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Parent–child dietary intake resemblance in the United States: Evidence from a large representative survey

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ABSTRACT

We studied the association in dietary intakes and patterns between parents (aged 20–65 years) and their children (aged 2–18 years), using nationally representative data collected by the US Department of Agriculture (USDA) in the Continuing Survey of Food Intake by Individuals 1994–96. We analyzed two 24-h recall dietary data for 1061 fathers, 1230 mothers, 1370 sons and 1322 daughters. All analyses adjusted for sampling design complexity. We assessed multivariate-adjusted parent–child correlations in selected nutrients, food groups and overall dietary quality assessed using the new USDA 2005 Healthy Eating Index score (HEI_n). The parent–child correlations were weak or moderate (0.20–0.33) for most intake measures. There were clear patterns of interaction with gender dyads in the intakes of calcium and dairy products ($P < 0.05$ for dyad × parental intake), whereby multivariate-adjusted correlations in mother–daughter or mother–child dyads were significantly stronger compared to their father–child counterparts. The reverse was true for multivariate-adjusted correlations in HEI_n. Hispanics and other ethnic groups had significantly stronger resemblance than Non-Hispanic whites and blacks in soft drinks and HEI_n. Resemblance in general was stronger among older children, though the reverse was true when considering agreement in HEI_n's upper quintile. The influence of family income and parental education on the resemblance was small. In conclusion, parent–child dietary resemblance in the US is relatively weak, and varies by nutrients and food groups, and by the types of parent–child dyad and population groups. Factors other than parental eating behaviors seem to play an important role in affecting American young people's dietary intake.

Introduction

Children and adolescents adopt certain dietary behaviors that previous studies suggested might track into adulthood (Mikkila, Rasanen, Raitakari, Pietinen, & Viikari, 2005; Wang, Bentley, Zhai, & Popkin, 2002). It is therefore important to promote healthy eating among the youth to prevent occurrence of chronic conditions later on in life, particularly obesity, cardiovascular disease, type 2 diabetes and certain types of cancer. There are many ways by which promoting healthy eating among the youth can be achieved. However, one of the suggested means was to educate the parents and enhance their awareness about their own health as well as that of their children. This approach assumes that parents are gate keepers and role models for their children and that their nutrition beliefs and behaviors may actually influence that of their offspring.

However, there is a growing body of evidence suggesting that dietary intake among the youth moderately resembles that of their parents, particularly in the United States. To date, around fifteen such studies have been conducted (Adelekan & Adeodu, 1997; Cullen, Lara, & de Moor, 2002; Feunekes, de Graaf, Meyboom, & van Staveren, 1998; Feunekes, Stafleu, de Graaf, & van Staveren, 1997; Fisher, Mitchell, Smiciklas-Wright, & Birch, 2002; French, Story, & Jeffery, 2001; Galloway, Fiorito, Lee, & Birch, 2005; Laskarzewski et al., 1980; Oliveria et al., 1992; Park, Yim, & Cho, 2004; Patterson, Rupp, Sallis, Atkins, & Nader, 1988; Perusse et al., 1988; Rossow & Rise, 1994; Stafleu, Van Staveren, de Graaf, Burema, & Hautvast, 1994; Vauthier, Lluch, Lecomte, Artur, & Herbeth, 1996), seven of which were carried out in non-representative samples within the United States, limiting the ability to produce national population estimates. A number of published studies support familial resemblance in dietary patterns (Adelekan & Adeodu, 1997; Laskarzewski et al., 1980; Oliveria et al., 1992; Patterson et al., 1988; Perusse et al., 1988; Rossow & Rise, 1994; Stafleu et al., 1994; Vauthier et al., 1996). On the other hand, other studies show that the association is either

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very weak or non-existent (Cullen et al., 2002; Feunekes et al., 1997, 1998). The weak or non-existent association is likely related to young people's eating patterns being affected by a myriad of complex factors, with the influence of parents and the family environment being only one of them (French et al., 2001; Popkin, 2006; Vereecken, Inchley, Subramanian, Hublet, & Maes, 2005).

To our knowledge, previous research has not examined familial resemblance in dietary intake using nationally representative data in the United States. Most previous studies are based on small and local samples, and the possible regional and between-group differences in the resemblance between child and parental dietary intakes could affect our understanding of the relationships at the national level. It is crucial to assess such an interrelationship to guide future dietary intervention programs which to date have been strictly targeted towards schools among other non-household settings (Abdel Gawwad, Fetohy, Fiala, Al Orf, & Al Saif, 2006; Agozzino, Esposito, Genovese, Manzi, & Russo Krauss, 2007; Fahlman, Dake, McCaughtry, & Martin, 2008; Janega et al., 2004; Nicklas et al., 1997; Podrabsky, Streichert, Levinger, & Johnson, 2007). Although previous studies assessed nutrient and food group associations between family members, none have evaluated associations in overall diet quality.

