Postnatal Growth as Stand-Alone Predictor of Cognition at 2 Years of Age in Extremely Preterm Infants

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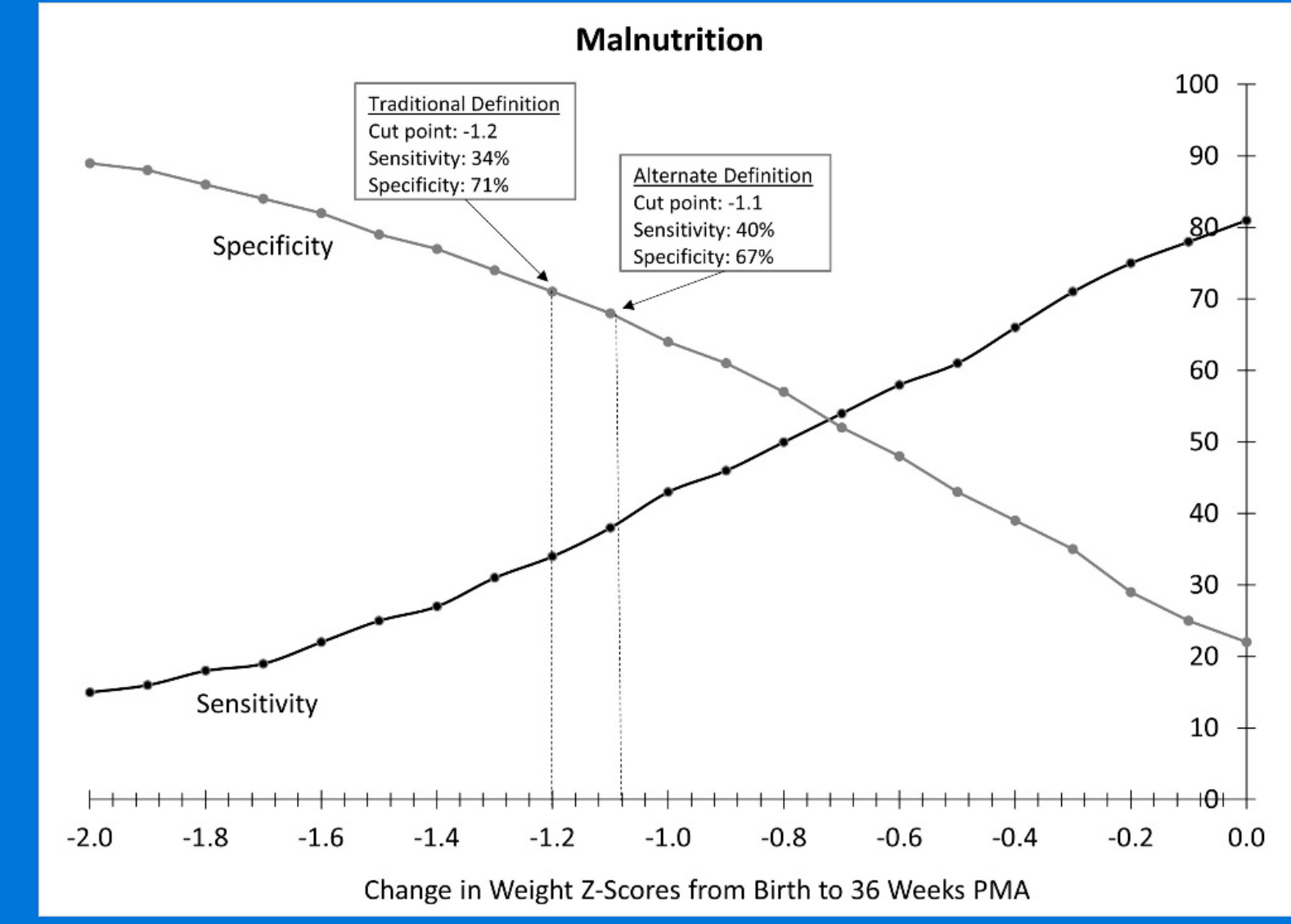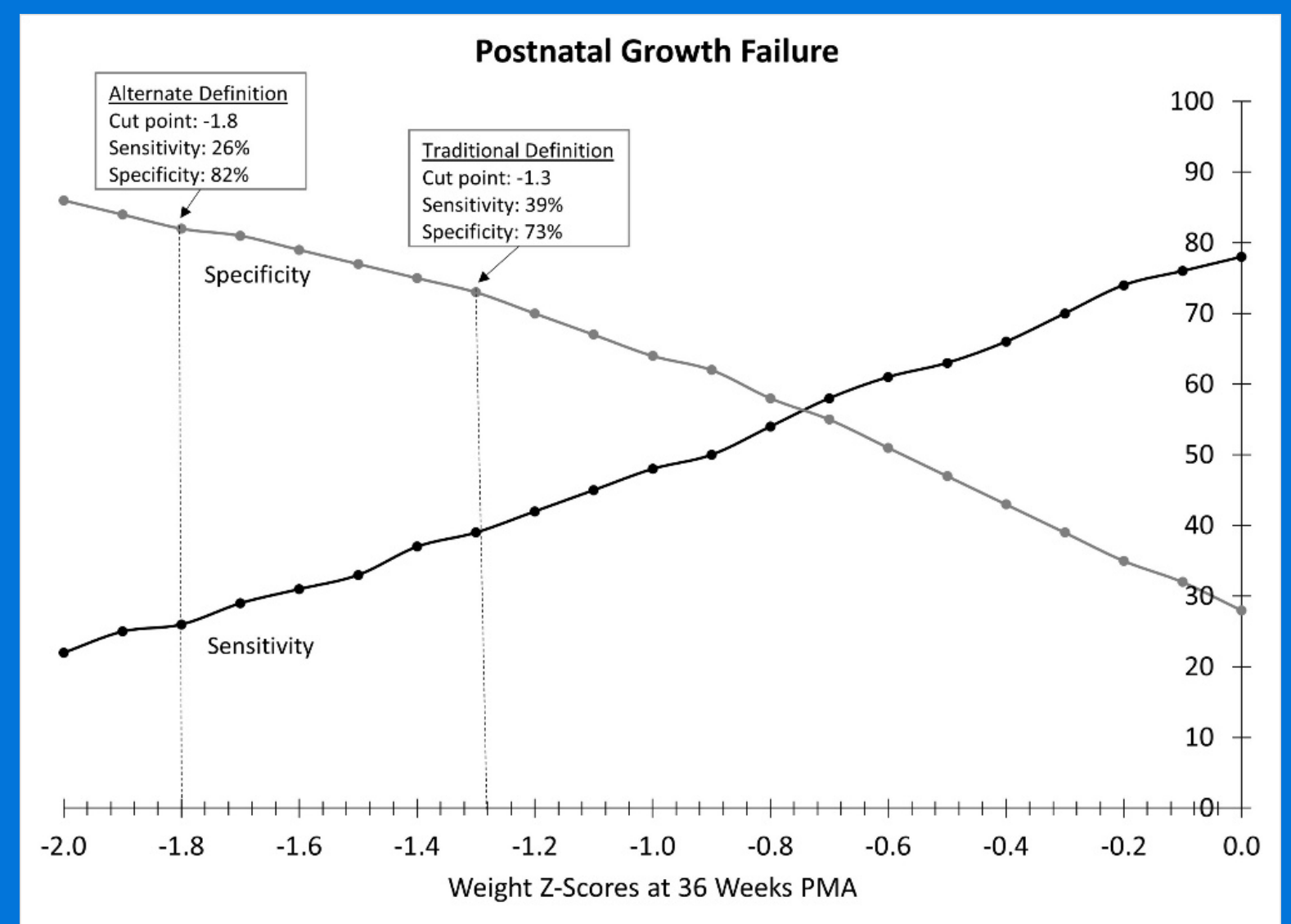4 Duke University, Durham, NC, USA
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Objective

