

# The Early Motor Questionnaire (EMQ): An exploration of item structure by age

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## Research Aims:

- Use large sample of parent-report EMQ data to:
  - **Develop age-independent scores**
  - Examine EMQ **stability over time**
  - Determine what factors influence motor development

## Background

- Age is the strongest predictor of overall motor development
  - But skill onset varies significantly between children<sup>1,2</sup>
- Influences of age may mask impact of other factors on early motor development

## Method

- 455 infants **ages 0.5 – 26 months** and their caregivers
  - recruited from 5 institutions
  - 167 families participated more than once at different ages
  - **total of 754 survey responses**
- Parent-completed EMQ with 3 sub scales
  - Gross motor (**GM**)
  - Fine motor (**FM**)
  - Perception-action (**PA**) development.
- Additional information collected
  - **gender** (n=754)
  - **birth weight** (n=521)
  - **parent perceptions** (n=283)



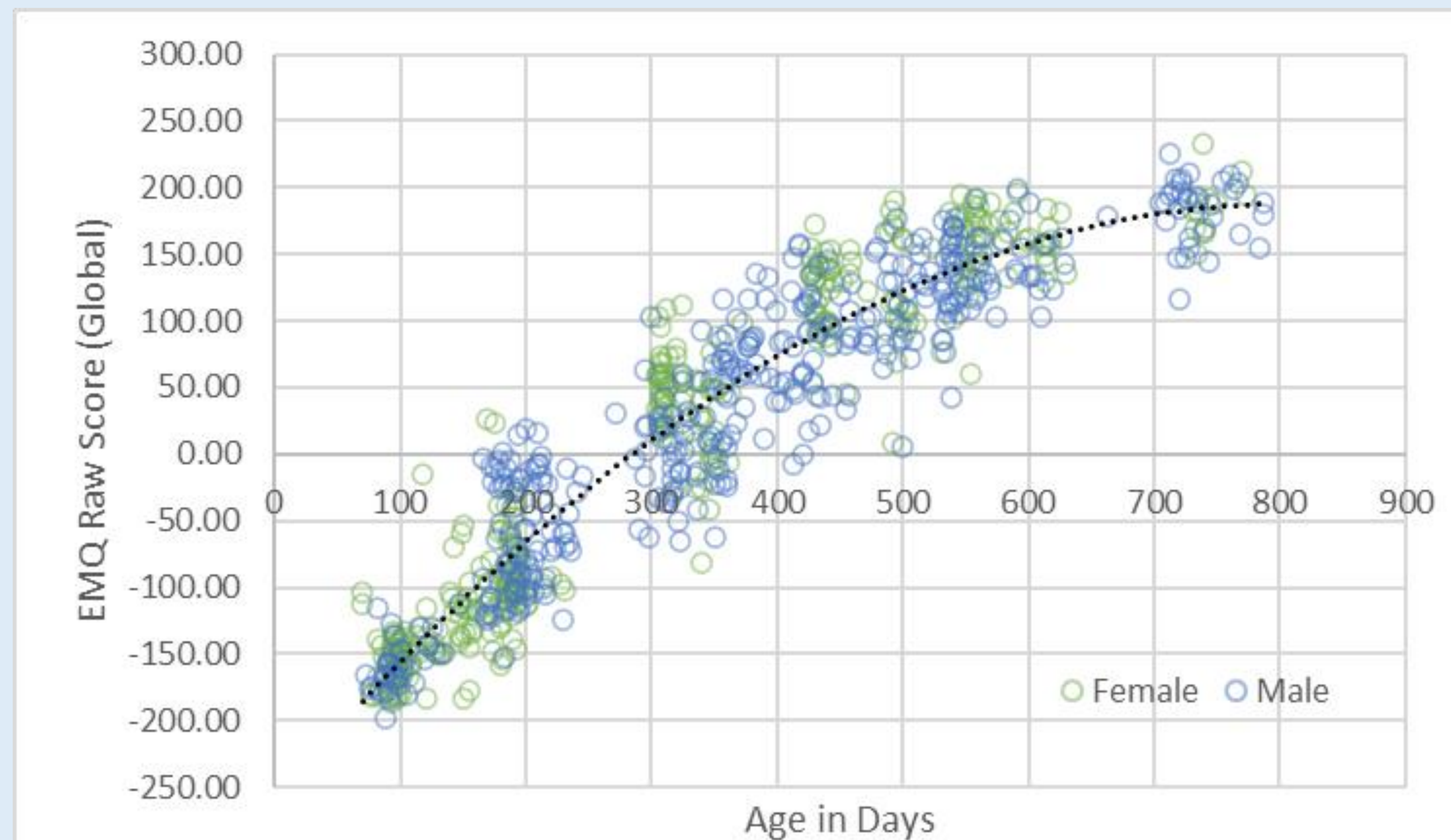
## 1) Polynomial trajectory of EMQ scores allows for calculation of standardized age-independent scores

$$y_{Global} = \left( \left( \frac{Obs_{Global} - ((-0.0007 * age^2) + (1.107 * age) - 260.11) - 2.5619}{36.2596} \right) * 10 \right) + 50$$

$$y_{GM} = \left( \left( \frac{Obs_{GM} - ((-0.0003 * age^2) + (0.4719 * age) - 112.67) - 4.0798}{18.2196} \right) * 10 \right) + 50$$