The present study examined parent–child dietary pattern interrelationships, using nationally representative data in the United States, and thus produced national population estimates. We estimated correlations in selected nutrients and food groups and assessed the intra-familial clustering in healthy behaviors through adherence to dietary guidelines (i.e., overall dietary quality) between parent and child dyads. We also tested for effect modification of these associations by selected individual and household-level characteristics.

Methods

Continuing Survey of Food Intakes by Individuals (CSFII) data

Data from the US Department of Agriculture (USDA) Continuing Survey of Food Intakes by Individuals (CSFII) 1994–96 were used (US Department of Agriculture ARS, 1994–96). A nationally representative multi-stage stratified sample of 16,103 non-institutionalized persons aged 0–90 years contained information about dietary intake (by one or two nonconsecutive 24-h recalls that were 3–10 days apart); socioeconomic, demographic and health parameters (Tippett & Cypel, 1997).

Study population

Parent sample

Among the 16,103 CSFII respondents, we included 9872 who were 20 years or older and had complete data on day 1 of recall. We excluded those over the age of 65 years ($n = 2127$) and those who completed only one 24-h dietary recall ($n = 414$), which resulted in a final sample of 7331 adults (aged 20–65 years, 3721 men and 3610 women) aged 20–65 years with both 24-h dietary recalls completed. Among them, 86% ($n = 6303$) were either the respondent or the spouse of the respondent and hence were eligible to be included in our sample. All other adults were other family members including, those having a "child of head of household" status. The rationale for excluding elderly subjects was that their dietary intake might differ from those of other family members due to illness or general poorer health.

Children sample

Children were matched to the adult sample by family relationship. Only those children aged 2–18 years with both completed 24-h recalls were considered. After matching parents with their children, the final sample sizes were: 2291 parents (1061 fathers and 1230 mothers) in 1473 households; 2692 children (1370 sons and 1322 daughters); a total of 4244 parent–child dyads (1156 mother–son, 1128 mother–daughter, 982 father–son and 978 father–daughter).

Measures

Dietary intakes and dietary quality indicators

Average dietary intakes from the two 24-h recalls were used. Among young children aged 2–9 years old in the total CSFII 1994–96, proxy response was the common pattern (only 7% and 11% self-reported dietary intake on days 1 and 2, respectively). Food groups and nutrients considered included energy (kcal/day), fat (g/day and % of energy), saturated fat (g/day and % of energy), cholesterol (milligrams; mg/day), sodium (mg/day), fiber (g/day), calcium (mg), sugars and candies (g/day), fruits and vegetables (g/day), dairy products (g/day), total and unsweetened soft drinks (g/day). The food groups and nutrients were selected because of their important influence on health outcomes, including obesity and the metabolic syndrome.

Diet quality index (HEI_n)

To assess the overall quality of diet, we applied the newly revised USDA 2005 Healthy Eating Index (HEI_n) (Britten, Marcoe, Yamini, & Davis, 2006; U.S. Department of Agriculture (USDA), 2005), which incorporated the new dietary recommendations and energy-adjusted all of its individual components (Britten et al., 2006). For many of the food group criteria, Mypyramid serving estimates rather than grams were used as made available by the USDA website http://www.ars.usda.gov/Services/. The HEI_n score consisted of the sum of scores on twelve components covering dietary recommendations in terms of nutrient and food group intakes scored differently (0–5 to 0–20) according to their importance to overall dietary quality. These were developed based on a large body of evidence as outlined elsewhere (Britten et al., 2006). Appendix A table shows the criteria used for scoring each component. The HEI_n could range between 0 and 100. Likely HEI_n is a more robust measure of overall diet pattern (and dietary quality) than intakes of individual nutrient or food groups.

Other covariates

Covariates in our statistical models were included as either potential confounders or effect modifiers as they were previously shown to affect dietary intakes, particularly among adults (Beydoun, Powell, & Wang, 2008; Beydoun & Wang, 2008a, 2008b): age and gender of parents and children, parental ethnicity (Non-Hispanic whites, Non-Hispanic blacks, Hispanics, Others), education (years), employment status (yes vs. no), smoking status (current smoker vs. not), self-rated health (poor health vs. not), physical activity (currently sedentary, measured as never or rarely participates in vigorous activities vs. not), and number of chronic conditions (>2 conditions vs. not), household poverty income ratio category (PIR: 0–129 (poor); 130–299 (near poor) and 300+ (not poor)), and contextual factors including geographical region and degree of urbanization. Other covariates in children included reported body mass index (BMI) and reported physical activity (same categories as for adults).

Statistical analysis

All analyses were conducted using survey-related commands in STATA release 9.0 (STATA, 2005), which take complex sampling design into account (multi-stage stratified cluster as opposed to