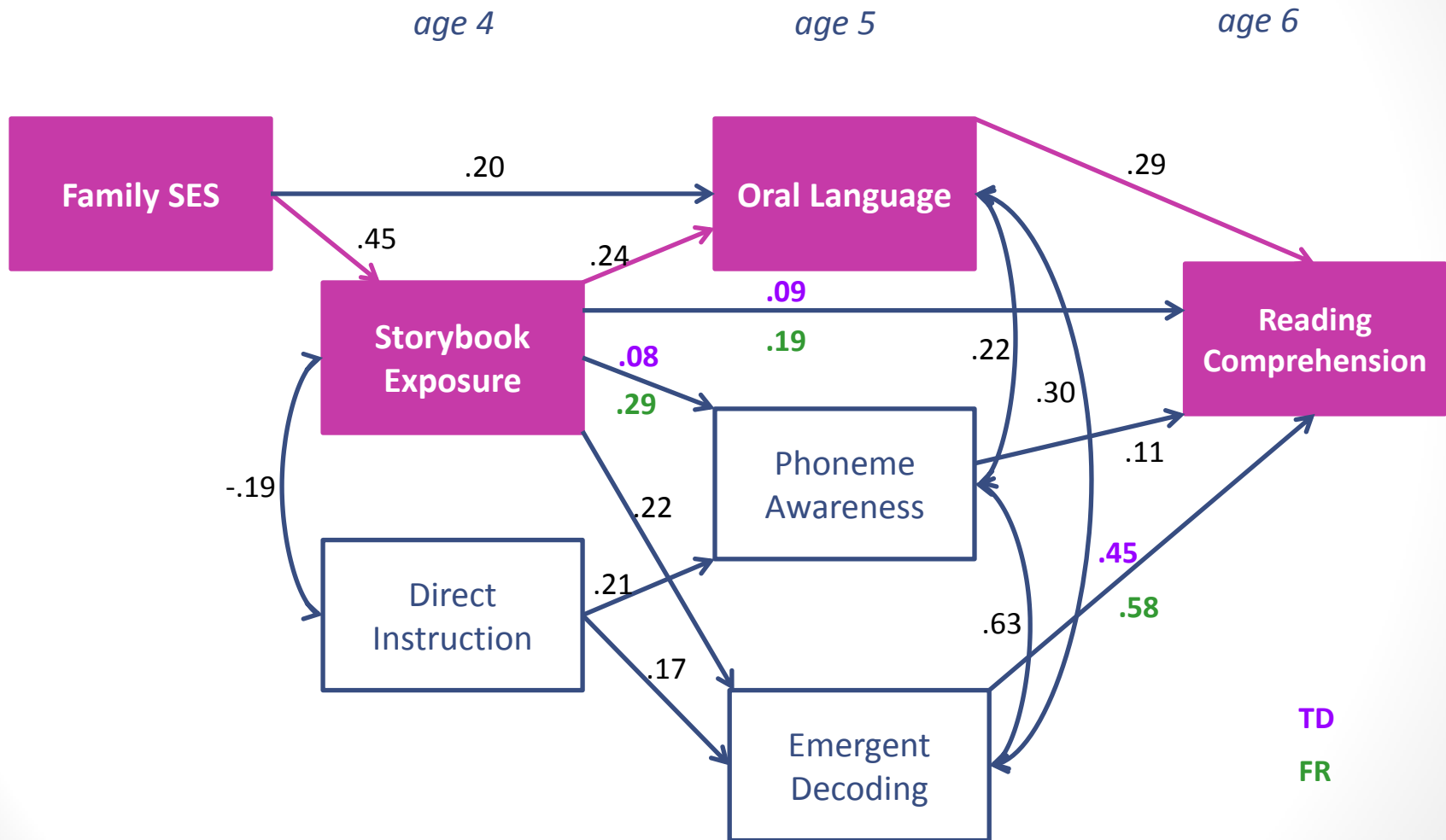
$\chi^2 (25) = 33.29, p=.124; CFI = .98; RMSEA = .06 (.00-.11)$

