

Baby-Led Weaning—Safe and Effective but Not Preventive of Obesity

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Childhood obesity has important consequences for morbidity and mortality throughout life.¹ In 2010, an estimated 43 million children younger than 5 years were obese or overweight worldwide, and the prevalence is expected to increase from 6.7% to 9.1% by 2020.² Antenatal to early postnatal life is a period of rapid growth and developmental plasticity and

therefore considered to be particularly sensitive for obesity prevention.³ Weaning, or the introduction of solid foods, is an important developmental milestone during this window of opportunity for obesity prevention and is a well-reasoned target for interventions. Baby-led weaning encourages infant self-feeding of all solid foods, rather than adult-led spoon-feeding, and is hypothesized to promote self-regulation of energy intake, a trait linked to the development of obesity in observational studies,⁴ and thereby lower obesity risk.⁵ However, concerns have been raised that baby-led weaning may increase the risks for infant undernutrition and choking, with most health care professionals reluctant to recommend it.⁶

In this issue of *JAMA Pediatrics*, Taylor et al⁷ describe the first randomized clinical trial to test the efficacy and safety of baby-led weaning to prevent excess infancy weight gain. The authors recruited 206 pregnant women and randomly allocated 105 to receive the Baby-Led Introduction to Solids (BLISS) intervention and the other 101 to receive usual care. The BLISS intervention was delivered through 8 contacts (from antenatal to 9 months postpartum), during which mothers were supported to breastfeed exclusively until their infant was 6 months of age and to allow infants to feed themselves solid foods rather than be spoon-fed from 6 months onward. The primary outcome was body mass index (BMI) at ages 12 and 24 months. Energy self-regulation, eating behaviors, and energy intake were also measured using validated instruments. Despite good adherence to the intervention, no differences were found in BMI z score, prevalence of overweight, energy intake, or energy self-regulation between infants in the intervention and control groups at ages 12 or 24 months.

These findings highlight the importance of rigorous randomized clinical testing of infant feeding approaches and other behavioral interventions, even though such approaches already have wide popularity among parents and experts based on intuition and previous weak observational evidence.⁸ The trial was well conducted. Recruited women were less likely to be from deprived households than nonparticipants but were similar in other measured aspects. As highlighted by the authors, outside of a trial setting, women who choose baby-led

weaning are more likely to have higher socioeconomic status, which may explain the observed association with lower obesity prevalence in previous nonrandomized studies. The high retention rate (80.5% at 24 months), high adherence to the intervention, and use of validated instruments to measure the outcomes of the trial provide much needed robust evidence regarding this weaning approach, allowing definitive conclusions to be drawn.

We learn much from this trial, despite the lack of efficacy on the primary outcome of obesity risk. Baby-led weaning promoted successful weaning, as indicated by greater enjoyment of food, less fussy or picky eating behaviors, ongoing self-feeding of most foods to age 12 months, and a substantial 4-week longer duration of exclusive breastfeeding. Of importance, the baby-led weaning intervention was safe. No group differences were noted in energy intake, growth faltering, or iron-deficient anemia. Intervention infants gagged more frequently at age 6 months but less frequently at age 8 months, and there were no differences in the numbers of self-limiting or more serious choking events.⁹ These findings help allay concerns regarding the safety of baby-led weaning. Parents may be allowed a free choice in the manner of infant weaning, or baby-led weaning might even be encouraged as an approach to address concerns regarding infant food neophobia, food refusal, and disruptive mealtime behaviors. The BLISS intervention provided individualized support and advice to promote high-iron, high-energy foods and fewer foods that posed a choking risk. Thus, the safety of baby-led weaning promotion in the community needs to be confirmed.

What then for obesity prevention? The BLISS intervention had demonstrable effects on eating behaviors with potential relevance to later obesity risk. However, contrary to the hypothesized benefit of baby-led weaning, the directional effects on these eating behaviors correlate with increased rather than decreased obesity risk. BLISS resulted in greater enjoyment of food (ie, pleasure derived from food) at 12 and 24 months, lower satiety responsiveness (ie, eating appropriately in response to feelings of fullness) at 24 months, and insignificant increases in BMI and prevalence of overweight at 12 months (15.1% vs 6%) compared with control infants. As a proposed target for obesity prevention, energy self-regulation aims to promote greater cognitive control over internal emotions and thrill-seeking urges and a greater awareness of true intrinsic signals of appetite and satiety to avoid eating in the absence of hunger. Baby-led weaning gives the infant autonomy, which in turn might promote the development or expression of energy self-



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regulation. Another recent trial taught preschoolers (697 children aged 4 years) to self-regulate their behavior around food, combined with obesity prevention messages, but obesity was not reduced.¹⁰ Those authors suggested that self-regulation may not be effective for weight control until children are older and have more autonomy over their food intake.

A possible reason why autonomy in feeding might not be beneficial but instead may be harmful for obesity prevention in infants is that infants' intrinsic appetitive and satiety cues may mediate a natural tendency toward overconsumption in the absence of external restraint. These eating behaviors have recently been shown to be partly heritable and determined by the same genetic variants that predict adult BMI and obesity

risk.¹¹ It is plausible that such intrinsic tendencies toward over-nutrition may be advantageous for growth and development in settings of food scarcity and intermittent undernutrition due to frequent infections but in more food-secure and obesogenic environments are likely to promote excessive weight gain.¹² Instead of autonomy, adult supervision and some restriction to avoid excessive food intake may be required until children are sufficiently mature to exert the higher executive functions necessary to self-regulate their energy intakes. Responsive feeding interventions promote a middle ground between authoritarian and permissive parenting¹³ and, although long-term effectiveness needs to be shown, recent evidence provides promise for such approaches in the early-life prevention of obesity.^{14,15}

ARTICLE INFORMATION

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Published Online: July 10, 2017.
doi:10.1001/jamapediatrics.2017.1766

Conflict of Interest Disclosures: None reported.

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High-Throughput Sequencing as First-Tier Diagnostics in Congenital and Early-Onset Disorders

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The yield of genetic testing methods has dramatically improved within the past few years, enabling the identification of genetic causes in common as well as rare and unusual phenotypes in an increasing proportion of patients. Thus, genetic testing has become part of the routine diagnostic workup for many disorders.



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The studies by Tan et al¹ and Berg et al² in this issue of *JAMA Pediatrics* demonstrate the dramatic effect of the diagnostic yield of different genetic testing approaches on cost-

effectiveness and the potential design of testing strategies in children with suspected monogenic conditions.

Tan et al¹ prospectively recruited a cohort of children with various childhood-onset disorders of suspected monogenic origin. They performed singleton whole-exome sequencing (WES) in 44 children who had not undergone sequencing, with 31 children (71%) displaying some degree of developmental delay and/or intellectual disability. In 23 of these children (52%), results of WES revealed causative variants. In addition to this high diagnostic yield, the authors made 2 important observations. First, in 8 of the 23 resolved cases (35%) the genetic finding