Preliminary Results of the Developmental Assessment of Healthy Preterm Babies of the Kangaroo Mother Care Program in Bogotá Using a Test Based on the Bayley Scales of Infant and Toddler Development, Third Edition, and a Test Based on the Griffiths Scales of Mental Development, Revised Edition.

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Importance of developmental assessment

- Babies who are born prematurely are in higher risk of neurological disorders in comparison to full-term infants, as premature birth exposes the infant to a range of developmental risks (Feldman, Eidelman, Sirota & Weller, 2002).

- The developmental area most commonly affected is the cognitive one (Johnson & Marlow, 2006), and various studies have found delays in the motor development of preterm infants (Lundqvist-Persson, Lau, Nordin, Bonas & Göran, 2011; Prins,van Lindern, van Dijk & Versteegh, 2010).

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Developmental assessment of preterm babies

- Questioning of the value of standardized tests: Standardized scores (normalized) may not be useful for describing clinical symptoms and could also be problematic for those tests that produce non-normal distributions in populations with a typical development and in clinical populations? (Campell, Brown, Cavanagh, Vess & Segall, 2008).
- Thorough understanding of child development and the use of a comprehensive, well researched measure are essential in the evaluation process (Luiz, Foxcroft & Povey, 2006) for both full term and preterm babies.
- Assessment measures can be used effectively in the early identification of developmental delays during the first year of life and in preventing barriers to learning and development in early childhood.

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The Present Study

Objective:

- ✓ Describe the development of a group of preterm infants by obtaining the normative values for a test based on the Bayley Scales of Infant Development (Third Edition) and a test based on the Griffiths Scales of Mental Development (Revised Edition) at 3, 6, 9 and 12 months of the child's corrected age.
- ✓ Pinpoint possible differences and similarities from both test regarding the developmental outcomes in this particular sample.

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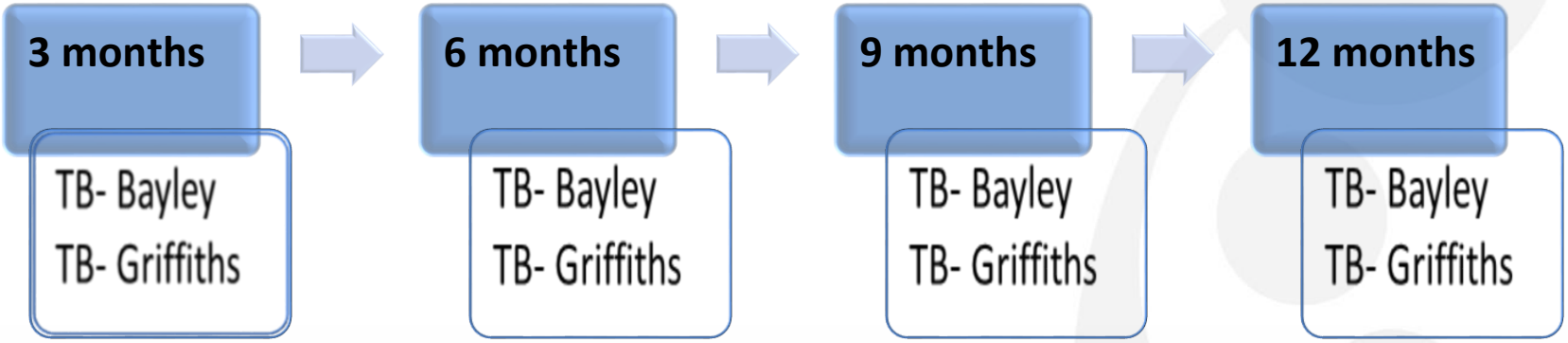
Design



- Corrected chronological age
- Randomly assigned to tests
- 8 days maximum between evaluations
- Additional socio-demographic information collected
- Optometry measurements

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Participants

- ✓ **311** healthy* preterm babies admitted to a Kangaroo Mother Care Program between 2013 and 2014.