To determine if adverse growth outcomes defined with z-scores calculated using the INTERGROWTH-21st growth curves can accurately predict the risk of cognitive delay

Eligibility Criteria

Extremely preterm infants of 24 to 26 weeks' gestation admitted to NICHD Neonatal Research Network neonatal intensive care units from 2008 to 2018 .

Weight, length, HC at birth and 36 weeks PMA → INTERGROWTH-21st Standard → Bayley III at 2 years of age
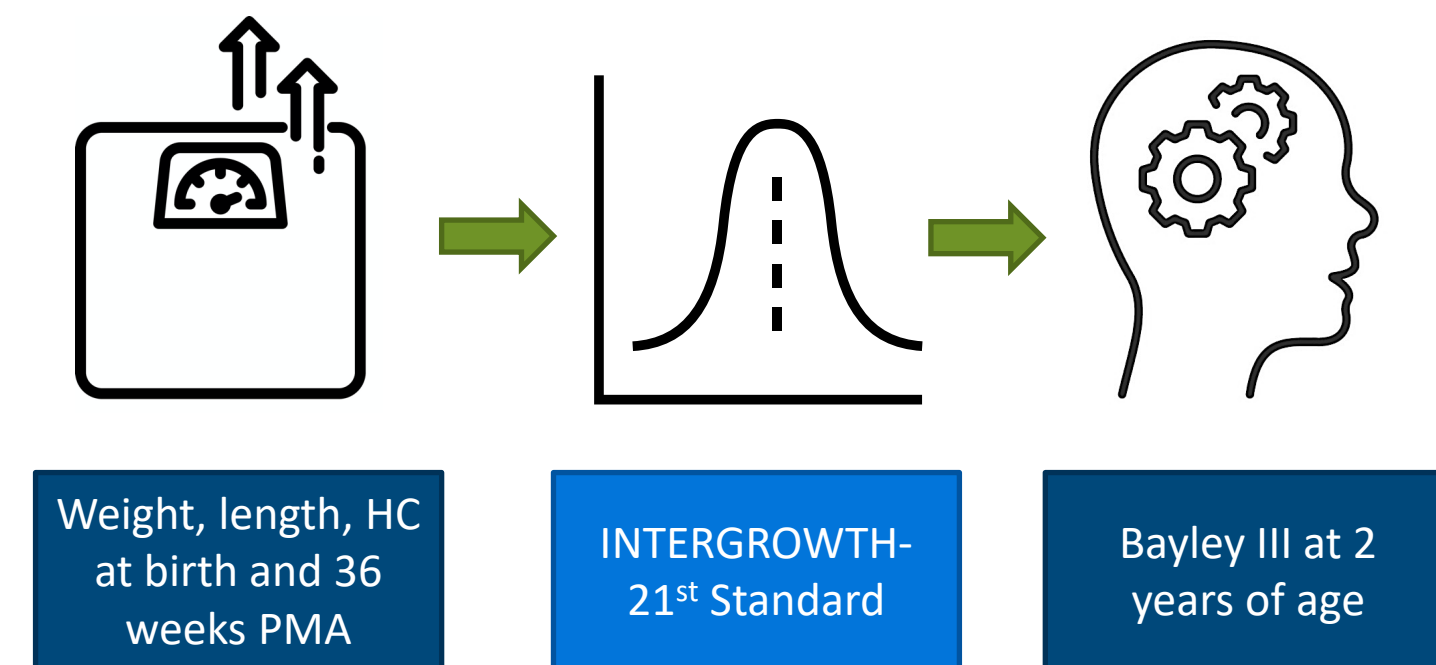
Methods

The final sample was randomly split into development and testing samples. Classification and regression trees (CART) were used to identify the most appropriate cut-offs for weight, length, and head circumference (HC) z-score at 36 weeks postmenstrual age (PMA) and for decline in weight, length, and HC z-score from birth to 36 weeks PMA to predict risk of cognitive delay (defined as Bayley-III cognitive composite score <85).

Traditional definitions of growth failure (i.e., weight, length, and HC < 10th centile) and malnutrition using the INTERGROWTH-21st standard have fair to low sensitivity and specificity to predict cognitive delay

9264 born 24-26 weeks GA
2081 died before discharge and 433 had major anomalies
6918 survived to discharge
6371 had W, L, and HC data at 36 weeks PMA
94 died after discharge, 655 were lost to follow-up, and 229 had missing cognitive score
5393 included in analysis

Postnatal Growth Failure

Alternate Definition
Cut point: -1.8
Sensitivity: 26%
Specificity: 82%

Traditional Definition
Cut point: -1.3
Sensitivity: 39%
Specificity: 73%

Specificity
Sensitivity
Weight Z-Scores at 36 Weeks PMA

Malnutrition

Traditional Definition
Cut point: -1.2
Sensitivity: 34%
Specificity: 71%

Alternate Definition
Cut point: -1.1
Sensitivity: 40%
Specificity: 67%

Specificity
Sensitivity
Change in Weight Z-Scores from Birth to 36 Weeks PMA

Length z score at 36 weeks PMA < -1 has the highest sensitivity to predict cognitive delay (80%) and HC z score decline from birth to 36 weeks PMA > 2.43 has the highest specificity (86%)

