THE RELATIONSHIP BETWEEN DEVELOPING SITTING POSTURAL CONTROL AND OBJECT PERMANENCE IN INFANTS WITH NEUROMOTOR DISORDERS

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BACKGROUND

- Object permanence is an important cognitive construct that develops during early life
- Object permanence is the ability to understand and remember that objects or people continue to exist even when they cannot be observed or sensed in any way
- The construct of object permanence links to motor skill development and contributes to building understanding of object properties[1-2]
- The purpose of this study was to examine the change in object permanence skill over time as sitting skills advanced, in infants with neuromotor delays

Participants

- Nineteen infants receiving early intervention services for motor delay
- Recruited as part of a larger START-Play study
- Mean age at entry = 11.8 mo, SD = 3 mo
- Inclusion criteria: >1SD below mean for corrected age on motor Bayley and ability to prop sit for at least 3 seconds
- Exclusion criteria: Blindness, diagnosis of progressive disorder, ability to transition in and out of sitting

METHODS

START-Play Scale for Object Permanence

Score	Behavior
0	Child does not look at or follow object
1	Child looks at object in one location, then shifts gaze 45° to find object when object is moved
2	Child re-orients body to gaze at moved object when object shifted in space
3	Child re-orients body posture to follow toy moved out of view (Example: looking over edge of tray in high chair 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[3]
6	Pulls cloth off toy after watching toy being slid under cloth[3]
7	Pulls cloth off interesting toy after watching cloth being placed, with identical cloth nearby[3]
8	*Finds a toy hidden under one of two cups (item 40 in cognitive Bayley)[4]
9	*Find a toy hidden under one of two cups when the cups are reversed after the toy is hidden (item 45 in cognitive Bayley)[4]
10	*Double visual displacement used as a toy is hidden under one cup, removed and hidden a second time under the second cup (item 50 in cognitive Bayley)[4]

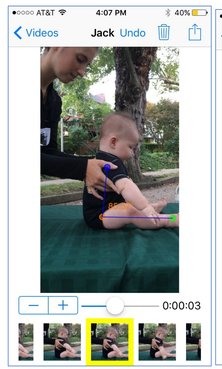
*Taken from studies of early working memory, recommended as predictors of later executive function.

Procedure

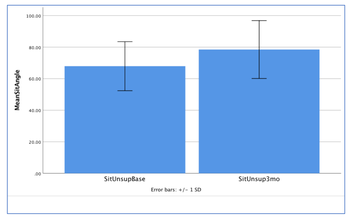
- Object permanence test done with sitting support as needed
- Sitting control measured using 3 trials, averaged within a session
- Videos of object permanence testing and sitting control recorded at baseline and after 3 months in home setting
- Videos of sitting and object permanence scored by blinded coders off site

Sitting Postural Control

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

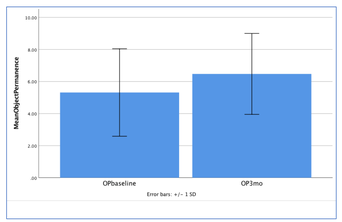


RESULTS



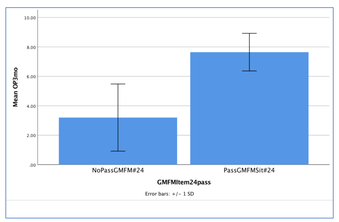
Sitting Posture Improved

- Repeated measures from baseline to 3 months post-baseline showed significant change over time (p=0.004)
- Sitting changed from leaning forward (mean=67°) to (mean=78°)



Object Permanence

- Repeated measures from baseline to 3 months post-baseline showed significant change over time (p=0.022)
- OP scaled scores changed from a mean of 5 to a mean of 7



Infants sitting arms free

- Infants passing item #24 on GMFM (sits at least 3 seconds arms free) scored significantly higher on the object permanence scale than infants with less functional sitting skill (p=0.01)

CONCLUSIONS

- Improvements in sitting skill, even though delayed developmentally, 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

- Therapists should understand that infants may be building specific cognitive constructs during the emergence of sitting
- Cognitive tasks should be embedded in tasks focused on motor skill building

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5. ©Nathanial Joseph Cochran 2017; nathancochran.info

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