

Early Intervention and Language Delay Profile Influence Toddlers' Grammatical Growth

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INTRODUCTION

Toddlers at-risk for developmental language disorders (DLD) are unlikely to receive early intervention. 'Watchful waiting' remains common practice because many early language delays resolve spontaneously without intervention.¹⁻³ However, spontaneous recovery varies by language delay profile and language domain. Early language delays are estimated to resolve for 60% of children with expressive (E) delays, but only 25% of children with receptive *and* expressive (RE) delays.⁴ Moreover, few studies of recovery examine grammar, the most vulnerable domain associated with DLD.⁵⁻⁷ In the absence of intervention, developmental gaps between children at risk for DLD and peers are likely to widen, as slower vocabulary growth impedes subsequent grammatical development.⁸

Short-term parent-implemented language interventions have been shown to accelerate vocabulary growth and receptive language abilities for toddlers with language delays relative to no-treatment comparison groups.⁹⁻¹¹ Treatment is also most beneficial for children with RE delays¹². Less is known about the effects of early language interventions on grammatical growth. The current study uses archival data to investigate whether toddlers who received brief, parent-implemented Enhanced Milieu Teaching (EMT) had better grammatical outcomes than toddlers in a usual care control group.

RESEARCH QUESTION

What are the effects of treatment and language delay profile on children's grammatical growth?



METHOD

Database

The current study used archival data from a randomized clinical trial of parent-implemented EMT enrolling 97 toddlers at risk for DLD (*M* age 30 mos).⁹

Participants

Toddlers were randomly assigned to treatment and control conditions, with 69% and 72% presenting with RE delays on the *Preschool Language Scale-4*¹³ at study intake, respectively. Children in the treatment received 3 months (28 sessions) of intervention, including parent training (1 hour/day, 2x/week). Treatment targets were single words and early word combinations.

Procedures

Spontaneous language samples from 20-min of parent-child interaction and 20-min of examiner-child interaction for 87 children (44=treatment; 43=control) were available for this study. Language samples were obtained pre-intervention, post-intervention, and at 6- and 12-month follow ups¹².

Measures

➤ The *Index of Productive Syntax*¹⁴ (IPSyn) was used to assess expressive syntax. All complete and intelligible utterances in the 40-min language samples were used (*M* utterances by time point, 70, 173, 238, 293)

➤ IPSyn z-scores were also computed to characterize children's syntactic abilities relative to age-expectations.

➤ The number of different words (NDW) produced spontaneously was used to assess expressive vocabulary.

