



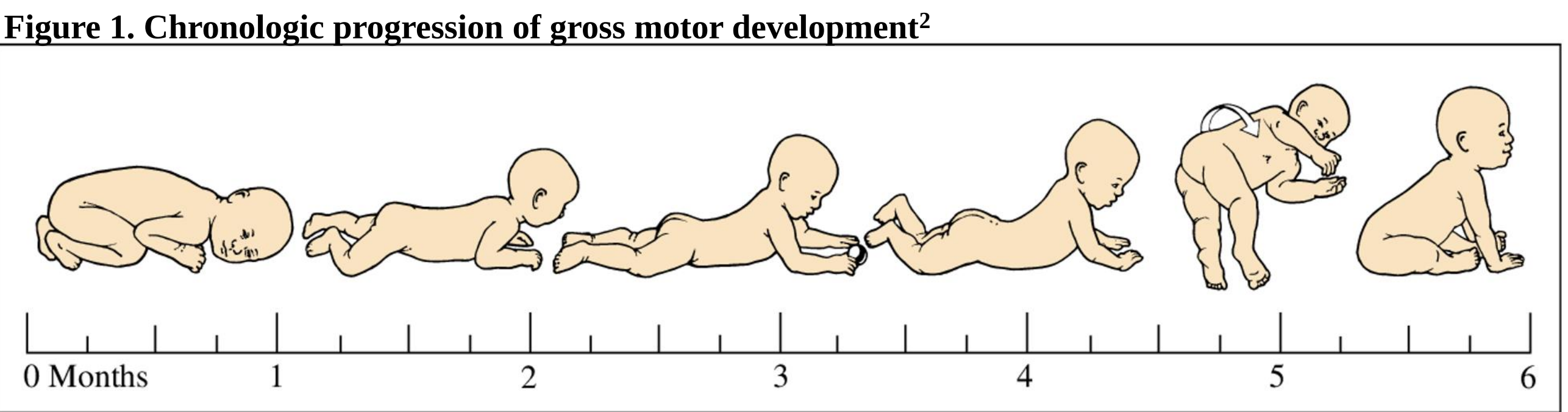
Longitudinal Assessment Of Cephalic Index Norms In A Large Population Of Well Children

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Background

- Cephalic index (CI) is the ratio of head width, or biparietal dimension, to head length, or anteroposterior dimension.
- CI is important in management of positional plagiocephaly, particularly decisions surrounding helmeting
- Our 2020 cross-sectional study¹ demonstrates that CI norms have increased in the wake of the Back to Sleep campaign
- Cross sectional data demonstrate that CI peaks around 6 months, then decreases as infants gain head control and mobility
- This longitudinal cohort study aims to track the natural history of C.I. in well children with serial head measurements

Table 1. Motor Milestones According to Center fo Disease Control and Prevention (CDC)	
Four Month Old	
Holds head steady without support when you are holding him/her	
Holds a toy when you put it in his/her hand	
Uses her arm to swing at toys	
Brings hands to mouth	
Pushes up onto elbows/forearms when on tummy	
Six Months Old	
Rolls from tummy to back	
Pushes up with straight arms when on tummy	
Leans on hands to support him/her-self when sitting	



Methods

- Children ages 0-3 months, 3-6 months, 9-12 months, and 2-3 years were enrolled at well-child appointments. Only subjects with multiple C.I. measurements are included in this cohort
- Cephalic index was obtained by measuring the biparietal and anteroposterior dimensions using a manual caliper
- Birth history, self-identified race/ethnicity, frequency of back sleeping and tummy time were obtained from parents, and analyzed to identify predictors of elevated cephalic index

Results

- Data from our large cross-sectional study (N = 1,187) showed that CI increases linearly from birth until a peak around 6 months of age, then decreases into childhood (Figure 2)
- 100 subjects were included in our longitudinal study. Of these, 91 had two follow up CI measurements and nine had three follow up CI measurements
- Longitudinal cohort demographics are similar to those of our cross-sectional study (Table 2)
- Serial measurements of cephalic index in the longitudinal cohort showed an increase until 6 months of age and then subsequent decrease, mirroring cross sectional findings (Figure 2, Figure 3)

