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Trajectories of Weight for Length Growth for Infants During the First Year of Life

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INTRODUCTION

- Childhood obesity is a public health problem. Approximately 7% of U.S. infants are obese, with rates of obesity increasing to 17% in childhood. Despite these striking statistics, little is known about the development of overweight and obesity at an early age.
- Understanding patterns of weight gain from infancy into childhood may help elucidate targets for intervention. However, traditional longitudinal models only depict the average growth of infants over time, providing no information on growth trajectories. Group-based trajectory analysis allows to examine subgroups of infants with distinct longitudinal patterns of growth rather than averages, and thus is a novel method for identifying subgroups of infants at risk for overweight and obesity.
- Traditional longitudinal analysis have identified associations between several maternal and feeding factors (i.e., excessive gestational weight gain, early introduction of solid foods, early cessation of breastfeeding, number of feeds per day) and overweight or obesity during infancy and childhood. However, no studies have evaluated whether these factors predict different trajectories of weight for length growth among infants.

OBJECTIVES

- To identify trajectories of weight for length growth during the first year of life and to explore associations between selected maternal and feeding variables and such trajectories.

METHODS

Subjects

- Subjects were women enrolled in the Pregnancy and Postpartum Observational Dietary Study (PPODS) and their infants.
- Inclusion Criteria:** Pregnant women with singleton gestation, 18-45 years, English speakers, enrolled in prenatal care prior to 17 weeks of gestation, and prenatal care at a large tertiary care hospital in central Massachusetts. Infants included in this analysis had at least one pediatric record with weight and length data during the first 12 months of life.
- Exclusion Criteria:** Women with a diagnosis of pre-gestational or gestational diabetes, or taking medications that affect weight.

Procedures

- Eligible mothers completed surveys at baseline (28-38 weeks of gestation), delivery (0-4 days post-partum), 6 weeks post-partum, and 3-, 6-, and 12-months post-partum.
- Mothers provided written consent for access to pediatric records for the infant's first year of life (n=90).
- Infant's weight and length measures were abstracted from pediatric records.

Measures

- Maternal demographic variables: age, race, ethnicity, education, perceived income, language spoken, marital status and number of minors at home.
- Maternal psychosocial variables: depression symptoms (Edinburg Post-Natal Depression Scale), total gestational weight gain, perceived infant's weight, perceived importance of monitoring infant's growth, and concern about infant gaining too little or too much weight.
- Feeding variables: belief that it is possible to overfeed an infant, feeding quantity, feeding frequency, age of introduction of solid foods, and age breastfeeding stopped.
- Infant variables: weight and length measures measured at pediatric offices during the first year of life. Weight for length percentiles were calculated using the World Health Organization standards for infants 0-2 years.

Statistical Analysis

- To identify weight for length growth trajectories throughout the first year of life, group based trajectory analysis was used. Model fit statistic (i.e., BIC) was used to select number and shapes of groups.
- To assess associations between maternal variables and feeding factors and weight for length growth trajectories, Chi-square Tests for categorical variables and ANOVAs for continuous variables were used.

