Parent Diet Quality and Energy Intake Are Related to Child Diet Quality and Energy Intake

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ABSTRACT

Background Parents' diets are believed to influence their children's diets. Previous studies have not adequately and simultaneously assessed the relationship between parent and child total diet quality and energy intakes.

Objective Our aim was to investigate whether parent and child diet quality and energy intakes are related.

Design We conducted a cross-sectional analysis using baseline dietary intake data from the Neighborhood Impact on Kids study collected in 2007 to 2009.

Participants/setting Participants were parents and 6- to 12-year-old children from households in King County (Seattle area), WA, and San Diego County, CA, targeted by Neighborhood Impact on Kids were recruited. Eligible parent–child dyads (n=698) with two or three 24-hour dietary recalls were included in this secondary analysis.

Main outcome measures Child diet quality (Healthy Eating Index-2010, Dietary Approaches to Stop Hypertension score, and energy density [for food only]) and energy intake were derived from the dietary recalls using Nutrition Data Systems for Research.

Statistical analyses performed Multiple linear regression models examined the relationship between parent diet quality and child diet quality, and the relationship between parent energy intake and child energy intake. In both analyses, we controlled for parent characteristics, child characteristics, household education, and neighborhood type.

Results Parent diet quality measures were significantly related to corresponding child diet quality measures: Healthy Eating Index-2010 (standardized β=.39; $P<0.001$); Dietary Approaches to Stop Hypertension score (β=.33; $P<0.001$); and energy density (β=.32; $P<0.001$). Parent daily mean energy intake (1,763±524 kcal) was also significantly related (β=.30; $P<0.001$) to child daily mean energy intake (1,751±431 kcal).

Conclusions Parent and child intakes were closely related across various metrics of diet quality and for energy intake. Mechanisms of influence are likely to be shared food environments, shared meals, and parent modeling.
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THE 2010 DIETARY GUIDELINES FOR AMERICANS recommend that individuals 2 years of age or older consume nutrient-dense foods (eg, fruits, vegetables, whole grains, low-fat dairy products, and lean meats) to promote health and reduce risk for chronic disease.[1] Despite these recommendations, usual intakes from 2007 to 2010 demonstrated that the majority of children were not meeting recommendations for fruits, vegetables, whole grains, and dairy.[2] In fact, children were consuming large quantities of energy from dietary components targeted for reduction, such as added sugars and solid fats.[3] Consumption of larger portions[4] and nutrient-poor, energy-dense foods[5] have been associated with higher weight and obesity in children.

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Eating behaviors adopted during childhood have been found to track into adulthood.[6] In childhood, eating behaviors are commonly acquired through observational learning[7] influenced by the home food environment, which include parent-directed child-feeding strategies.[8,9] Parents are considered to be the gatekeepers of food, particularly for young children,[9,10] and have the primary responsibility for feeding their children.[11] Therefore, a parent's diet can be expected to have a substantial impact on a child's diet.[12] However, results are mixed about the common perception that parent and child intakes are similar, and very few studies have examined the resemblance between children and their parents' in overall dietary quality and energy intake.[13] A meta-analysis by Wang and colleagues[13] examined parent–child dyad studies focused only on total energy and dietary fat and found weak associations between parent and child percent energy from fat (r=0.20; 95% CI 0.13 to 0.28) and energy intake (r=0.21; 95% CI 0.18 to 0.24).

Previous findings need to be interpreted with caution because of variability in dietary assessment methods and focus on selected components of the diet (eg, energy, fat) instead of broader dietary patterns that might be more strongly related to health outcomes. Diet quality indices provide a better representation of overall dietary patterns.[14] Dietary intake, as measured by multiple 24-hour recalls[15] or records have demonstrated stronger correlations between parent and child intakes than when using food frequency questionnaires.[13]

More accurate diet quality data on parent and child were analyzed in the current study using: Healthy Eating Index (HEI-2010),[16,17] Dietary Approaches to Stop Hypertension (DASH) score,[18] and energy density.[19] The current study builds on previous findings and uses data collected from a large sample of parent–child dyads to estimate the association of parent diet quality and energy intake on child diet quality and energy intake. In particular, confounding variables from both the parent and child were controlled for within the analysis to allow for a more precise estimation of the relationship between parent and child diet quality and energy intake.