Pathways to Comprehension



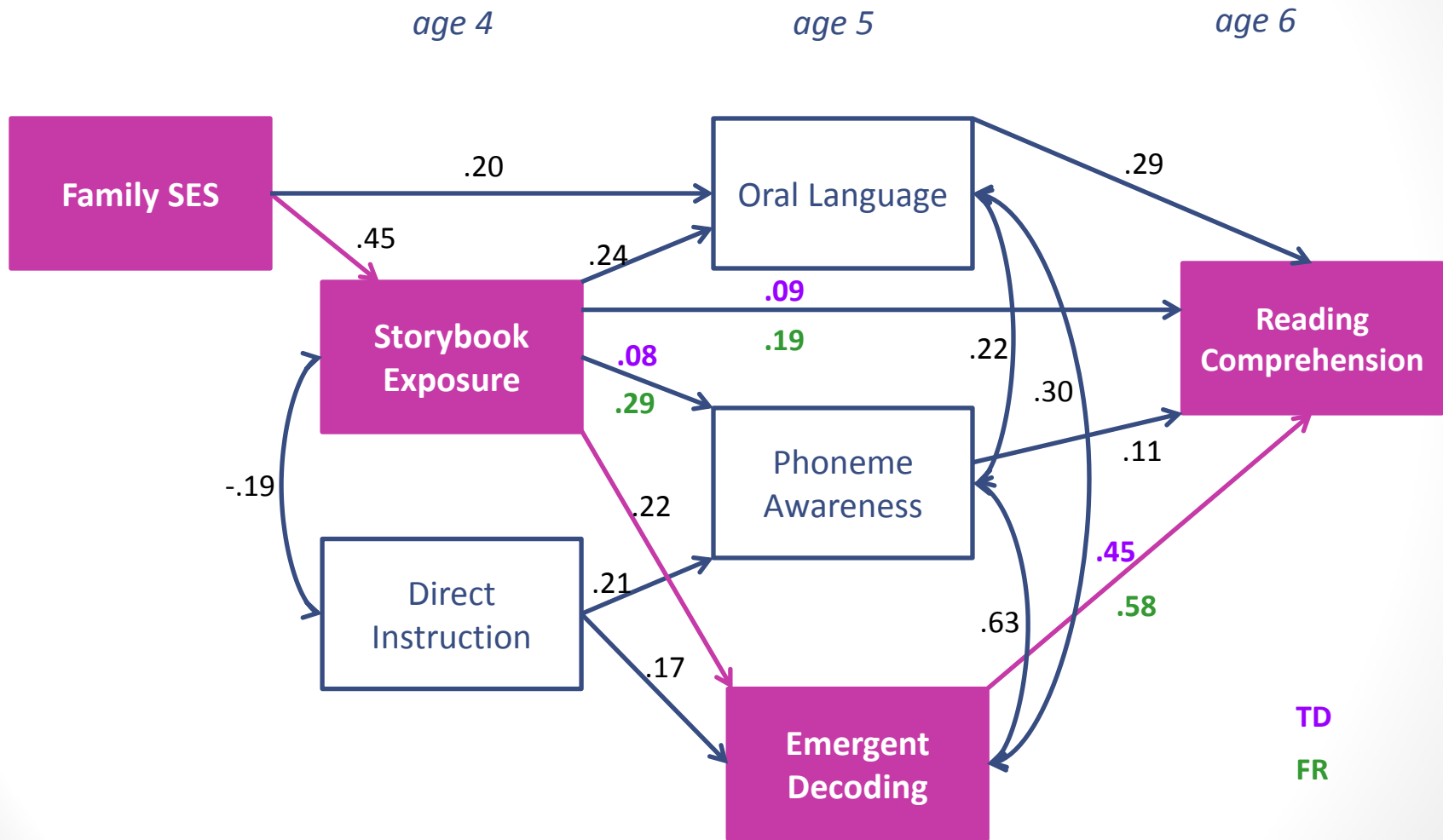
$\chi^2 (21) = 29.89, p=.094; CFI = .98; RMSEA = .07 (.00-.12)$