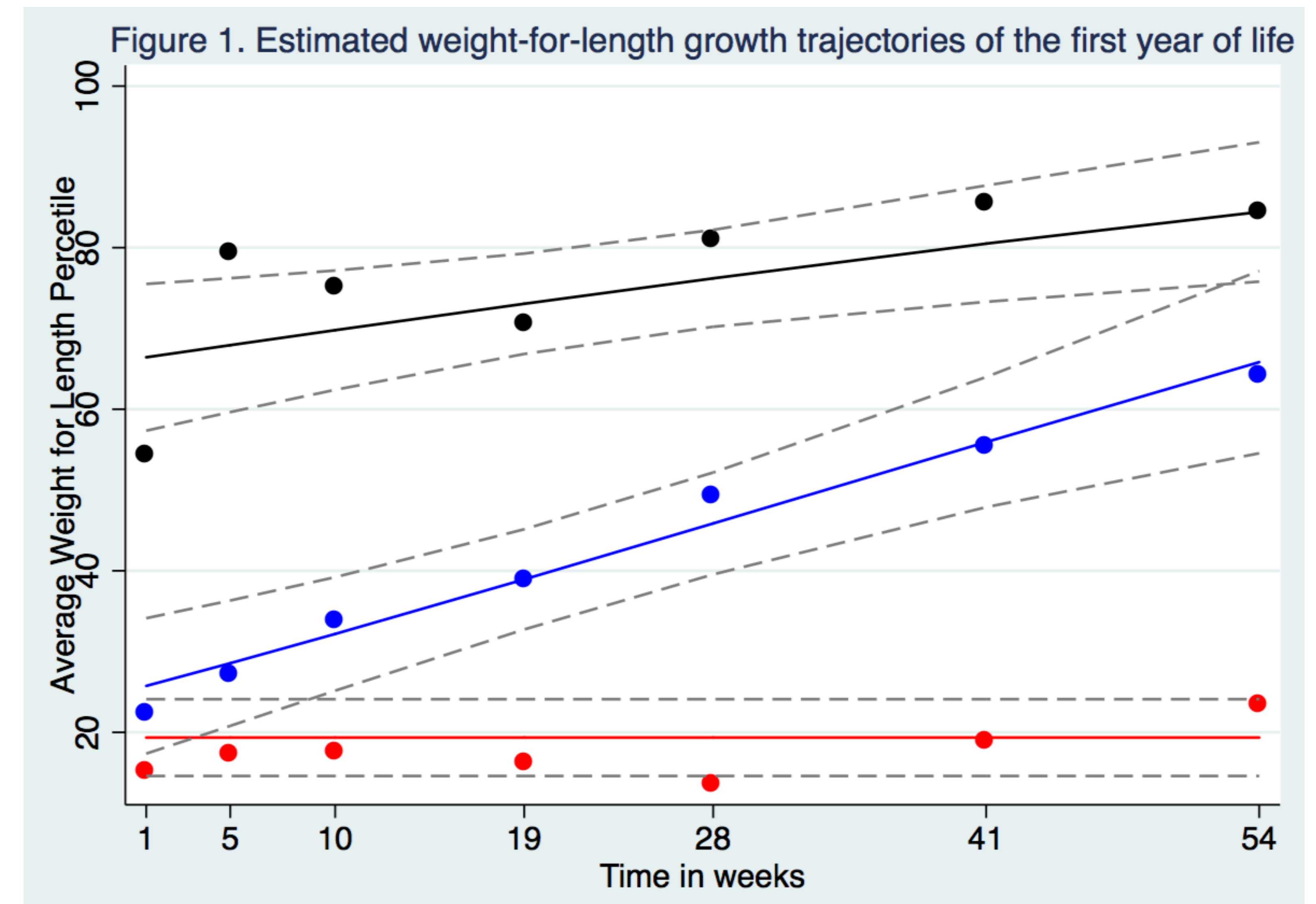
RESULTS

- Sample characteristics are presented in Table 1 below.

Table 1. Sample Characteristics, PPODS study (n=90).

| Maternal Demographic and Psychosocial Characteristics | Total Sample N =90(%) | Feeding Characteristics | Total Sample N =90(%) |
|---|-----------------------|-----------------------------|-----------------------|
| Average Age; mean (SD) | 28.5 (5.2) | Possible to overfeed babies | 48 (71.6) |
| Race: White | 56 (70.0) | Feeding style: Amount | |
| Latina | 23 (27.1) | Follow guidance | 6 (9.1) |
| Education: < College | 43 (50.6) | Follow baby appetite/growth | 60 (90.9) |
| Marital Status: Married | 65 (77.4) | Feeding style: Frequency | |
| 1+ Minors at home | 52 (63.4) | On demand | 35 (50.7) |
| Difficulty paying bills | | Follow routine | 3 (4.4) |
| Great/some difficulty | 38 (44.7) | Demand and routine | 31(44.9) |
| No difficulty | 47 (55.3) | Age breastfeeding stopped | |
| Depression score; mean(SD) | 4.8 (4.7) | 0 months | 2 (2.9) |
| Adherence to IOM guide for GWG | | 1.5 months | 10 (14.5) |
| Below/Adherent | 33 (36.7) | 3months | 7 (10.1) |
| Above | 57 (63.3) | 6 months | 15 (21.7) |
| Baby weight perception | | 12 months | 22 (31.9) |
| Underweight | 4 (5.6) | >12 | 13 (18.8) |
| About right | 67 (94.4) | Age solid foods introduced | |
| Important to monitor growth | 67 (98.5) | 0 months | 0 (0.0) |
| Worried if baby gained too little | 66 (98.5) | 1.5 months | 0 (0.0) |
| Worried if baby gained too much | 62 (91.2) | 3 months | 5 (6.6) |
| | | 6 months | 48 (63.2) |
| | | 12 months | 23 (30.2) |

- Three growth trajectories were identified: a low and stable growth group [red trajectory, 38.3%], a moderate growth group [black trajectory, 26.7%], and a rapid growth group [blue trajectory, 35.0%].



- There was no association between maternal and feeding characteristics listed in Table 1 and growth trajectories ($p>0.05$)

CONCLUSIONS

- The finding of three trajectories of infant weight for length growth underscores the importance of using trajectory analysis to obtain a more refined understanding of differences in growth patterns among infants.
- Future studies with larger samples are warranted to confirm the weight trajectories identified in this study; assess associations between infant growth trajectories and childhood overweight and obesity; and identify predictors of trajectory membership.
- Our failure to find associations between selected maternal and feeding variables with any of the three trajectories may be due, in part, to the small sample size in this study.

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