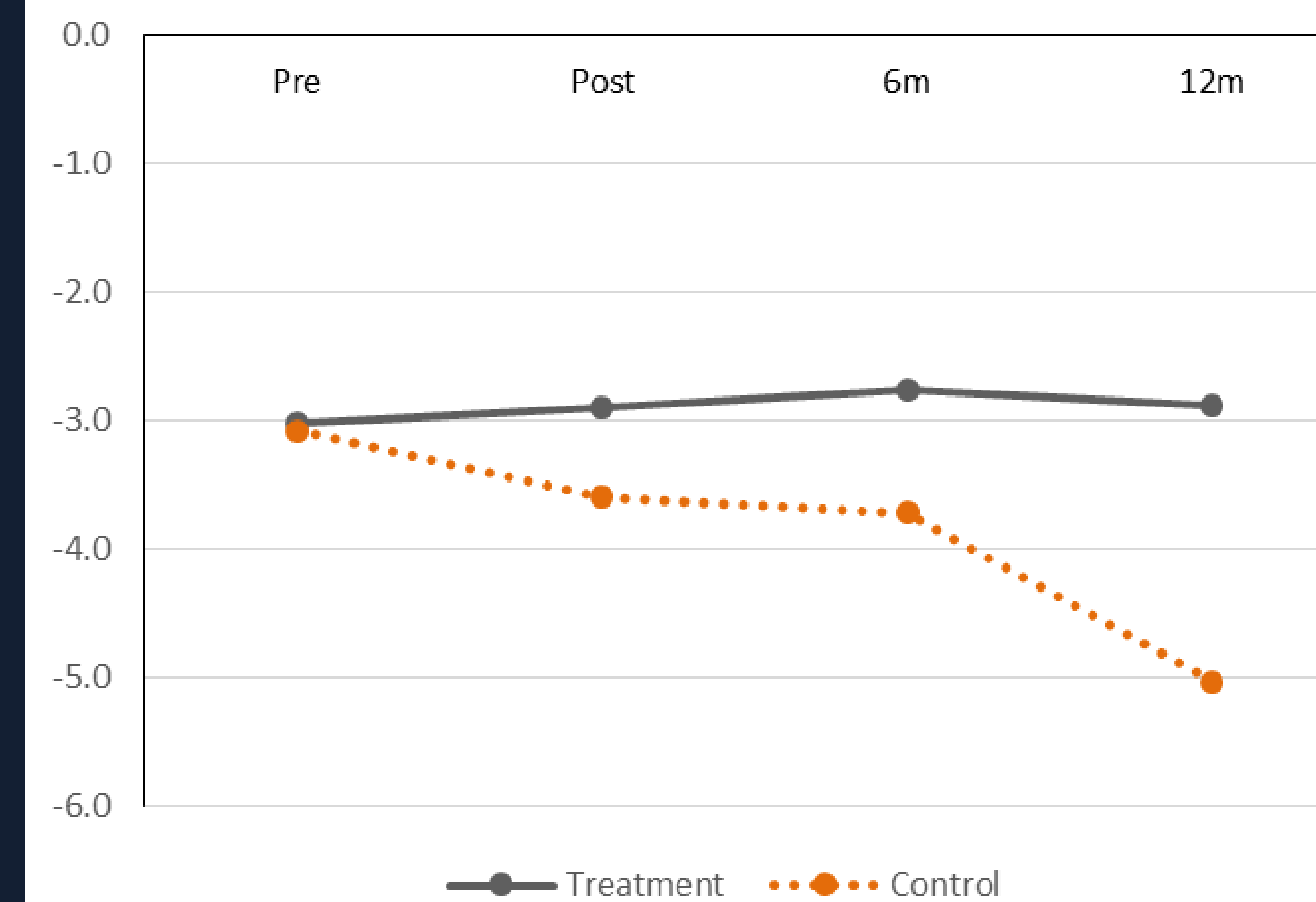
Primary Analysis

Latent class growth analysis¹⁵ was used to classify growth trajectories for IPSyn raw scores. Growth mixture models with varying numbers of classes were estimated with Mplus¹⁶ and the best fitting model was selected by comparing the Akaike information criterion (AIC) and Bayesian information criterion (BIC) from each model. Treatment group and pre-intervention delay profile (E vs RE) were then explored as predictors of latent class, controlling for gender, family history, and age at study entry.

RESULTS

Mean IPSyn z-scores by treatment group are reported in Figure 1.

Figure 1. IPSyn z-scores by Study Time Point



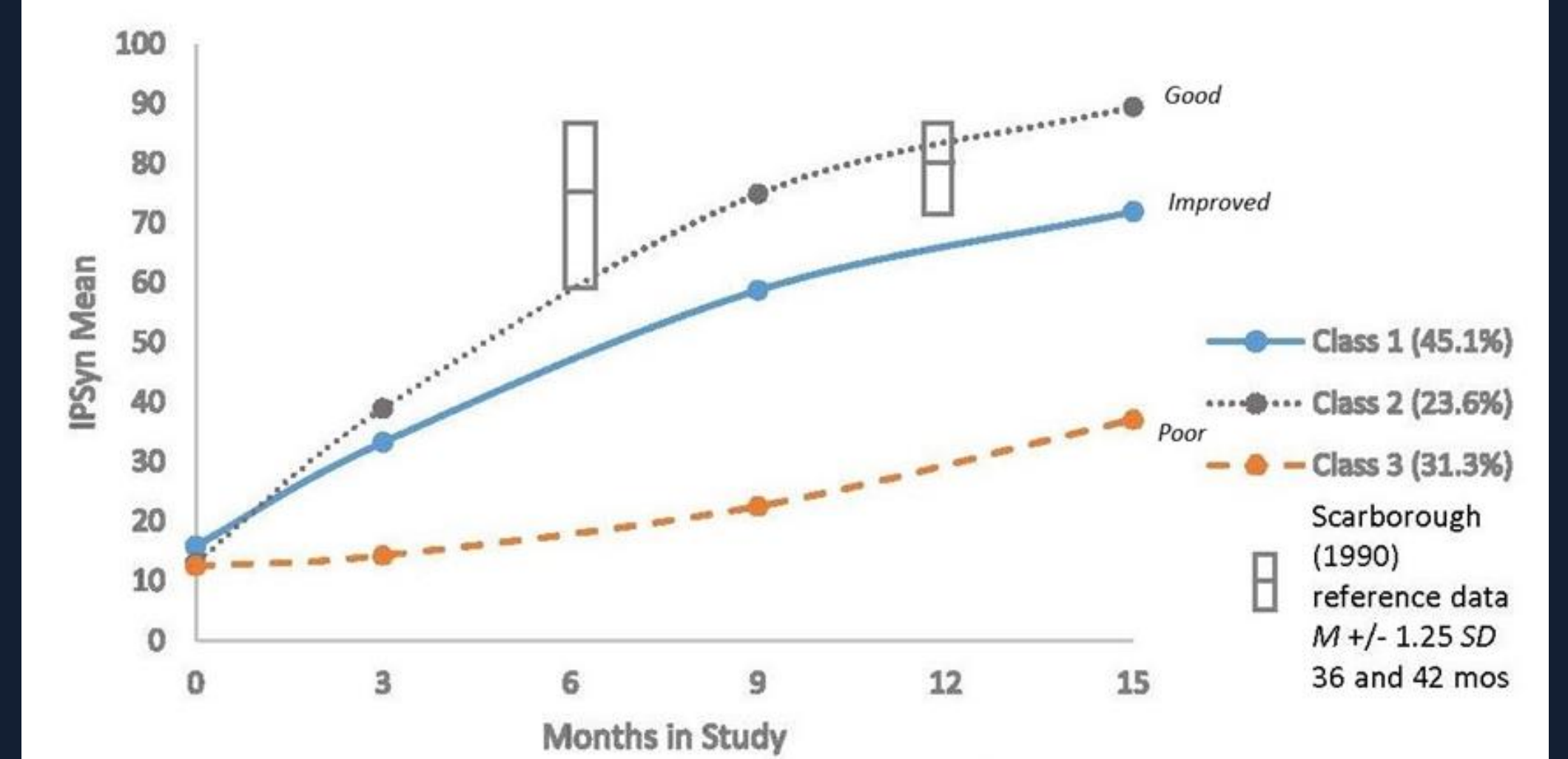
- Children who received treatment maintained their status relative to their peers; however, their expressive syntax remained severely delayed (*M* *z* = -2.88, 12-month follow-up).
- In contrast, children in the control group lost ground relative to age expectations (*M* *z* = -5.04, 12-mos follow-up).

