

Duquesne University

Duquesne Scholarship Collection

Graduate Student Research Symposium

2020-03-31

Functional Sitting Skill Development, Sitting Posture and the Relationship to Object Permanence in Infants with Motor Delays

Karl Jancart
Duquesne University

Jessica Spirnak
Duquesne University

Claire Boe
Duquesne University

Amber Delprince
Duquesne University

Regina Harbourne
Duquesne University

Follow this and additional works at: <https://dsc.duq.edu/gsr>



Part of the [Developmental Psychology Commons](#), and the [Physical Therapy Commons](#)

Functional Sitting Skill Development, Sitting Posture and the Relationship to Object Permanence in Infants with Motor Delays. (2020). Retrieved from <https://dsc.duq.edu/gsr/2020/proceedings/5>

This Poster is brought to you for free and open access by Duquesne Scholarship Collection. It has been accepted for inclusion in Graduate Student Research Symposium by an authorized administrator of Duquesne Scholarship Collection.

Background/Purpose

- Object Permanence is the ability to understand that objects continue to exist even when they cannot be observed.
- Object permanence, a cognitive construct, is grounded in infants' everyday perceptual-motor experience, such as sitting and object interaction.¹⁻²
- The development of sitting may also contribute to building cognition through object understanding.
- Adequate postural control in sitting allows infants to process visual information and use their hands freely to manipulate objects, which facilitates cognitive development.³
- It is not clear how sitting development relates to object permanence in infants with motor delays.
- The purpose of this study was to investigate the relationship of two factors: functional sitting skill development, measured by a standardized observational test, and sitting posture, measured by angular forward lean of the trunk in sitting.
- 25 infants with severe motor delays were assessed for gains in object permanence, angular trunk lean, and functional sitting between baseline and 3 months.

Results

- A significant regression equation was found ($F(2,22)=9.63, p<.001$) with a R^2 of .467. However, only GMFMsit was a significant predictor of object permanence scores ($t=4.03, p=0.001$). See graphs
- Infants who progressed in functional sitting skills were able to perform better on the Object Permanence Scale regardless of "normal" posture as measured by AngleSit.

Conclusions

- Infant improvements in sitting skill, even though delayed developmentally and with adaptive postures, may contribute to advancing a cognitive skill such as understanding the permanent characteristics of objects.
- Advancement of object permanence may be related to sitting development, in addition to advances previously noted in self-mobility studies.

Clinical Relevance

- Physical therapists often focus on alignment of posture in both early sitting and standing, at the expense of allowing functional adaptations that can drive cognitive advancement.
- Therapists should understand that infants may be building cognitive constructs during the emergence of sitting function.
- Cognitive tasks should be embedded in tasks focused on building functional motor abilities.

Methods

Participants

- Twenty-five infants with severe motor delays were recruited as part of a larger study (START-Play).
- Inclusion criteria:
 - > 1SD below mean for corrected age on motor domain of the Bayley Scales of Infant and Toddler Development
 - 7-16 months of corrected age
 - Ability to sit propping with their arms for at least 3 seconds but unable to get in and out of sitting (sitting emergence)
- Exclusion criteria: blindness, progressive disorder

Procedure

- The Object Permanence Scale (OPS), the Gross Motor Function Measure-88⁴ Sitting subsection (GMFM-SS), and angular measurement of forward lean of the trunk via the Angles Video Goniometer© App measured at baseline and 3 months.
- The median score of 3 trials of sitting used for trunk lean =AngleSit

Object Permanence Scale (OPS)

- Consists of 7 tasks extracted from developmental studies on object permanence.⁵
- Developed to measure object permanence from minimal to advanced skills, scaled from 0-10.
- During the test, infants sit on the floor or sit in a supportive chair depending on their ability to maintain a sitting position.