143 (46%)

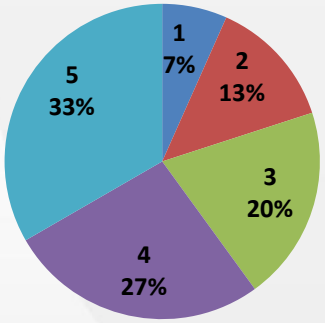
168 (54%)

Median:
Weight: 2110 gr
Height: 45 cm

Median:
34 weeks
(29-36)

Mothers
Age M= 28 yrs

Fathers
Age M= 31 yrs



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Assessment Methods

Tests based on:

The Bayley Scales of Infant and Toddler development, Third Edition

- *Evaluates 5 developmental areas:*
- cognitive
- receptive language
- expressive language
- fine motor
- gross motor

TB-B3

The Griffiths Scales of Mental development, Revised Edition

- *Evaluates 5 functioning domains:*
  - locomotor
  - personal-social
  - hearing and language
  - eye and hand coordination
  - performance.

TB-G2

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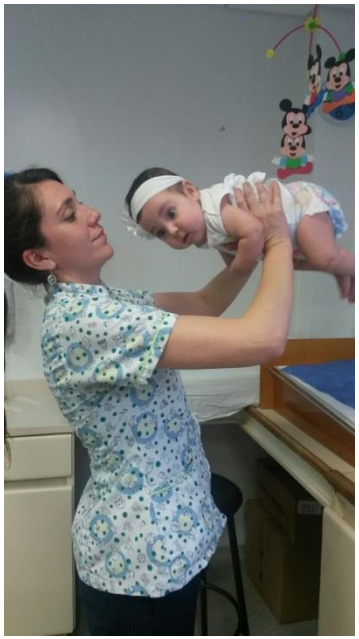
3 months evaluations



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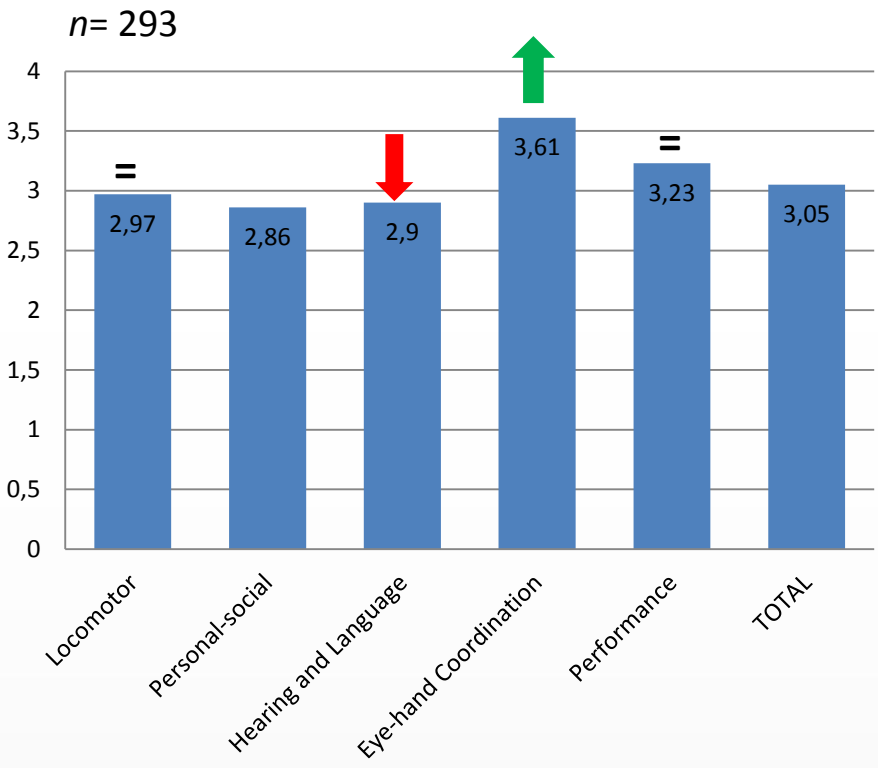
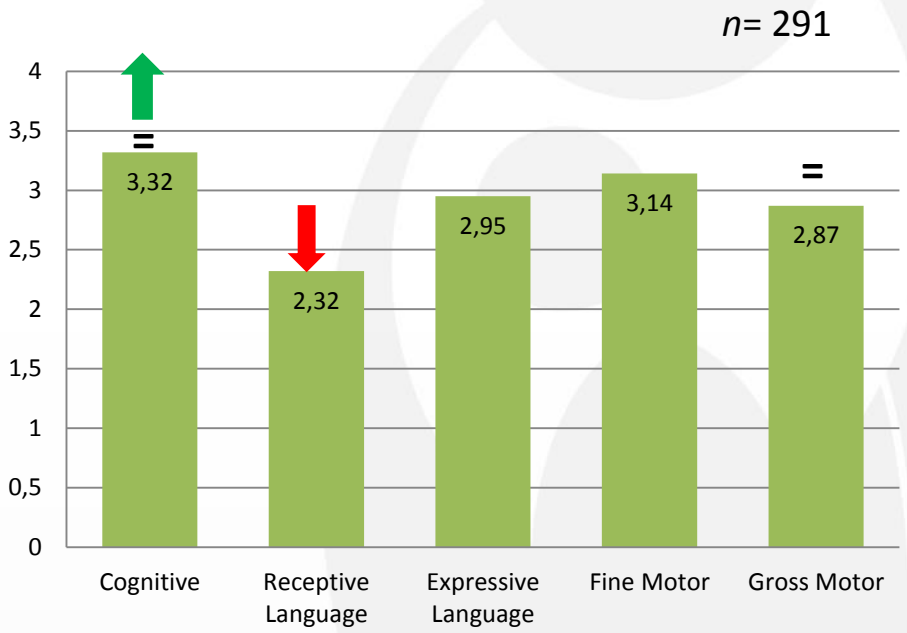
Results: 3 Months