Pathways to Comprehension



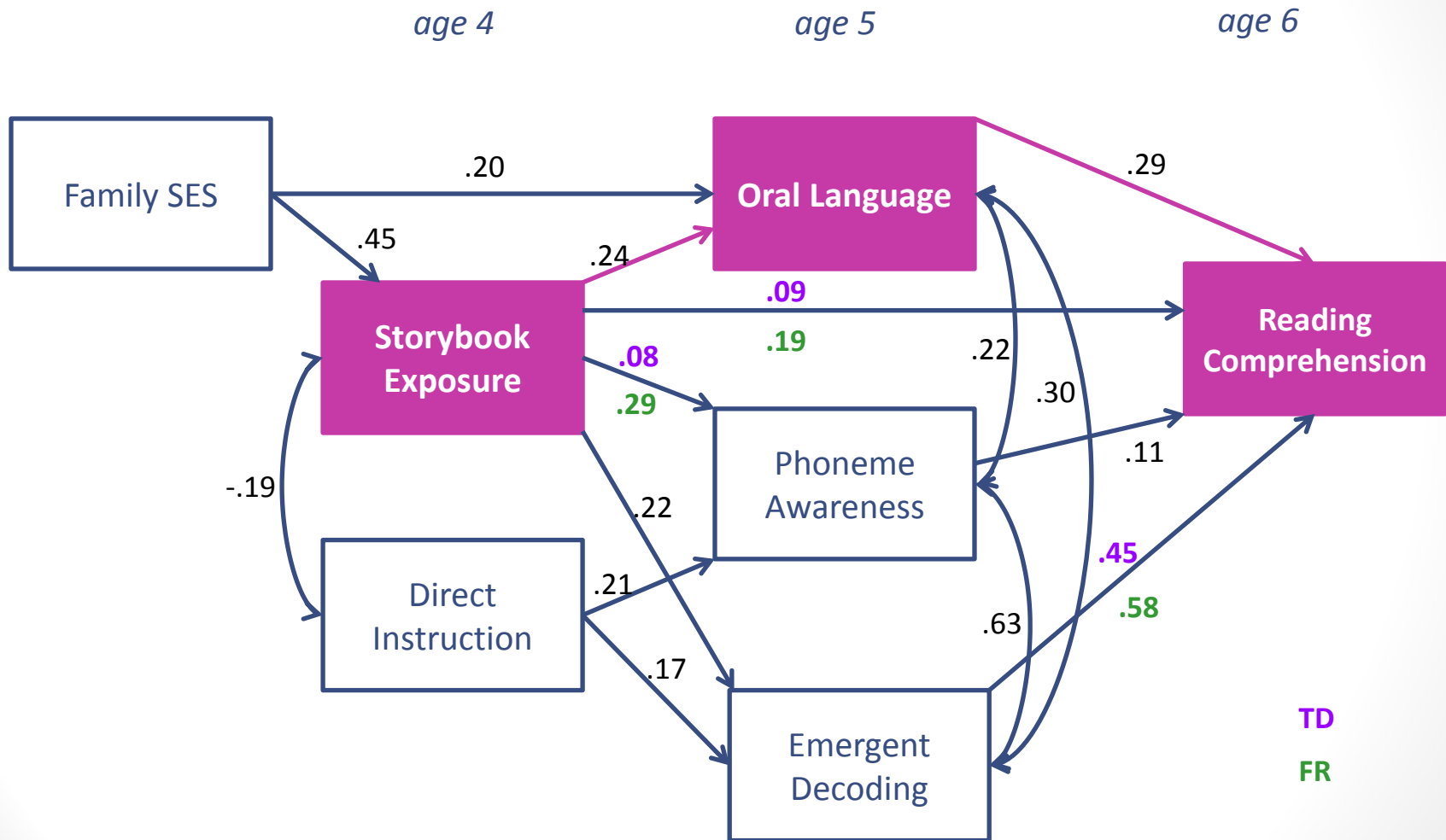
$\chi^2 (21) = 29.89, p=.094; CFI = .98; RMSEA = .07 (.00-.12)$