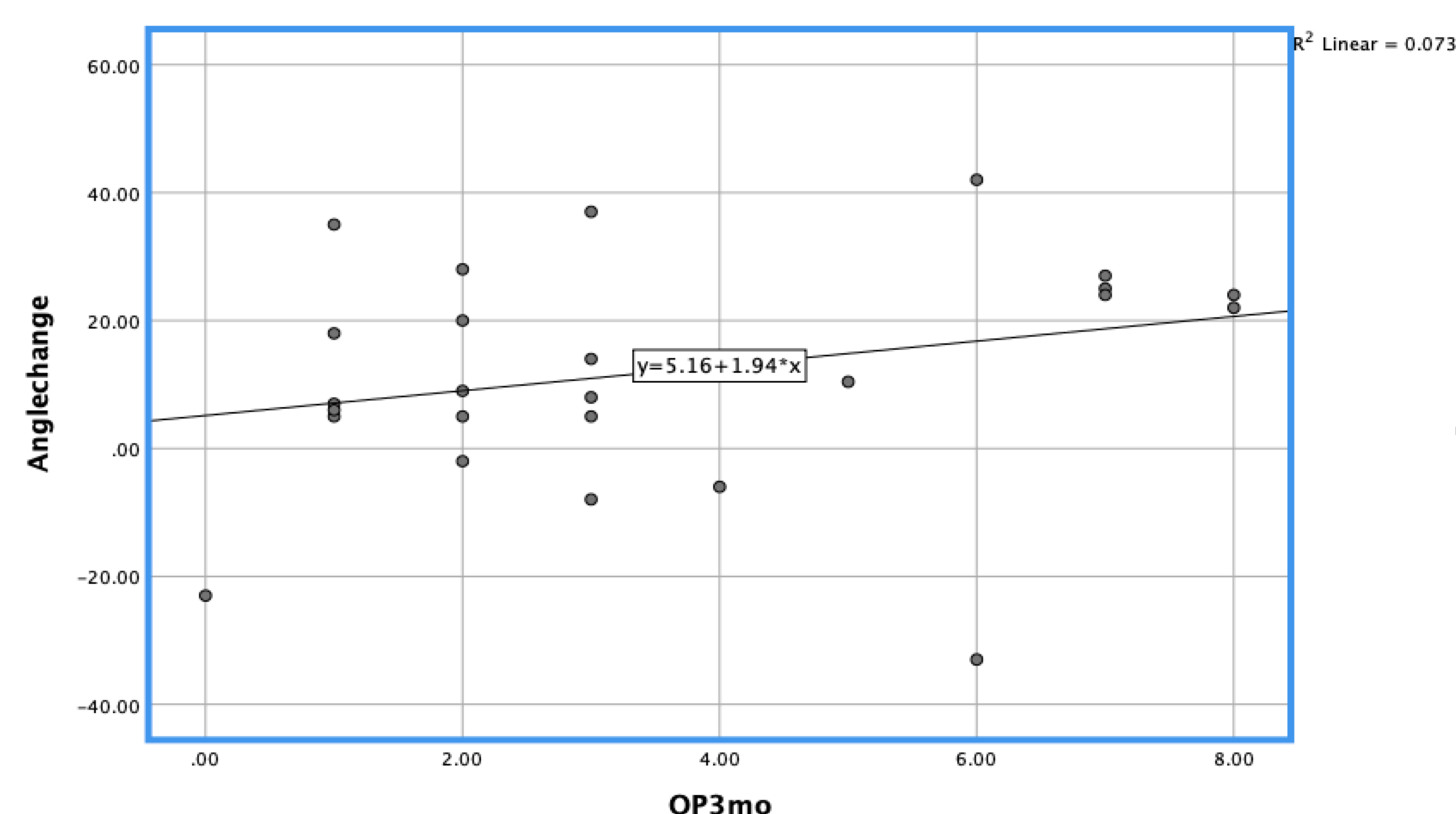
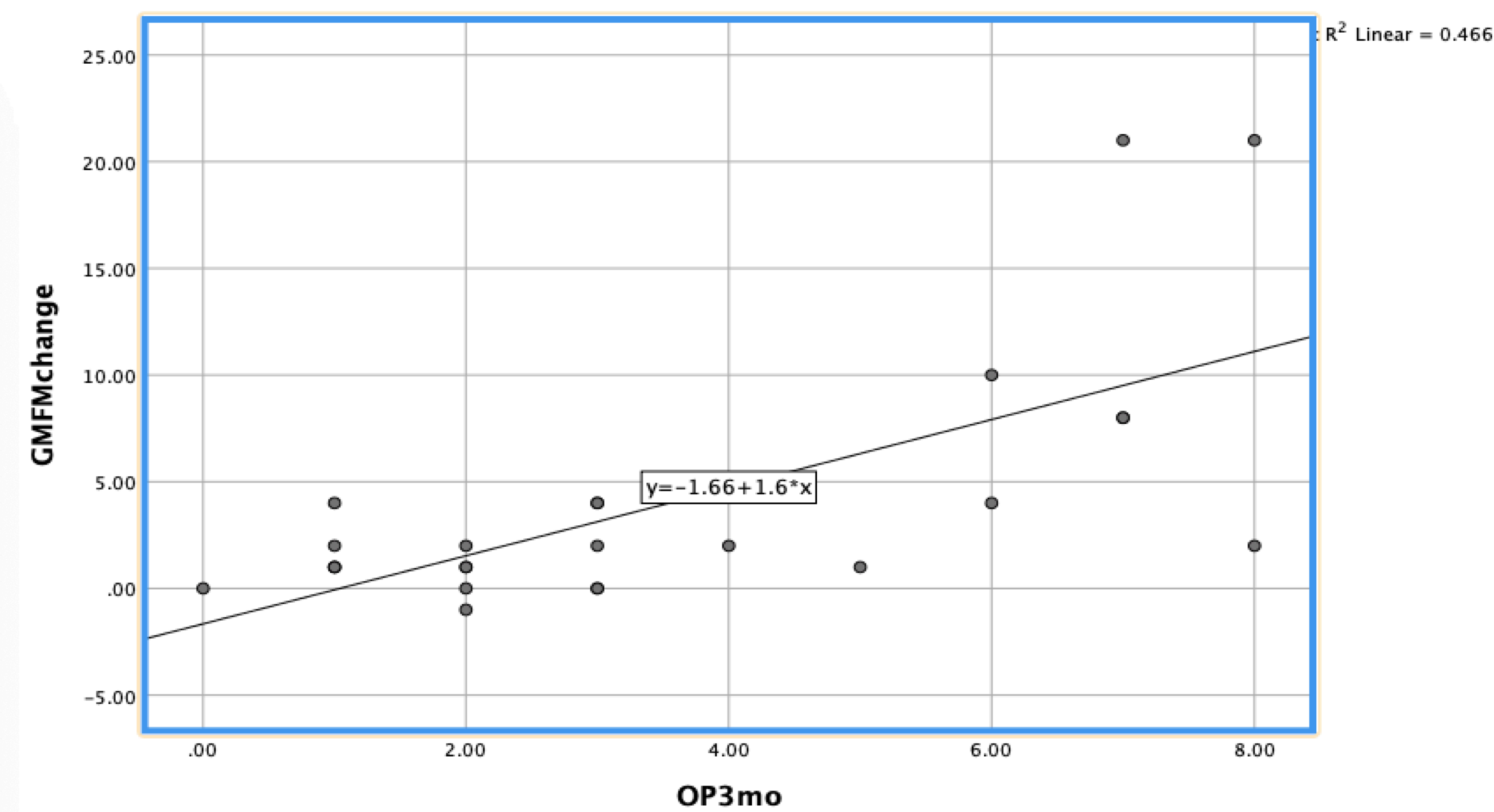
Analysis