Age Equivalent Test Scores (mean)





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Results: 3 Months

TB – G2

Scales	M	SD	Min - Max
Locomotor	2,97	0,65	0,15 - 4,50
Personal-social	2,86	0,62	1,50 - 5,25
Hearing and Language	2,90	0,62	0,60 - 4,50
Eye-hand Coordination	3,61	0,40	1,00 - 4,25
Performance	3,23	0,46	0,18 - 4,50
TOTAL	***3,05***	0,37	1,50 - 4,00

TB – B3

Scales	M	SD	Min - Max
Cognitive	3,32	0,46	2,00-5,00
Receptive Language	2,32	**1,05**	0,16 - 4,10
Expressive Language	2,95	**1,07**	0,20 - 7,00
Fine Motor	3,14	0,30	2,00 - 4,10
Gross Motor	2,87	0,64	0,16 - 4,10

- ✓ Age-equivalent scores around 3 months similar for both test
- ✓ TB- B3: Receptive Language lower scores // Cognitive higher scores
- ✓ TB- G2: Eye-hand coordination higher scores

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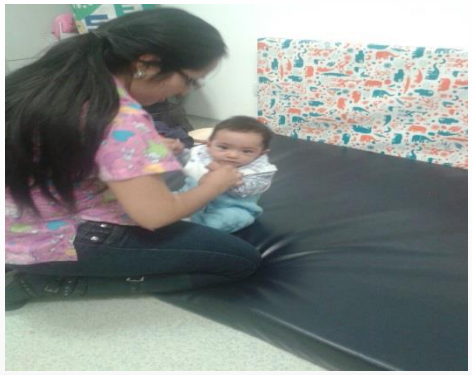
6 months evaluations



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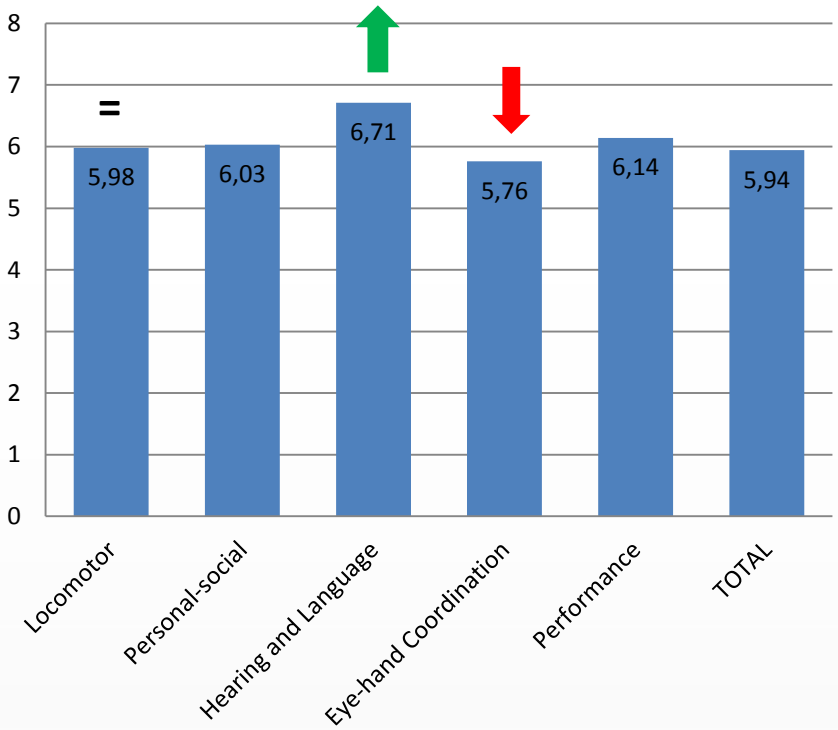
Results: 6 Months

