

# Early exploratory behaviors in preterm infants and their implications to intervention

**Source:** Babik I, Galloway JC, Lobo MA. *Infants born preterm demonstrate impaired exploration of their bodies and surfaces throughout the first 2 years of life.* Phys Ther 2017; 97:915-25.

**S**tudies indicate that preterm infants present delays in development of gross and fine motor skills, language, learning and integrative, executive and cognitive functions<sup>1,2</sup>. Therefore, it is important to follow them up in early development. In an initial phase, before beginning the object-guided exploratory behavior, the infant perform a series of non-object-oriented exploratory behaviors that were studied by researchers from the University of Delaware.

The longitudinal study followed 24 full-term (FT) infants, 24 preterm without significant brain injury (PT) and 6 preterm with significant brain injury (PTI). The behaviors of the infants were taped at birth and at 1.5, 3, 4, 6, 9, 18 and 24 months of corrected age. Until the corrected age of 9 months, the infants were placed in prone and supine. Since 3 months they were also taped in a seating position. There was no social direct interaction nor with portable objects during the assessment and each posture was taped for 3 minutes. Behaviors were assessed and analyzed by Hierarchical Linear Model.

There was a constant increase in the maintenance of the head in midline in all postures. In prone and supine, such behavior was more frequent in FT, followed by PT and then PTI. There were no differences between groups in seated.

One hand in midline was less frequent in PT and PTI than in FT, in prone and seated. Both hands in midline occurred less frequently in prone in the PTI and in seated for PT and PTI than FT.

One hand fist ed asymmetric decreased with age in the all postures. In supine and prone, PTI showed more frequency than FT and PT. In the sitting position, PT and PTI showed more frequency than FT. For both hands fist ed the percentage of time decreased over the first year in all postures, with both hands opening at approximately 7 months in bench press and prone, and at 12 months in seated. In prone, it was greater for FT than PT and PTI in the first 6 months.

Mouthing the hands was seen more often in PTI than FT and PT in prone. In supine, PTI showed fewer hands in the mouth from 0 to 9 months. It declined steadily from 3 to 15 months for all infants in seated.

Looking at the hands and Looking at hands while acting were watched at very low frequency in prone. In supine, PTI looked less than the others did. In seated, no differences were found between groups.

Touching the body decreased through the months in supine and prone for all infants, and for 3 to 18 months in seated. PTI played less touches than the others did. Touching surfaces in prone increased during the first nine months without differences between groups. In supine, there was a peak at 9 months, with PTI showing more touches than FT and PT. Seated, there was a steady increase from 3 to 18 months for all infants.

Head up in prone was more frequent in FT, followed by PTs and after PTIs. Keeping the raised head increased with age for FT and PTI groups.

PTI infants performed fewer bouts of exploration per minute than other infants from 6 to 9 months in prone and from 6 to 24 months in seated. Over the age, all infants increased the separate behaviors performed. In prone, FT infants showed greater variability than PT and PTI. In seated, FT and PT showed greater variability

than PTI. For the combined behaviors performed, FT performed greater variety than all PT. PT performed a greater variety than PTI in seated.

The results show the delay of preterm infants, especially those with significant brain injury in the acquisition of important motor milestones, such as cervical and upper limb control.

**Commentary by:** Jocelene de Fátima Landgraf PT, PhD;  
Jaqueline Almeida Pereira PT, MSc.  
Department of Physical Therapy,  
Federal University of Rio de Janeiro.  
Raquel de Paula Carvalho PT, PhD.  
Department of Human Movement Science,  
Federal University of São Paulo.

If these non-object-oriented exploratory behaviors are not present, delays are expected in object-oriented exploratory behaviors such as reaching. A systematic review showed that preterm infants performed more bimanual, with increased movement units and variable postural muscle activity when compared with full-term infants<sup>3</sup>. Furthermore, preterm at 6 and 7 months achieved slower reaches and greater adjustments in the attempt to obtain successful holds<sup>4</sup>. However, we should consider the gestational age of the preterm baby because more similarities than differences in exploratory behavior of objects was found in late preterm (more than 34 weeks of gestational age) than full term infants<sup>5</sup>.

Therefore, the present study reinforces the literature about the need of early follow-up programs to detect and intervene in the preterm infant population. A systematic review highlighted the variability in early intervention programs and the difficulty in identifying the most effective intervention package<sup>6</sup>. However, we can emphasize that exploratory non-object-oriented behaviors should be stimulated during the intervention. It is believed that practicing/repeating such skills during therapy could lead to increase such behaviors. Increasing such behaviors would increase the possibility of providing fundamental experiences for the future development of these children. It is important that new studies verify the effects of intervention using such behaviors as part of rehabilitation for immediate and long-term effects on gross and fine motor development, language, cognition, and other aspects of child development.

## References

1. Cabral TI, da Silva LG, Tudella E, Martinez CM. *Motor development and sensory processing: a comparative study between preterm and term infants*. Res Dev Disabil 2015 Jan 1;36:102-7.
2. Toulmin H, Beckmann CF, O'Muircheartaigh J, Ball G, Nongena P, Makropoulos A, Ederies A, Counsell SJ, Kennea N, Arichi T, Tusor N. *Specialization and integration of functional thalamo cortical connectivity in the human infant*. Proc Natl Acad Sci USA 2015 May 19;112(20):6485-90.
3. Guimarães EL, Cunha AB, Soares DD, Tudella E. *Reaching behavior in preterm infants during the first year of life: A systematic review*. Motor control 2013 Oct;17(4):340-54.
4. Toledo AM, Tudella E. *The development of reaching behavior in low-risk preterm infants*. Infant Behav Dev 2008 Sep 1;31(3):398-407.
5. Soares DA, von Hofsten C, Tudella E. *Development of exploratory behavior in late preterm infants*. Infant Behav Dev 2012 Dec 1;35(4):912-5.
6. Orton J, Spittle A, Doyle L, Anderson P, Boyd R. *Do early intervention programmes improve cognitive and motor outcomes for preterm infants after discharge? A systematic review*. Dev Med Child Neurol 2009 Sep;51: 851-9.