- SPSS version 26 used
- Linear regression model with change scores in OPS =dependent variable
- Predictors=change in GMFMsit and change in AngleSit

Angles Video Goniometer © App

- The Angles Video Goniometer©5 application measures forward trunk incline when support released in sitting.
- Coder moved video to point where the infant stops falling forward after trunk release.
- The coder (95% reliability) measured the angle of the trunk to the legs at the lowest point.

Score	Behavior
0	Child does not look at object or follow object
1	Child looks at object in one location, then shifts gaze to new location to find object when object is moved
2	Child re-orient's body part other than head to gaze at moved object when object shifted in space
3	Child re-orient's body posture to follow object moved out of view (e.g., looking over edge of tray in highchair when toy dropped)
4	Looks inside of wide container and attempts to retrieve toy dropped inside
5	Pulls cloth off interesting toy after watching cloth being placed and toy partially visible
6	Pulls cloth off toy after watching toy being slid under cloth
7	Pulls cloth off interesting toy after watching cloth being placed and toy completely covered, with identical cloth nearby
8	Finds a toy hidden under one of two cups
9	Find a toy hidden under one of two cups when the cups are reversed after the toy is hidden
10	Double visual displacement used as a toy is hidden under one cup, removed and hidden a second time under the second cup



References

- Soska, K. C., Adolph, K. E., & Johnson, S. P. (2010). Systems in development: motor skill acquisition facilitates three-dimensional object completion. *Developmental psychology*, 46(1), 129-138.
- Surkar, S. M., Edelbrock, C., Stergiou, N., Berger, S., & Harbourne, R. (2015). Sitting postural control affects the development of focused attention in children with cerebral palsy. *Pediatric Physical Therapy*, 27(1), 16-22.
- Lobo, M. A., Harbourne, R. T., Dusing, S. C., & McCoy, S. W. (2013). Grounding early intervention: physical therapy cannot just be about motor skills anymore. *Physical Therapy*, 93(1), 94-103.
- Russell, D., Rosenbaum, P. L., Wright, M., & Avery, L. M. (2013). *Gross Motor Function Measure (GMFM-66 and GMFM-88) User's Manual*, 2nd Edition: Wiley.
- Lowe, J. R., Duncan, A. F., Bann, C. M., Fuller, J., Hintz, S. R., Das, A., ... & Watterberg, K. L. (2013). Early working memory as a racially and ethnically neutral measure of outcome in extremely preterm children at 18–22 months. *Early human development*, 89(12), 1055-1061.

Acknowledgement

This research was funded by the US Department of Education, IES grant (NCT02593825) awarded to the START-Play Consortium.

For any questions about this research, please contact Karl Jancart: jancartk@duq.edu