Age Equivalent Test Scores (mean)

n= 231



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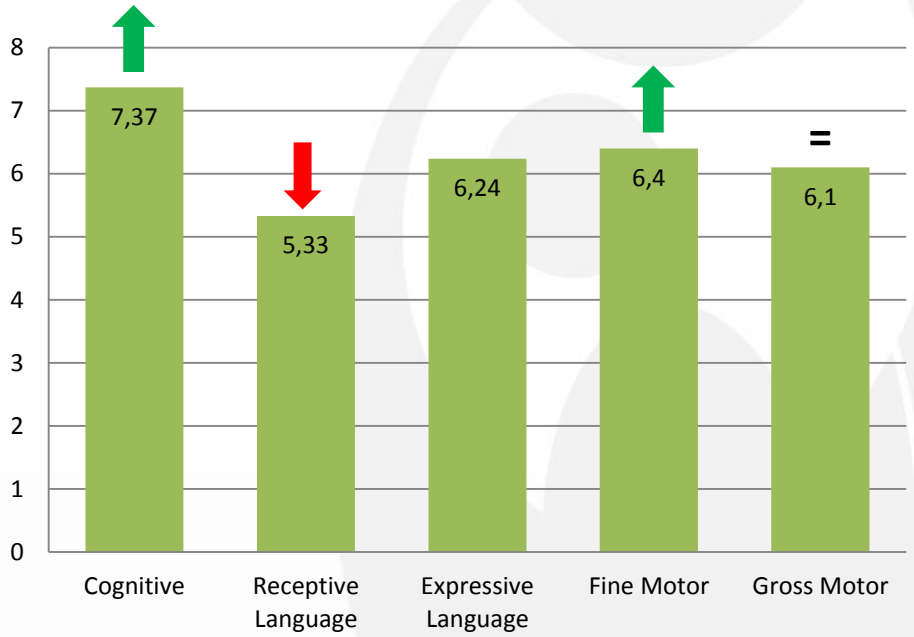

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Results: 6 Months

TB – G2

Scales	M	*SD*	*Min - Max*
Locomotor	5,98	**0,80**	4,50 - 9,50
Personal-social	6,03	**0,84**	4,00 - 7,75
Hearing and Language	6,71	0,69	4,50 - 8,75
Eye-hand Coordination	5,76	0,54	4,50 - 9,00
Performance	6,14	0,47	4,75 - 8,25
TOTAL	5,94	0,44	5,00 - 8,25

TB – B3

Scales	M	*SD*	*Min - Max*
Cognitive	7,37	0,85	3,10 - 9,00
Receptive Language	5,33	**1,17**	2,10 - 10,00
Expressive Language	6,24	**1,60**	2,20 - 10,00
Fine Motor	6,40	0,80	3,10 - 8,00
Gross Motor	6,10	0,87	2,20 - 9,00

- ✓ More variability in scores (for both tests)
- ✓ TB- B3: Low Receptive Language // High Cogntive
- ✓ TB- G2: High hearing and language

