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INTENSIVE AND PREVENTIVE GRAPHOGAME TRAINING PROMOTES PRINT KNOWLEDGE IN PRE-READERS AT COGNITIVE RISK FOR DYSLEXIA

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INTRODUCTION

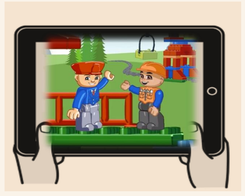
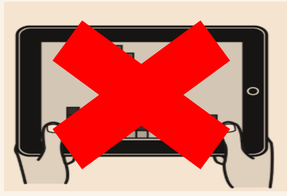
- Interventions tackling **word decoding difficulties** are most effective when:
  - Remediation programs focus on **letter-sound coupling** and **phoneme blending** (so-called phonologically-based interventions) [1]
  - Interventions are provided **preventively** in kindergarten and first grade, even before reading and spelling problems become manifest [2]
- Nowadays, phonologically-focused reading interventions are often embedded in **digital game-based learning platforms**, e.g. **GraphoGame (GG)** [3]

PROBLEM STATEMENT

- Limitations of previous studies, investigating the **preventive impact of GraphoGame** [4,5]:
  - Limited GG training durations to approximately 3-4 hours
  - Did not adapt the GG content to the skills of pre-readers
  - Only examined the influence on decoding-related skills, without looking at transfer effects on language and domain-general cognitive skills
- **Current objective**: to examine the impact of a **preventive, intensive, and pre-reading adapted GG training** on decoding-related, language and domain-general skills in children at cognitive risk for dyslexia.

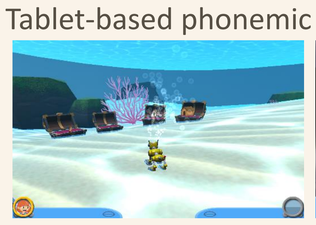
METHOD

- **Participants**: 88 pre-reading kindergartners at cognitive risk for dyslexia
- **Interventional procedure: 12 weeks, 6 days/week, 15 minutes per day**

GraphoGame[a] group (n=31)	Active control group (n=29)	Passive control group (n=28)
		

[a]GraphoGame trained letters, auditory and visual discrimination, grapheme-phoneme coupling, phoneme blending and counting, reading and spelling.

- **Assessment procedure to investigate interventional impact**
  - **Every three weeks during the intervention period: at home**
    - Tablet-based phonemic awareness + receptive letter knowledge assessment

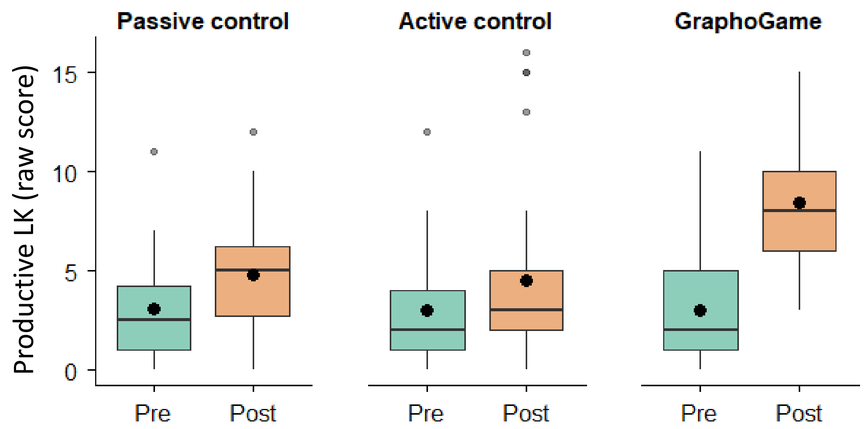



  - **Before and after intervention: at school**
    - **Decoding-related skills** (active letter knowledge, verbal STM, rapid naming skills, word decoding)
    - **Language skills** (vocabulary, text comprehension, morphological awareness)
    - **Domain-general cognitive skills** (sustained attention, visuospatial STM, visuospatial WM)

RESULTS (LINEAR MIXED MODEL ANALYSIS)

