Child Development is associated with Cognition and Health-Related Quality of Life in Young Adulthood

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Aim

To study the association between a child's development at age 2 y and cognition and health-related quality of life (HRQoL) in young adulthood.
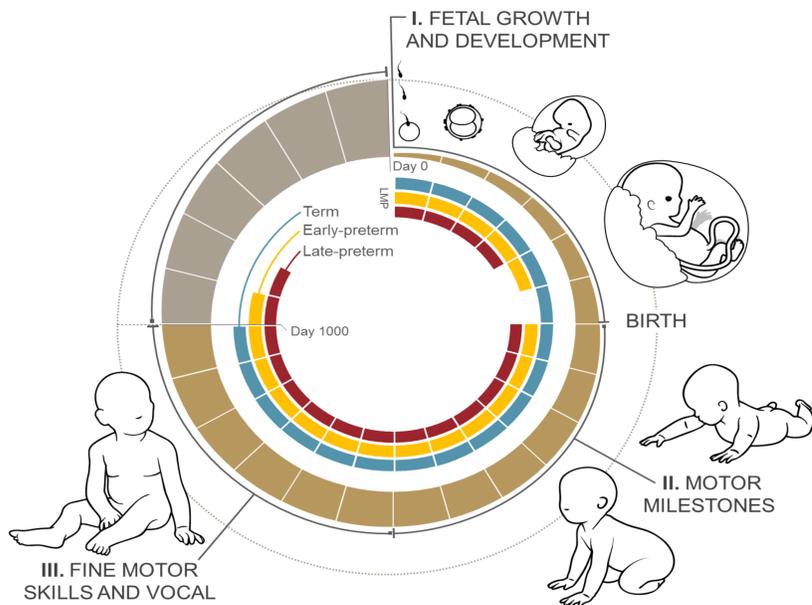

Fig. 1 Healthy Birth Growth and Development Lifecycle diagram.

Methods

Subjects
In 1983, data were collected for a unique nationwide cohort of 1338 infants in the Netherlands who had very preterm birth (gestational age < 32 wk) or very low birth weight (birth weight < 1500 g) (Project On Preterm and Small for Gestational Age Infants: POPS).[1,2] The subjects were assessed at several ages until age 28 y.[1,2] We included subjects aged 19 y from the POPS cohort who did not have severe complications. 401 of the 408 individuals (98%) who were available for analysis had been born preterm.

Dutch Developmental Instrument
Dutch Development Instrument (DDI) is a modification of the Gesell test. In the Netherlands, DDI is used in preventive Child Health Care (CHC) to assess development of children from birth to age 4 y. DDI includes 75 developmental milestones covering 3 domains of child development: fine motor activity, adaptive, personal/social behavior; communication; gross motor activity.
DDI is administered by a trained health care professional at 13 regular visits to CHC. 5 to 9 specific milestones are evaluated at each CHC visit. Development score (D-score) is determined from an algorithm that summarizes these developmental milestones into a single aggregate score measuring global development. The LMS method was used to transform the score into standard deviations score (SDS)(Fig. 2).[3,4] D-score SDS, adjusted for gestational age, was calculated from the subjects who were aged 2 y.

Outcome measures
Cognition at age 19 y was defined by the Multicultural Capacity Test – Intermediate Level (MCT-M ,mean=100, standard deviation=15). HRQoL was measured by:
(1) London Handicap Scale (LHS) using the LHS score utility calculated with the Dutch population preference index, and
(2) Health Utility Index Mark 3 categorized into 4 levels (Multi-Attribute Utility [MAU]).
Outcomes were adjusted for potential confounders: maternal age at birth, maternal smoking, maternal diabetes, socioeconomic status, parity, gestational age, sex, and ethnicity. Data were reported with 95% confidence intervals (CI).

Results

In subjects aged 19 y, an increase in D-score at approximately age 2 y by +1 standard deviation was associated with:
- 2.25-point increase in MCT-M (95% CI, 0.86-3.63).
- 0.68 decreased odds of no perfect health (95% CI, 0.54-0.87).
- 0.84 decreased odds of less functional capacity (95% CI, 0.70-0.98).

In subjects aged 19 y, frequency of no perfect health and moderate-to-severe functional capacity were significantly greater in subjects who had D-score SDS < -1 than > +1 at approximately age 2 y (Table 1).

Discussion
Limitation of our study are some potentially important confouders, such as parental IQ and several complications, that may have strengthened the association of development with cognitive capacity and HRQoL. However, we adjusted for socioeconomic status of the parents and we excluded the individuals with severe complications. Strengths include the longitudinal nature of the cohort and long-term follow-up.

Table 1. Relation between D-score from age 2 y in children born very preterm and/or with a very low birth weight and outcomes at age 19 y*.

Outcome	D-score SDS	
	< -1 SDS	> +1 SDS
No Perfect health	31 (42%)	16 (18%)
Moderate-to-severe functional capacity	34 (46%)	29 (31%)

*N=408 subjects. Data reported as number subjects (%). Abbreviations: D-score, Development score; SDS, standard deviation score.

Fig 2. The D-score presented in a chart for development
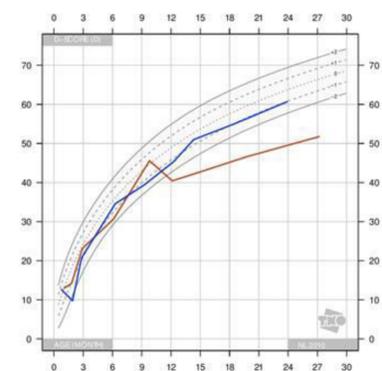
Conclusion

In children who were born preterm, development at approximately age 2 y was strongly associated with cognitive capacity and HRQoL at age 19 y.

References
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