

Gross and fine motor skills differentially predict expressive and receptive language outcomes

Background and Aims

- Motor and language skills can be parsed into two categories per area: gross and fine motor, and receptive and expressive language.
- Acquisition of gross motor skills (e.g., walking) is predictive of increases in receptive and expressive language¹. Fine motor skills (e.g., block building, design copy) from 12-24 months are also predictive of expressive language outcomes at 36 months².
- Similarly, consistent hand use for fine motor skills from 18-24 months is related to receptive and expressive language at 36 months³.
- It remains unclear whether gross and fine motor skills contribute differentially to receptive and expressive language outcomes.
- Aim:** Investigate concurrent and predictive relations of gross and fine motor skills towards receptive and expressive language development.

Methods

- Participants:** 81 infants (46% female) were followed longitudinally at 12 and 24 months. Data are part of a larger study on social development.
- Language and Motor Measures:** the Mullen Scales of Early Learning (MSEL) were administered at 12 and 24 months. Language was measured using the MSEL language subscales for receptive language (RL) and expressive language (EL). Motor skills were measured using the MSEL motor subscales for gross motor (GM) and fine motor (FM).
- Analyses:** A cross-lagged model analysis⁴ was conducted to assess the relations between GM and FM skills at 12 and 24 months to RL and EL skills at 12 and 24 months (see **Figure 1**). Analyses were conducted in MPlus using maximum likelihood estimation to address missing data across time points.

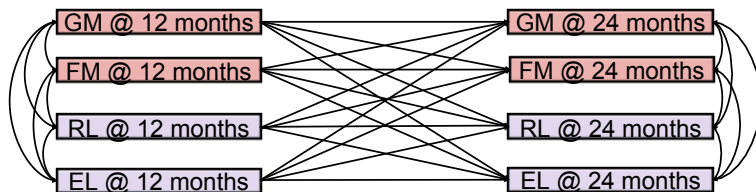


Fig. 1 Conceptual cross-lag model

Results

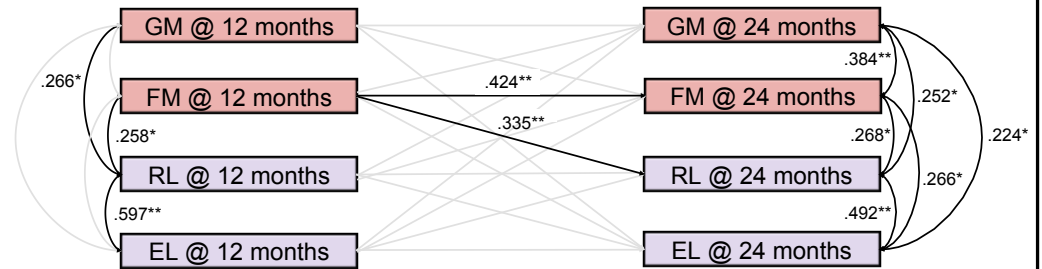


Fig. 2 Cross-lagged and concurrent effects of motor and language

* $p < .05$, ** $p < .01$

Table 1

Means and Standard Deviations

Variable	Mean	SD
GM 12 months	50.45	13.65
FM 12 months	50.96	11.17
RL 12 months	46.08	7.42
EL 12 months	51.21	10.10
GM 24 months	48.53	11.70
FM 24 months	42.50	10.39
RL 24 months	51.96	10.12
EL 24 months	52.68	9.91

• **Table 1** displays the means and standard deviations of the model variables.

• FM skills at 12 months predicted RL, but not EL, skills at 24 months. GM skills at 12 months did not predict RL or EL skills at 24 months.

• Concurrent relations between motor and language skills at 12 and 24 months were also found (**Fig 2**).

Discussion

- Baseline fine motor skills at 12 months on the MSEL include reaching and grasping, which are actions that likely afford novel opportunities for interactions with objects and caregivers that foster language growth.
- Baseline gross motor skills at 12 months on the MSEL include the infant pulling themselves up to stand, or their ability to sit without using hands/arms for support. Utilizing the MSEL gross motor subscale at 12 months may not yet capture gross motor skills that previous research has identified as predictive of language learning (e.g., walking).
- Future work should assess these relations at different ages, as the relations between motor skills and language likely changes across development.

For more information about our studies visit
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¹Walle et al., 2014, DOI: 10.1037/a0033238

²LeBarton et al., 2013, DOI: 10.1111/desc.12069

³Nelson et al., 2017, DOI: 10.1002/dev.21560

⁴Sleight et al., 2012. Autoregressive and Cross-Lagged Panel Analysis for Longitudinal Data.