Pathways to Comprehension



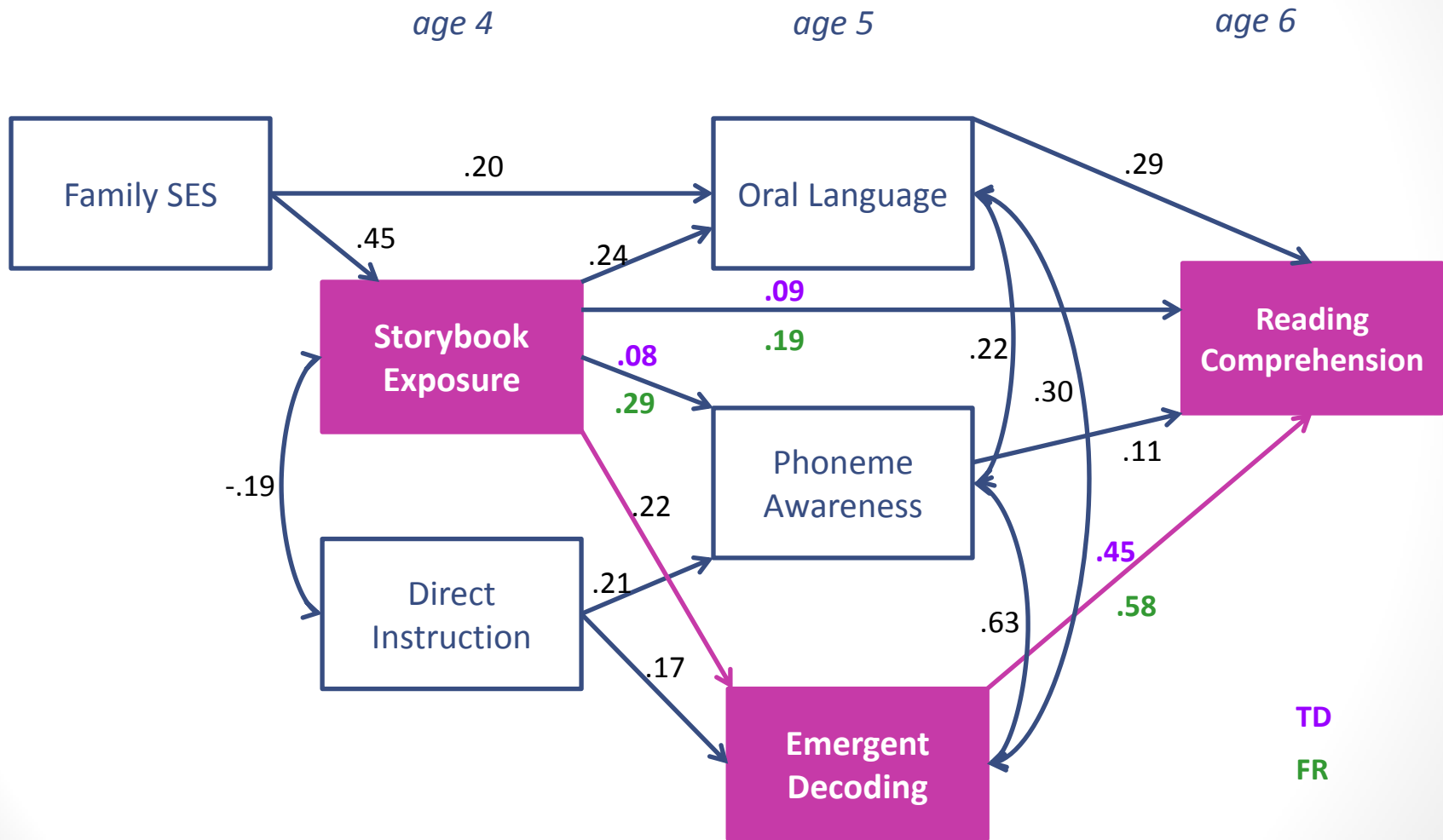
$\chi^2 (21) = 29.89, p=.094; CFI = .98; RMSEA = .07 (.00-.12)$

