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Infant Eating Behaviors and Risk for Overweight

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JAMA PEDIATRICS

Effect of the INSIGHT Responsive Parenting Intervention on Rapid Infant Weight Gain and Overweight Status at Age 1 Year: A Randomized Clinical Trial

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IMPORTANCE Rapid infant weight gain is associated with later obesity, but interventions to prevent rapid infant growth and reduce risk for overweight status in infancy are lacking.

OBJECTIVE To examine the effect of a responsive parenting (RP) intervention on infant weight gain between birth and 28 weeks and overweight status at age 1 year.

DESIGN, SETTING, AND PARTICIPANTS The Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) study is an ongoing randomized clinical trial comparing an RP intervention designed to prevent childhood obesity with a safety control. The study includes primiparous mother-newborn dyads (n = 291) and was conducted at the Penn State Milton S. Hershey Medical Center, Hershey, Pennsylvania, in addition to home visits. Enrollment was initiated in January 2012, and evaluable population analyses for this study were conducted between April 2015 and November 2015.

INTERVENTIONS At 2 weeks post partum, initial intervention materials appropriate to the assigned treatment group were mailed to the participant's home. Research nurses conducted home visits at 3 weeks, 16 weeks, 28 weeks, and 40 weeks, and a research center visit occurred at 1 year. The Intervention Nurses Start Infants Growing on Healthy Trajectories curriculum included messages about infant feeding, sleep hygiene, active social play, emotion regulation, and growth record education. The control group received a developmentally appropriate home safety intervention also delivered by nurse home visitors.

MAIN OUTCOMES AND MEASURES Conditional weight gain from birth to 28 weeks was calculated. General linear models examined intervention effect on conditional weight gain. The intervention's effect on infant weight-for-length percentiles was tested using analysis of variance. Logistic regression compared the odds of overweight status (weight for length ≥95th percentile) at 1 year as a function of conditional weight gain.

RESULTS Of the mothers included in the study, 246 were white (88%), 260 were non-Hispanic (93%), 210 were married (75%), and 201 were working full time (72%) at time of enrollment. The mean conditional weight gain score was lower among infants in the RP group compared with the control group (−0.18; 95% CI, −0.36 to −0.001), reflecting that the RP infants gained weight more slowly than control group infants (0.18; 95% CI, 0.02-0.34); this effect did not differ by feeding mode (predominantly fed breast milk or not). Infants in the RP group also had lower mean weight-for-length percentiles at 1 year than infants in the control group (57.5%; 95% CI, 52.56%-62.37% vs 64.4%; 95% CI, 59.94%-69.26%; P = .04) and were less likely to be overweight at age 1 year (5.5% vs 12.7%; P = .05).

CONCLUSIONS AND RELEVANCE An RP intervention is associated with reduced rapid weight gain during the first 6 months after birth and overweight status at age 1 year.

JAMA Pediatr. 2016;170(8):742-749. doi:10.1001/jamapediatrics.2016.0445

Nearly 1 in 4 children is overweight or obese by preschool age.[1] As a result, there is increasing attention on preventing rapid weight gain during the first 2 years after birth. Developing interventions for this age range has been challenging because the mechanisms of rapid weight gain during infancy are not well understood. The usual predictors of obesity in later childhood and adulthood do not directly apply to infancy. For instance, the diet of most infants does not typically include junk food as a major component.[2] Physical activity is generally not assessed in infants. Media exposure is common during infancy, but the usual mechanisms (reducing physical activity and increasing consumption of the advertised junk food) by which this exposure is related to increasing obesity risk may not operate in infants. Therefore, interventions have often focused on breastfeeding and the timing of introduction of solid foods, but accumulating evidence does not support either as a robust risk factor for infant obesity.[3]

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Emphasis has been placed on mothers misreading infant hunger and satiety cues or using food too often to soothe crying, resulting in overfed infants. In the August 2016 issue of *JAMA Pediatrics*, Savage and colleagues[4] reported the results of the Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) study, in which mother-newborn dyads in the intervention group

(n = 145) were randomized to receive a responsive parenting curriculum that included teaching mothers to recognize infants' hunger and satiety and to avoid using food to soothe or to a control group (n = 146) that received a developmentally appropriate home safety intervention. Compared with infants in the control group, those in the intervention group grew less rapidly during the first 6 months after birth, had a lower mean weight-for-length percentile at 1 year, and had a lower (but not significantly different) prevalence of overweight at the age of 1 year (5.5% vs 12.7%, $P = .05$).

Underlying this and similar interventions is the assumption that when parents correctly respond to infants' hunger and satiety cues, those infants will not gain weight too rapidly. However, there is an alternative hypothesis. Some infants may have greater hunger than others, and mothers of such infants may actually be responding accurately to the cues of hunger. The mechanisms underlying hunger and satiety in adults remain poorly understood, and even less is known about these mechanisms during infancy. Infants with a more vigorous sucking behavior have more rapid weight gain,[5] but what this sucking behavior represents is not known.

Also unknown is whether all infants are equally able to accurately self-regulate intake to achieve a healthy weight. One possible scenario is that some infants cry especially often and vigorously with real hunger. Those real hunger cries may be accurately interpreted by mothers, and when these infants are fed appropriately in response to their physiological hunger and satiety cues, they gain weight rapidly and become obese.

The National Institutes of Health convened a workshop in 2013 to develop a scientific agenda for examining the causes of obesity from birth to the age of 2 years.[3] There was discussion regarding the possibility that mothers may be accurately responding to the cries of truly hungry infants. This led to the question of whether mothers should not feed a hungry infant. Perhaps feeding infants every time they signal hunger results in obesity. Alternatively, withholding food might harm the parent-infant emotional bond when caregivers are not sensitive and responsive to infants' needs. The long-term consequences of not allowing a hungry infant to eat to satiation are not known.

Infants whose mothers describe them as having a big appetite gain more weight. What does this big appetite represent? The basic behavioral mechanisms of eating are an area of current scientific inquiry. For instance, sucrose elicits pleasure and has analgesic properties when given within hours of birth; however, these effects are less potent in obese children,[6] suggesting that some children may require more sweet taste or food to achieve the same soothing effect. In addition, infants with more demanding temperaments are less likely to die during a famine, presumably because they more persistently demand to be fed.[7] Moreover, the degree to which an individual is willing to work to obtain food is an independent predictor of obesity.[8] Infants who more persistently cry for food or who suck more vigorously may be exhibiting early markers of this behavioral predisposition.

The trial by Savage et al[4] is an important one. It begins to shed light on the possible interventions to reduce weight gain during the first year of life. However, there is a long history in medicine and public health of attributing poorly understood health problems to personal responsibility or, in the case of children, inadequate parenting. Caution is needed before rapid weight gain during infancy is attributed to mothers not competently and sensitively reading infants' hunger and satiety cues. Even though parenting is an important modifiable contributory cause and an appropriate intervention target, consideration must be given to some of the infants' features.

Although a subgroup of infants may indeed be overfed by mothers struggling to accurately read infant cues or using food too often to soothe, the majority of rapid weight gain during infancy may not be caused by this dynamic. The challenge is how to parent infants with different eating behavior predispositions and, most fundamentally, whether withholding feedings from hungry infants is an appropriate and feasible approach to managing their risk for obesity.

ARTICLE INFORMATION

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Conflict of Interest Disclosures: The author has completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

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