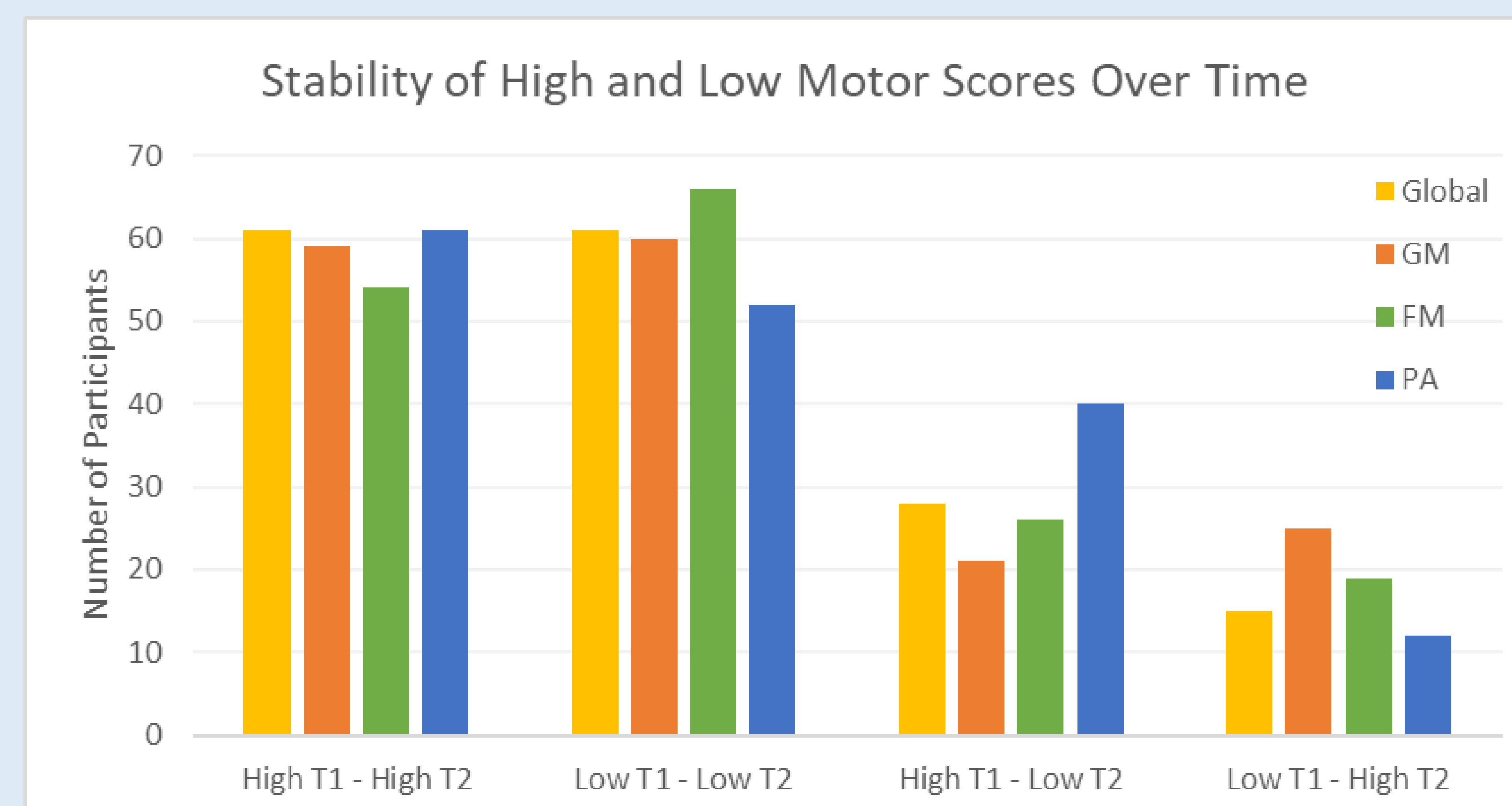
$$y_{FM} = \left( \left( \frac{Obs_{FM} - ((-0.0003 * age^2) + (0.3903 * age) - 96.512) - 4.3476}{15.6245} \right) * 10 \right) + 50$$

$$y_{PA} = \left( \left( \frac{Obs_{PA} - ((-0.0001 * age^2) + (0.2448 * age) - 50.934) + 5.8595}{13.2185} \right) * 10 \right) + 50$$



With our derived formulas, age-independent scores can be calculated for existing or future studies using the EMQ

## 2) Age-adjusted EMQ scores are relatively stable over time



## 3) Gender and birth-weight may influence motor development

- Interaction between **gender and survey administration method on Global and GM scores**
  - Need to consider possible underlying effects of gender on other study variables in preliminary analyses
- **No effect of birth weight** in full-term children above 2500gm
  - But consistently reported in pre-term and low birth-weight infants<sup>3</sup>
- No effect of parent perceptions
  - **Confirming the absence of bias in parent reported motor development**

## Future Directions

- Future planned analyses will study **impact of socioeconomic status** on motor development using age-independent scores
- Additional time points will be collected to explore the utility of age-independent scores in **characterizing the trajectory of motor development**

## References

1. Adolph, K. E., Young, J. W., Robinson, S. R., & Gill-Alvarez, F. (2008). What is the shape of developmental change? *Psychological Review*, 115(3), 527-543. doi:10.1037/0033-295x.115.3.527
2. Libertus, K., & Smith, D.K. (2020). Milestones: Physical Development from Birth to Age 3. In J. B. Benson (Ed.), *Encyclopedia of Infant and Early Childhood Development* (2nd ed.); Elsevier.
3. De Kieviet, J. F., Piek, J. P., Aarnoudse-Moens, C. S., & Oosterlaan, J. (2009). Motor development in very preterm and ver low-birth-weight children from birth to adolescence: A meta-analysis. *JAMA*, 302 (20), 2235-2242. doi:10.1001/jama.2009.1708

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