Pathways to Comprehension



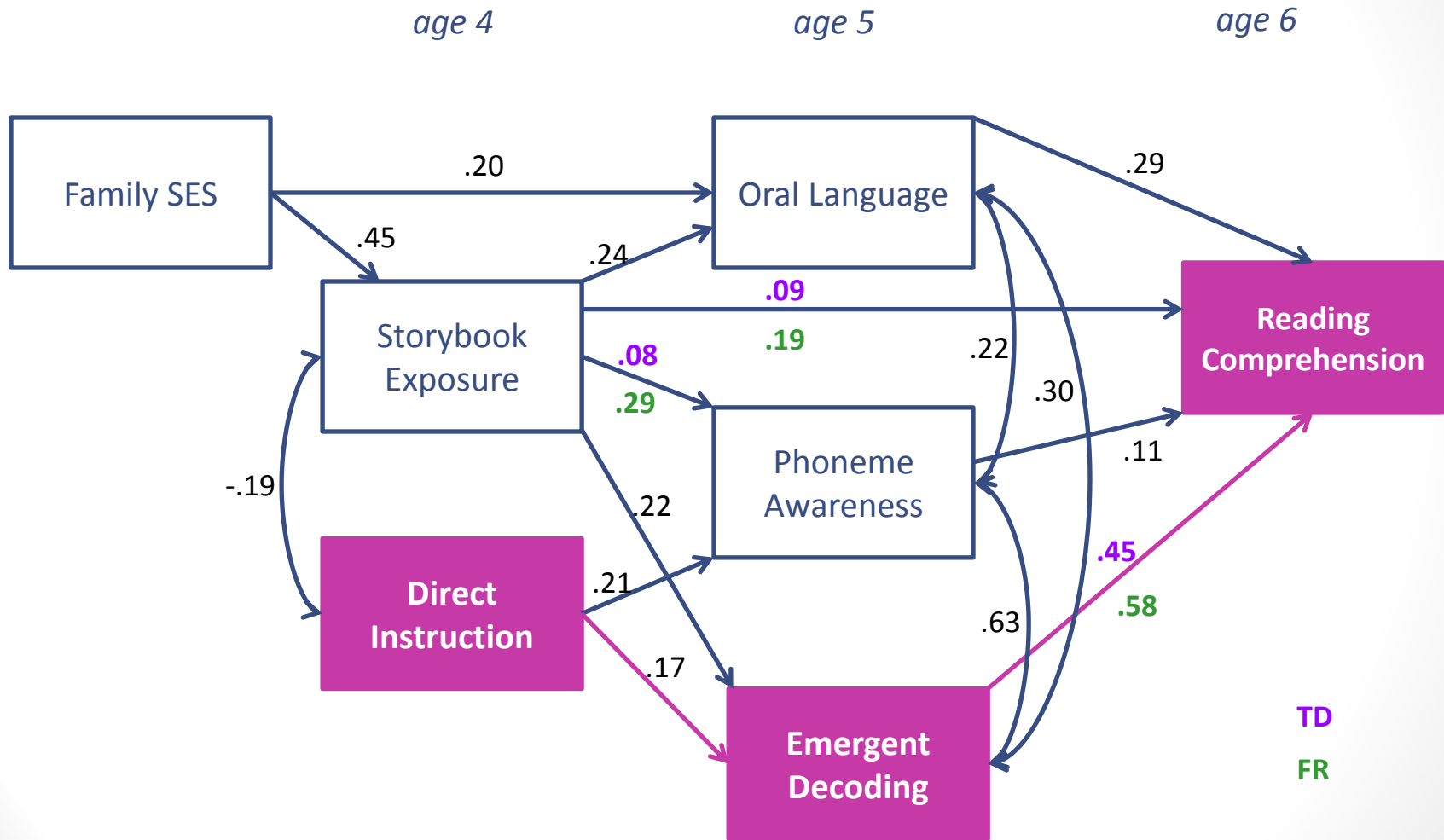
$\chi^2 (21) = 29.89, p=.094; CFI = .98; RMSEA = .07 (.00-.12)$