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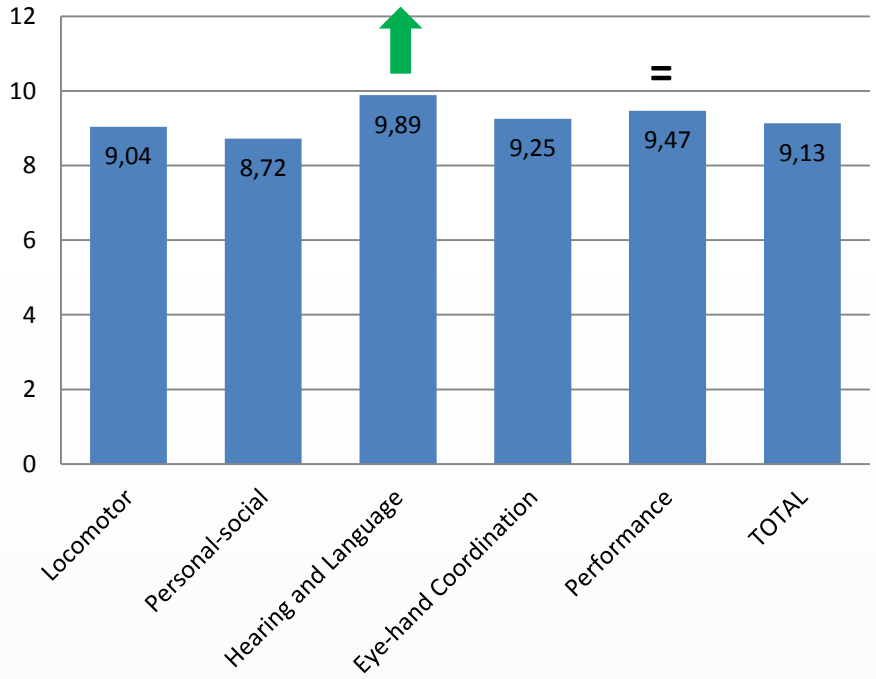
9 months evaluations

Results: 9 months

Age Equivalent Test Scores (mean)

n= 152



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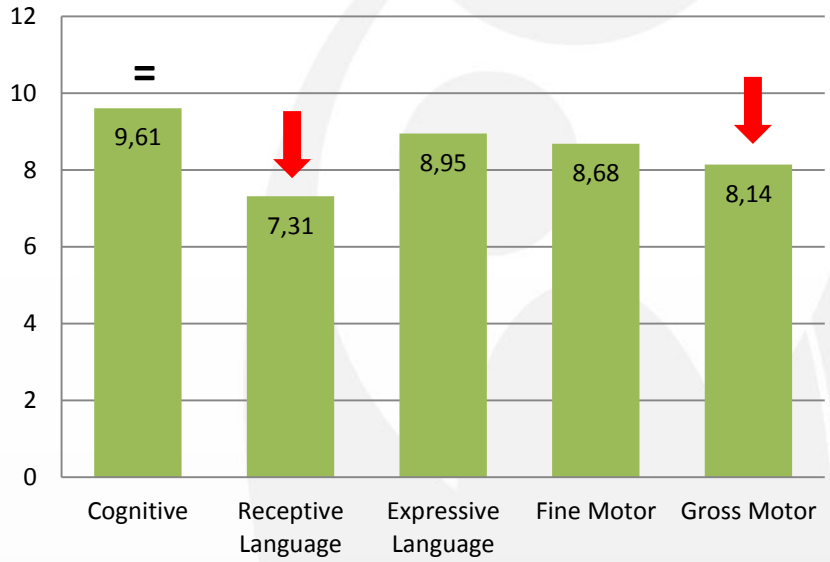

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Results: 9 months

TB – G2

Scales	M	*SD*	*Min - Max*
Locomotor	9,04	**0,94**	6,75 - 11,25
Personal-social	8,72	**0,80**	6,25 - 10,50
Hearing and Language	9,89	0,66	7,00 - 12,00
Eye-hand Coordination	9,25	0,63	7,25 - 11,50
Performance	9,47	**1,1**	5,75 - 11,50
TOTAL	9,13	0,58	7,00 - 10,50

TB – B3

Scales	M	*SD*	*Min - Max*
Cognitive	9,61	**1,19**	6,00 -13,00
Receptive Language	7,31	**1,93**	3,10 - 11,00
Expressive Language	8,95	**1,46**	3,20 - 13,00
Fine Motor	8,68	**0,99**	7,00 - 11,00
Gross Motor	8,14	**1,12**	6,00 - 12,00

- ✓ More variability in scores (+ TB- B3)
- ✓ TB – B3: higher cognitive scores // lower gross motor (than 6 months and other test)
- ✓ TB – G2: lower P-S // Higher eye-hand coordination scores