Three classes were identified (Figure 2): Class 1: *improved* (*n*=44), Class 2: *good* (*n*=11), and Class 3: *poor*, *n*=32).

Table 1. Predictors of Latent Class Membership

Parameterization using Reference Class 1						
	Estimate	S.E.	Est./S.E.	P-Value	OR	Inverse OR
Class #2 On						
Family Hx	0.97	1.05	0.92	0.36	2.62	
Gender	4.47	2.03	2.21	0.03	86.92	
Tx Group	1.31	1.00	1.31	0.19	3.70	
RE Type	-1.05	1.05	-1.00	0.32	0.35	2.86
Age T0	-3.16	1.92	-1.65	0.10	0.04	23.52
Class #3 On						
Family Hx	-0.85	0.73	-1.16	0.25	0.43	2.33
Gender	0.51	0.90	0.57	0.57	1.66	
Tx Group	-0.78	0.61	-1.27	0.21	0.46	2.18
RE Type	2.58	1.25	2.06	0.04	13.22	
Age T0	-1.53	0.64	-2.38	0.02	0.22	4.60
Intercepts						
Class #2	-4.35	2.46	-1.77	0.08		
Class #3	-4.52	2.39	-1.89	0.06		
Parameterization using Reference Class 2						
	Estimate	S.E.	Est./S.E.	P-Value	OR	Inverse OR
Class #1 ON						
Family Hx	-0.97	1.05	-0.92	0.36	0.38	2.62
Gender	-4.47	2.03	-2.21	0.03	0.01	86.92
Tx Group	-1.31	1.00	-1.31	0.19	0.27	3.70
RE Type	1.05	1.05	1.00	0.32	2.86	
Age T0	3.16	1.92	1.65	0.10	23.52	
Class #3 ON						
Family Hx	-1.81	0.95	-1.92	0.06	0.16	6.12
Gender	-3.96	1.61	-2.46	0.01	0.02	52.20
Tx Group	-2.09	0.99	-2.10	0.04	0.12	8.06
RE Type	3.63	1.59	2.28	0.02	37.86	
Age T0	1.63	1.72	0.95	0.34	5.11	
Intercepts						
Class #1	4.35	2.46	1.77	0.08		
Class #3	-0.17	2.80	-0.06	0.95		

Figure 2. Three-class Model: Growth Curve Trajectory for IPSyn Raw Scores



- Children who received treatment were 8 times (*p* = .035) more likely to have *good* outcomes than *poor* outcomes.
- Children with RE delays were 13 times (*p* = .039) more likely to have *poor* outcomes than *improved* outcomes and 38 times (*p* = .023) more likely to have *poor* outcomes than *good* outcomes.
- Further analysis of NDW revealed that 84% of children with *poor* outcomes had slow early vocabulary growth.

CONCLUSIONS

The study has three major implications.

1. Toddlers with both receptive and expressive delays are at elevated risk for poor grammatical outcomes.
2. Early intervention that increases vocabulary growth *before age 3* appears necessary to improve grammatical outcomes. The majority of children with poor outcomes had very limited vocabulary growth in the first 3 months of the study.
3. Early interventions for toddlers at-risk for DLD should systematically target syntax to maximize children's language outcomes.

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