Pathways to Comprehension



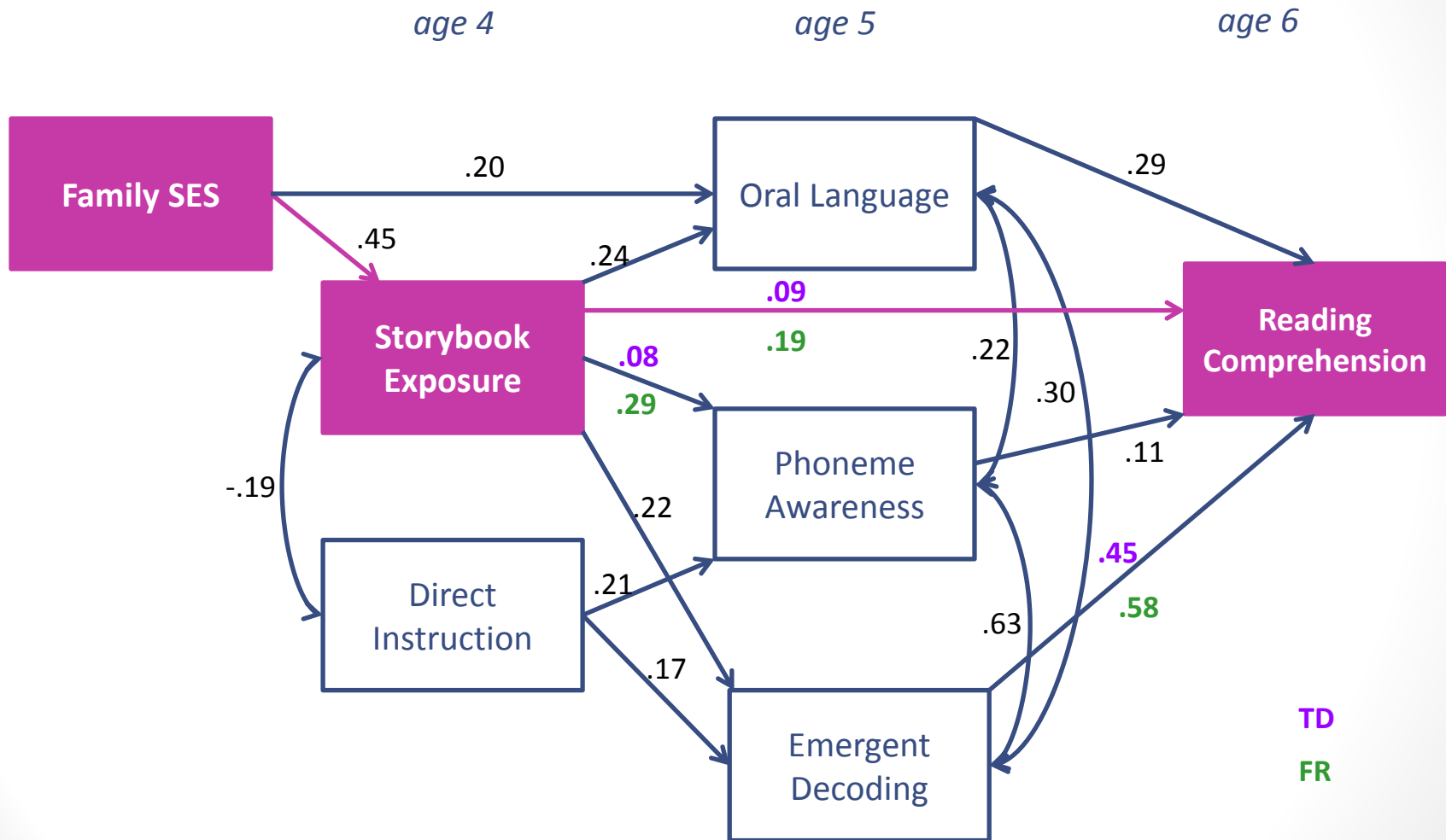
$\chi^2 (21) = 29.89, p=.094; CFI = .98; RMSEA = .07 (.00-.12)$