https://Neonatal.RTI.org/Publications/
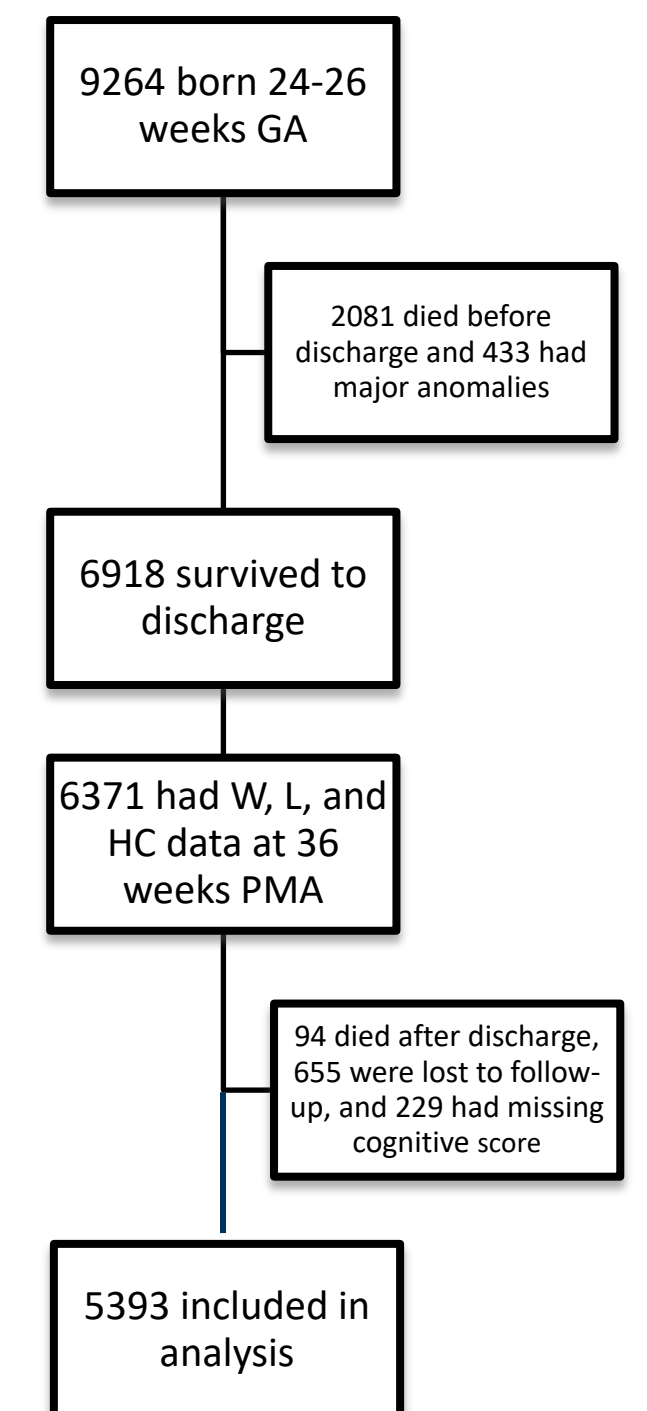
	Outcome/Definition	Cut Point	Se	Sp	PPV	NPV
Weight	Z score at 36 weeks PMA					
	Traditional definition	< -1.28	40%	72%	45%	67%
	Alternative definition	**≤ - 1.79**	**26%**	**82%**	**46%**	**66%**
	Z score decline from birth to 36 weeks PMA					
	Traditional definition	≤ -1.20	34%	71%	41%	65%
	Alternative definition	≤ -1.06	40%	67%	41%	66%
Length	Z score at 36 weeks PMA					
	Traditional definition	< -1.28	73%	39%	41%	71%
	Alternative definition	**< -1.00**	**80%**	**31%**	**40%**	**72%**
	Z score decline from birth to 36 weeks PMA					
	Traditional definition	≤ -1.20	60%	49%	41%	68%
	Alternative definition	≤ -1.47	53%	58%	42%	68%
Head circumference	Z score at 36 weeks PMA					
	Traditional definition	< -1.28	66%	45%	41%	69%
	Alternative definition	≤ -2.92	27%	84%	50%	66%
	Z score decline from birth to 36 weeks PMA					
	Traditional definition	≤ -1.20	50%	57%	41%	66%
	Alternative definition	**≤ -2.43**	**22%**	**86%**	**48%**	**66%**

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