METHODS

Study Population

Parent–child dyads were part of the Neighborhood Impact on Kids study, a longitudinal cohort study that examined differences in neighborhood environments in relation to obesity and related behaviors among children (6 to 12 years old) and parents living in King County (Seattle area), WA, and San Diego County, CA.[20] Neighborhood physical activity environments and nutrition environments were assessed using existing land use and street network data (eg, residential or commercial uses), food establishment data (eg, availability of restaurants), park observations (eg, park availability and quality), and other spatial data (eg, residential density) in a Geographic Information System to assign neighborhoods to low or high physical activity scores and low or high nutrition environment scores.[21] High physical activity and nutrition environment neighborhoods indicated a more favorable neighborhood environment for these factors.

From September 2007 to January 2009 parents and children were recruited based on neighborhood type (high physical activity/high nutrition environment; high physical activity/low nutrition environment; low physical activity/high nutrition environment; and low physical activity/low nutrition environment). Eligible parent–child dyads had to live ≥5 days per week in one of the identified neighborhoods; be able to engage in at least moderate-intensity physical activity; not have a medical condition associated with obesity (eg, Cushing's syndrome); and not be participating in a medical treatment known to impact growth. Parent–child dyads were excluded if the child had a chronic illness known to affect growth; ≤10th percentile body mass index (BMI; calculated as kg/m^2) for age and sex based on parent report; had eating disorder pathology; on medically prescribed dietary regimen; or had psychiatric problems that would interfere with participation. Only one child per household was eligible to participate and the parent had to be the legal guardian.

A total of 8,616 households were contacted, 4,975 were screened for interest and eligibility. Of the 944 who agreed to participate, 730 families attended an anthropometric measurement visit and provided consent/assent. At the beginning of the anthropometric measurement visit, the study procedures were described in detail with each parent and child. After addressing any questions, written consent was obtained from the parent and assent was obtained from the child. Among these dyads, 698 families had both the parent and child having 2 or 3 days of dietary recalls (on the same days) and were included in this secondary analysis. The demographic and anthropometric characteristics of parents and children included (n=698) did not significantly differ from those of parents and children excluded (n=32) from this analysis (not shown). The study protocol was approved by the Institutional Review Boards at Seattle Children's Hospital and San Diego State University.

Measures

Demographics. Individual (eg, child and parent age, race, and sex) and household-level demographic (eg, highest level of education for the adult) information was collected by parent completion of a questionnaire (available at: http://www.seattlechildrens.org/research/child-health-behavior-and-development/saelens-lab/measures-and-protocols/).

Anthropometrics. Parent and child height and weight were collected by a trained research assistant at the clinic or the family's home (based on parent location preference). Weight and height were measured in at least triplicate to the nearest 0.1 kg and 0.1 cm, respectively, using a digital scale (Detecto 750; Detecto DR400C) and stadiometer (235 Heightronic digital stadiometer, portable SECA 214). Further measurements were taken until 3 of 4 consecutive measures were within 0.1 cm and 0.1 kg, respectively. The child's BMI was calculated and the value was standardized relative to the Centers for Disease Control and Prevention 2000 norms to determine standardized BMI (*z*-BMI).[22] BMI was also calculated for parents; overweight was defined as BMI ≥25 and obesity as BMI ≥30.[23]

Dietary Intake. Dietary intake of each parent and child was assessed by up to three random 24-hour dietary recalls representative of both weekday and weekend days conducted by trained staff over the phone using a standard multiple-pass approach. Recalls were planned to occur within 3 weeks of the anthropometric measurement visit, but the timeframe was extended when necessary to obtain up to 3 recalled days. Staff used a self/parent-report approach; thus, additional resources (eg, schools) were not consulted. For children younger than 8 years old, a consensus recall approach was used with parents and children reporting together; children 8 years old or older reported individually with parent assistance. At the anthropometric measurement visit, parent–child dyads were given two-dimensional food models to assist with portion estimation during the phone recalls. Recall data were analyzed using Nutrition Data System for Research (NDS-R) (version 2.92, 2010, Nutrition Coordinating Center, University of Minnesota) software. NDS-R is based on the US Department of Agriculture Nutrient Data Laboratory as the primary source of nutrient values and composition with supplementation of food manufacturers' information and data available in the scientific literature.[24] NDS-R uses standardized published imputation procedures to minimize missing values.[25] Child and parent diet quality and energy intake estimates were based on means across recall days. Overall diet quality for both parent and