



Early Childhood Predictive Indices of Writing Skills at School Age: Analyses from TEDS

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INTRODUCTION



Why literacy matters?

Literacy → academic success, employment, social participation (OECD, 2023)
26% of adults struggle with literacy tasks (OECD, 2023)

What predicts later writing?

Early language, Phonological awareness, Executive Functions, Early literacy skills ... (Mercugliano et al., 2024)

RESEARCH GAP

- Evidence focused mainly on cognitive predictors
- Behavioural and socio-emotional predictors underexplored
- Limited knowledge on developmental timing (distal vs proximal predictors)
- Few studies identify early signatures of later literacy difficulties (Mercugliano et al., 2024)

RESEARCH AIMS



AIM 1 – Early predictors (2–4.5 yrs) → Writing outcomes (7 yrs) in Typical Development (TD) vs Learning Difficulties (LD) Children



AIM 2 – Developmental timing → Distal vs Proximal predictors in TD vs LD

Hypothesis:

AIM 1 – Shared predictors, different effect sizes,
AIM 2 – Developmental timing matters, no difference in TD and LD children

PARTICIPANTS AND MEASURES

Twin Early Development Study (TEDS)
10,000+ pairs of twins (UK, born between 1994–1996)
Longitudinal cohort study



Measures:

- **Early predictors** (2, 3, 4 and 4.5 yrs)
- **Writing outcomes** (7 yrs): teacher assessment, Likert scale & NC standards
- **SLD diagnosis and learning difficulties** (7, 8 and 9 yrs): parent reports

DATA ANALYSIS



- Cleaning, outliers, missing data
- TD vs LD grouping
- Descriptives & correlations



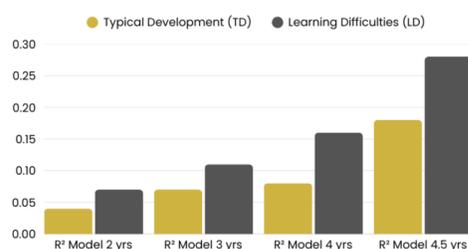
- Predictor selection via correlations
- Avoid multicollinearity
- FIML estimation, explained variance and model diagnostics
- BH correction



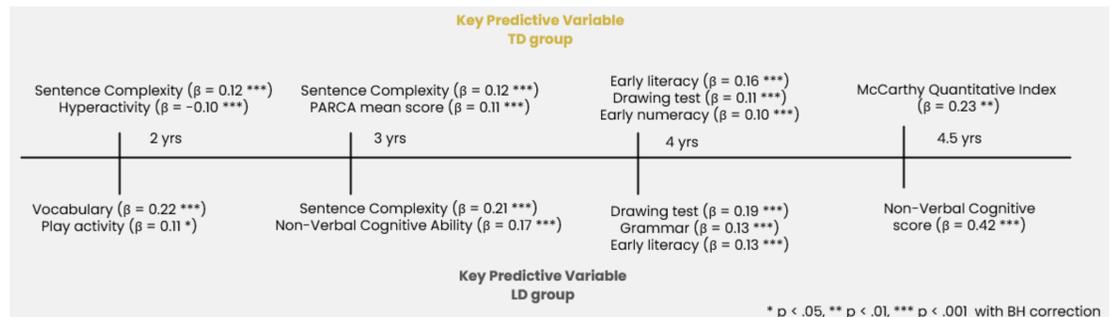
- Blocks of predictors (demographic → predictors age 2,3,4 and 4.5 yrs)
- Incremental variance explained (ΔR^2)
- Timing effects (2 yrs vs 4.5 yrs)
- BH correction

RESULTS AIM 1

R^2 higher in LD group → stronger overall prediction



Key predictors for TD vs LD children



RESULTS AIM 2

Proximal predictors add substantial ΔR^2

For LD: distal predictors already strong at 2 yrs → earlier influence

Suggests need for earlier prevention in at-risk children

STEP & VARIABLES	TD group		LD group	
	R^2	ΔR^2	R^2	ΔR^2
Step 1: Sex, Age, Attend playgroup	0.0165		0.034	
Step 2: Sex, Age, Attend playgroup + Predictors 2 yrs	0.0497	0.0332	0.0985	0.0645 *
Step 3: Sex, Age, Attend playgroup + Predictors 2 yrs + Predictors 3 yrs	0.0796	0.0299 *	0.134	0.0356 ***
Step 4: Sex, Age, Attend playgroup + Predictors 2 yrs + Predictors 3 yrs + Predictors 4 yrs	0.1215	0.0419 *	0.2334	0.0994 *

F-statistics TD group:
Step 2 vs 1: $F(331, 1619) = 0.98$, $\Delta R^2 = 0.033$, $p = 0.57$
Step 3 vs 2: $F(109, 1510) = 1.28$, $\Delta R^2 = 0.030$, $p = 0.0303$
Step 4 vs 3: $F(361, 1149) = 1.15$, $\Delta R^2 = 0.042$, $p = 0.0441$

F-statistics LD group:
Step 2 vs 1: $F(130, 581) = 1.34$, $\Delta R^2 = 0.065$, $p = 0.0138$
Step 3 vs 2: $F(93, 488) = 1.54$, $\Delta R^2 = 0.036$, $p = 0.00215$
Step 4 vs 3: $F(174, 314) = 1.31$, $\Delta R^2 = 0.099$, $p = 0.0208$

* $p < .05$, ** $p < .01$, *** $p < .001$ with BH correction

KEY TAKEAWAYS



Distal predictors → screening opportunities as early as toddler years



Tailored, multi-level interventions → prevent cascading effects on education & well-being



Early identification of LD/SLD = crucial



Including non-cognitive factors may strengthen prediction & intervention design

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