Figure 2. Cephalic Index Cross-sectional and Longitudinal Values by Age

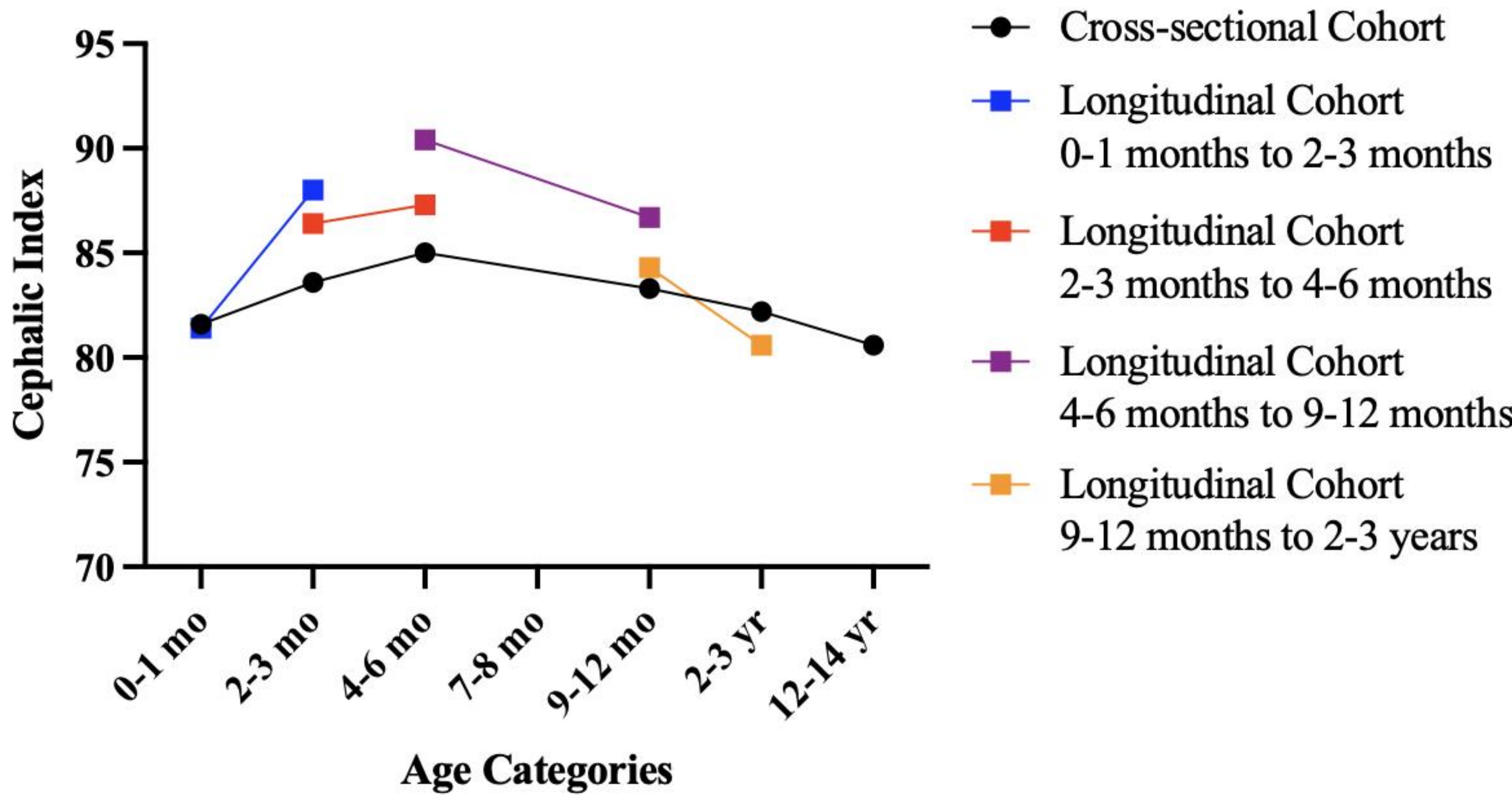


Table 3. Age Distribution of Longitudinal Cohort and Mean Cephalic Index Change Between Time Points

A. Number of Subjects for First and Second Cephalic Index Measurements Distributed into Age Categories						
CI2 Age	0-1 mo	2-3 mo	4-6 mo	7-8 mo	9-12 mo	2-3 yr
CI1 Age	0-1 mo	8	6	1	19	25
	2-3 mo		11	0	1	2
	4-6 mo			0	5	12
	7-8 mo				1	0
	9-12 mo					24
B. Mean Cephalic Index Change Distributed into Age Categories						
CI2 Age	0-1 mo	2-3 mo	4-6 mo	7-8 mo	9-12 mo	2-3 yr
CI1 Age	0-1 mo	6.3 (8.1)	4.5 (5.9)	6.8	-1.6 (4.8)	-2.2 (5.1)
	2-3 mo		2.1 (6.7)	-	2.3	-0.2 (19.5)
	4-6 mo			-	-6.8 (4.5)	-2.9 (4.4)
	7-8 mo				5.6	-
	9-12 mo					-3.8 (4.4)

CI: Cephalic index; Mo: Months; Yr: years

Conclusions

- Cephalic index increases from 0 to 6 months, and decreases without intervention after 6 months within our longitudinal cohort. This result is consistent with data from our cross-sectional study
- This natural history of CI is likely attributable to the infant’s increased head control and motor ability, including rolling over, after the age of six months

References:

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- Johnson CP, Blasco PA. Infant growth and development. *Pediatr Rev*. 1997; 18(7):224-242