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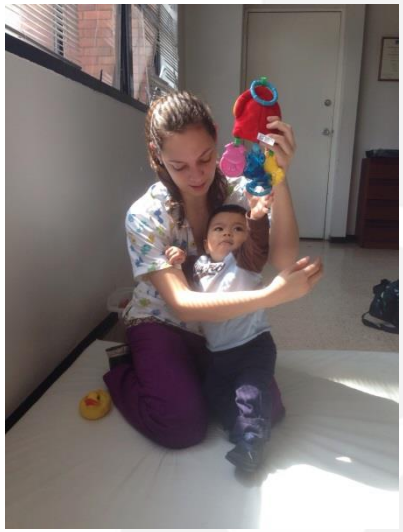
12 months evaluations



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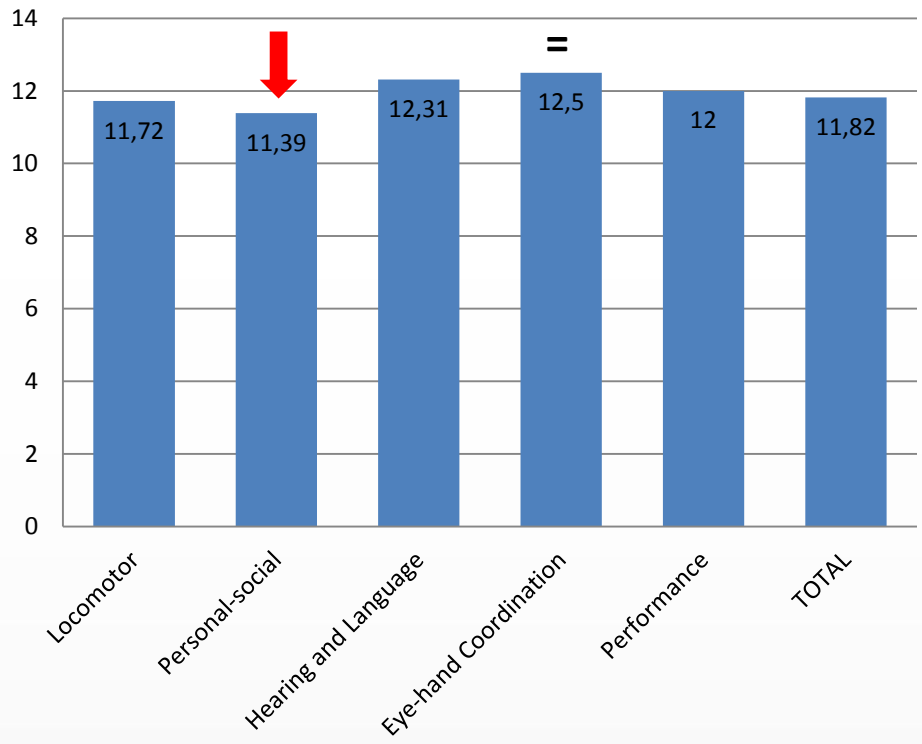
Results: 12 months

Age Equivalent Test Scores (mean)

n= 115



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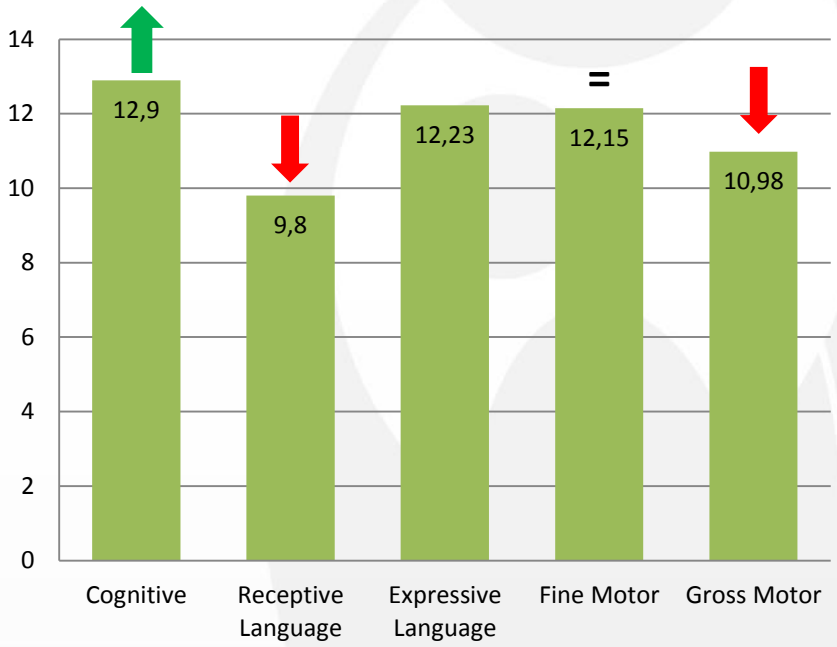