Pathways to Comprehension



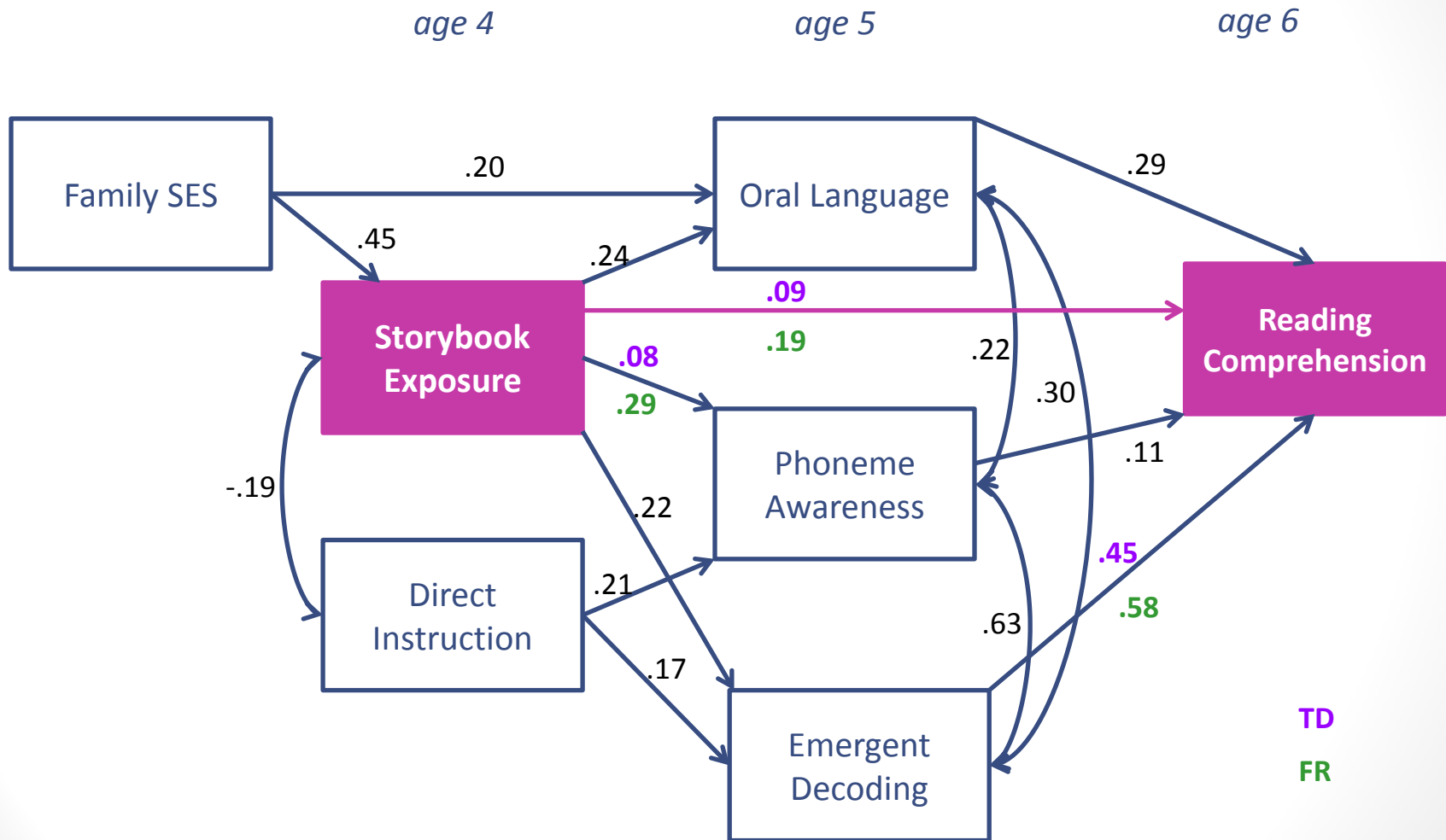
$\chi^2 (21) = 29.89, p=.094; CFI = .98; RMSEA = .07 (.00-.12)$

Pathways to Comprehension: FR only



$\chi^2 (21) = 29.89, p=.094; CFI = .98; RMSEA = .07 (.00-.12)$

Pathways to Comprehension: FR only



$\chi^2 (21) = 29.89, p=.094; CFI = .98; RMSEA = .07 (.00-.12)$