

ABSTRACT

▪ **Background:** Extremes of weight gain during infancy are associated with adverse outcomes during childhood, but few studies have evaluated those born extremely preterm (EP).

▪ **Objective:** To evaluate the association between EP infant weight gain after NICU discharge with health and neurodevelopmental outcomes at 10 and 15 years.

▪ **Methods:** Of the 1198 EP survivors enrolled in Extremely Low Gestational Age Newborn (ELGAN) study that survived to two years, 787 were assessed at 10 years and 602 were assessed at 15 years. Health and neurodevelopmental outcomes were assessed using questionnaires, anthropometric measurements, standardized cognition tests, and validated instruments. Associations were described as odds ratios (OR) and 95% confidence intervals (CI). Logistic regression models were used to adjust for confounders.

▪ **Results:** Contrary to our hypothesis, except for a higher rate of anxiety at 15 years of age among participants who grew faster, no associations were found between infant weight gain and outcomes at 10 and 15 years.

▪ **Conclusions:** In this cohort born EP, within the range of weight z-score changes between -0.67 and +0.67, child health and neurodevelopmental were not associated with the rate of infant weight gain.

Cohort Description

▪ Children born 2002 – 2004, at one of 14 hospitals in 5 U.S. states in 3 hubs, North Carolina, Midwest, and New England, born before 28 weeks of gestation.

▪ 63% of the cohort were white, 26% were African-American, and one third had public health insurance

▪ Of 1506 neonates enrolled, 1198 are presumed alive; data were available for infant weight gain and 10 year outcomes for 787 participants (66% of survivors) and 15 year outcomes for 602 (50%) of survivors

Infant Weight Gain Definitions

Based on weight z score at 18-24 months adjusted age minus weight z score on day of discharge from NICU:

- Slower weight gain: change in z-score < -0.67
- Faster weight gain: change in z-score > 0.67)
- Referent: change in z score ≥ -0.67 and $\leq +0.67$

Outcomes at 10 and 15 years

- Weight, height, body mass index
- Asthma diagnosed by provider
- General health by parent report
- ADHD, anxiety, depression identified by Child Symptom Inventory-4 (10 years) or MINI-Kid (15 years)
- Cognitive impairment through Differential Ability Scales and NEPSY-II (10 years) or Weschler Abbreviated Scales of Intelligence and NIH Cognitive Tool Box (15 years)

Results

▪ Contrary to our hypothesis neither faster nor slower infant weight gain was associated with notable adverse health or neurodevelopmental outcomes at 10 or 15 years

▪ The findings were not altered through sensitivity analyses, when faster weight gain was defined as change in z-score > 1 or change in z-score > 2

▪ In a pre-specified test of interaction between sex and infant weight gain, faster infant weight gain was associated more strongly with obesity among females

▪ In tests of interaction between weight z-score at NICU discharge and infant weight gain, higher weight z-score among those with faster infant weight gain at discharge was associated with worse general health at 10 years than those with lower weight z-score.

Conclusions

Within the range from a z-score change of -0.67 to +0.67, infant weight gain after discharge from the NICU was not associated with adverse health or developmental outcomes in childhood and adolescence

Table. Associations Between Infant Weight Gain and Child Outcomes

Outcomes	10 Year Outcomes		15 Year Outcomes	
	Slower Weight Gain (n=77)	Faster Weight Gain (n=492)	Slower Weight Gain (n=57)	Faster Weight Gain (n=386)
Worse General Health ¹	1.5 (0.4, 6.0)	1.1 (0.4, 2.8)	1.7 (0.7, 3.8)	0.9 (0.5, 1.4)
Cognitive Impairment ²	1.1 (0.6, 2.2)	1.0 (0.7, 1.6)	1.7 (0.6, 4.4)	1.2 (0.6, 2.2)
Obesity ³	0.6 (0.2, 1.8)	1.2 (0.7, 2.1)	1.4 (0.5, 4.0)	1.3 (0.7, 2.4)
Asthma ⁴	0.7 (0.4, 1.2)	1.0 (0.7, 1.3)	1.5 (0.7, 3.4)	1.4 (0.9, 2.3)
Anxiety ⁵	1.1 (0.5, 2.5)	1.3 (0.8, 2.2)	3.6 (0.9, 14.7)	2.6 (1.1, 6.5)
ADHD ⁶	1.1 (0.5, 2.3)	1.2 (0.7, 1.8)	0.2 (0.0, 2.2)	1.4 (0.6, 3.2)
Depression ⁷	**	0.9 (0.5, 1.7)	1.0 (0.3, 3.8)	1.2 (0.5, 2.7)

Adjustments

- Birthweight (BW) z-score, 1,3,5,6,7
- Gestational age (GA) at delivery, 1,2,3,4,5,6,7
- Maternal education, 1,2,3,4,5,6,7
- Maternal pre-pregnancy BMI, 1
- Neonatal chronic lung disease (CLD), 1,2,3,4,5,6,7
- White matter damage (WMD), 1,2,3,4,5,6,7
- Public insurance 4,5,6,7
- Maternal single 4,5,6,7

**Sample size too small to extrapolate data from

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