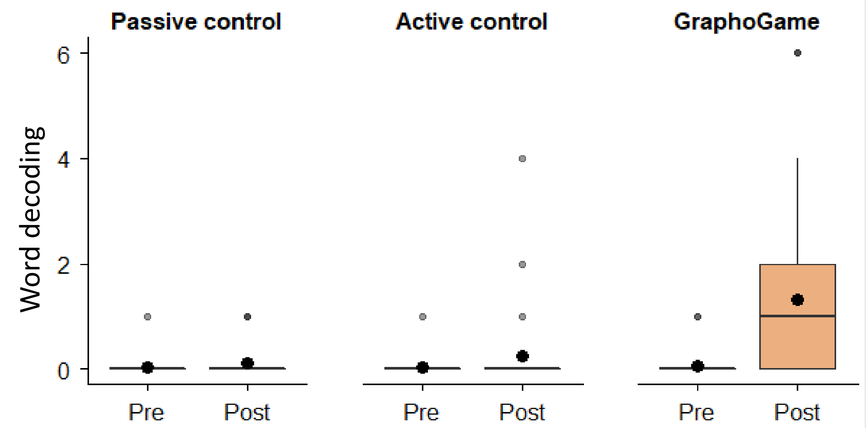
Group*Time [a]
F(2,88) = 27.33, $p < .001$

Productive letter knowledge



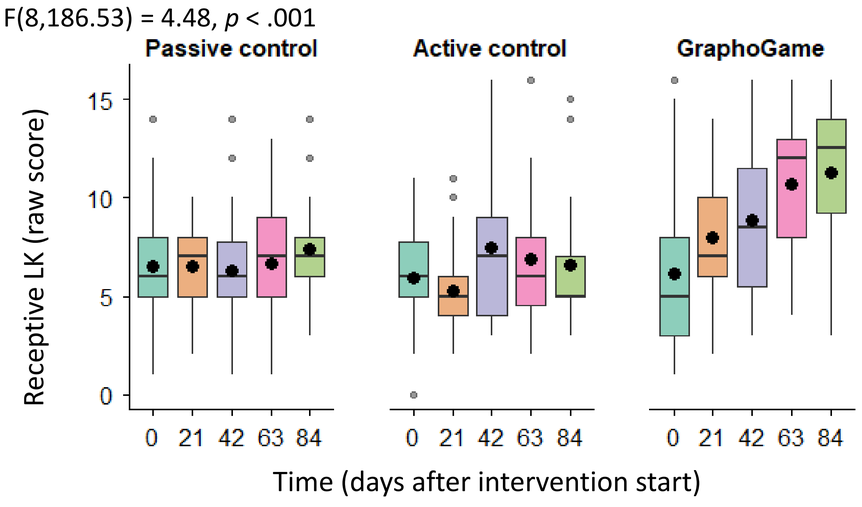
Group*Time [a]
F(2,88) = 9.91, $p < .001$

Word decoding



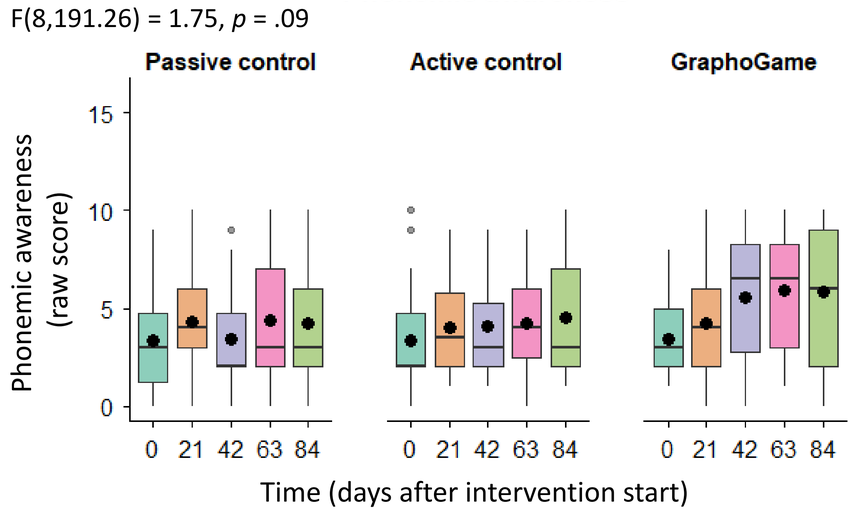
Group*Time [a]
F(8,186.53) = 4.48, $p < .001$

Receptive letter knowledge



Group*Time
F(8,191.26) = 1.75, $p = .09$

Phonemic awareness



[a]All post-hoc pairwise comparisons for productive and receptive LK, and word decoding indicate efficacy of GraphoGame

Note. Group*Time interactions for the other variables that are not shown were insignificant (p > .05)

TAKE HOME

- GraphoGame only promoted skills that were **explicitly trained**
- Even at post-test, **word decoding** remained at a very **rudimental** level
- Despite **a clear trend**, no significant larger improvement in favor of GG regarding **phonemic awareness** was found.
- Results revealed **no transfer-effects** to **non-trained decoding-related skills, language** and **domain-general skills**
- **Follow-up study** needed to evaluate the impact on actual **reading and writing** skills by comparing the GG-group with non-trained at-risk children and a typically-developing control group

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