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Results: 12 months

TB – G2

Scales	M	SD	Min - Max
Locomotor	11,72	**1,17**	8,25 - 14,00
Personal-social	11,39	0,75	9,00 - 13,50
Hearing and Language	12,31	0,88	9,25 - 15,50
Eye-hand Coordination	12,5	0,89	10,50 - 15,00
Performance	12	0,87	9,50 - 14,50
TOTAL	11,82	0,69	9,50 - 13,75

TB – B3

Scales	M	SD	Min - Max
Cognitive	12,9	1,58	9,00 - 19,00
Receptive Language	9,8	**2,43**	5,10 - 15,00
Expressive Language	12,23	1,35	9,00 - 16,00
Fine Motor	12,15	**2,11**	8,00 - 17,00
Gross Motor	10,98	1,38	7,00 - 17,00

- ✓ TB- B3 more score variability (see SD)
- ✓ TB- B3: Cognitive still higher // motor skills lower
- ✓ TB- G2: all age equivalent scores closer to 12 months

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In practice: Qualitative insights on tests

TB - G2

- Takes less time
- More flexibility
- Includes more parental report, which may introduce social desirability bias
- More “playfull environment” for assessment – allows for closeness with baby
- Use of mat (vs. table) = more proximity (9 and 12 months)

TB – B3

- More specific items in each subscales allow for easier detection of areas that need improvement
- More rigurous application and punctuation (may not move between scales)
- More complete and specific assessment of language
- Serial items – faster assessment and punctuation
- At 9 and 12 test is longer and baby gets tired easily

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Conclusions: On Preliminary Results

- ✓ More score variability from 6 months on
- ✓ At 12 months, more score variability with TB- B3
- ✓ At 12 months, TB- G2 age equivalent scores around 12 months
- ✓ Higher cognitive scores with TB-B3
- ✓ Very low scores on Receptive Language (TB-B3)
- *Only descriptive information: just a picture of participants' development*
- *At 6, 9 and 12 months data is not complete yet.*

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Next Steps…

- Item-Item comparison (test's scales cannot be compared)
- Revision of TB-B3 receptive language (why such low scores?)
- Correlational analyses of optometry information and developmental areas/items
- Normalization curves for each test
- Explaining why the differences at 6, 9 and 12 months: Environment and Development

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Thank you

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References

Campbell, JM., Brown, RT., Cavanagh, SE., Vess, SF. & Segall, MJ (2008). Evidence-based assessment of cognitive functioning in pediatric psychology. *Journal of Pediatric Psychology, 33*, 9, 999–1014.

Johnson, S. & Marlow, N. (2006). Developmental screen or developmental testing? *Early Human Development*, *1, 82*, 173–183.

Luiz DM, Foxcroft CD and Povey J (2006). The construct validity of the Griffiths Scales of Mental Development: factorial validity study. *South African Joumal of Psychology,* 36, 192-214

Lundqvist-Persson, C., Lau, G., Nordini, P., Bona, E. & Karl-Göran, S. (2011). Preterm infants' early Developmental status is associated with later Developmental outcome. *Acta Pediatrica, 101,* 172-178.

Silva,Naíme Diane Sauaia Holanda, Lamy Filho,Fernando, Gama,Mônica Elinor Alves, Lamy,Zeni de Carvalho, Pinheiro,André do Lago, Silva,Diego do Nascimento. Instrumentos de avaliação do Desenvolvimento infantil SD recém-nascidos prematuros. *Revista Brasileira de Crescimento e Desenvolvimento humano*, *21*, 85-98.

Prins, S.A., Von L9oñpinSDrn, J.S., Van Dijk, S. & Versteegh, F.G.A (2010). Motor Development of premature infants born between 32 and 34 weeks. *International Journal of Pediatrics.* 1-4.

**Images taken from www.google.com (images)*

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