RESEARCH
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Dietary Intake of Children Attending Full-Time Child Care: What Are They Eating Away from the Child-Care Center?

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ABSTRACT

Background The Academy of Nutrition and Dietetics recommends children attending full-time child care obtain one-half to two-thirds of daily nutrient needs during their time at the child-care center, leaving one-third to one-half to be consumed away from the center. Although there are guidelines to optimize dietary intake of children attending child care, little is known about what these children consume away from the center.

Objective To describe the dietary intake away from the child-care center for preschool-aged children relative to the expected one-third to one-half proportion of recommended intake, and to examine the relationships between energy intake away from the center with weight status, food group consumption, and low-income status.

Design Cross-sectional study conducted between November 2009 and January 2011.

Participants/setting Participants (n=339) attended 30 randomly selected, licensed, full-time child-care centers in Hamilton County, OH.

Main outcome measures Child weight status and dietary intake (food/beverages consumed outside the child-care setting from the time of pickup from the center to the child's bedtime), including energy and servings of fruits, vegetables, milk, 100% juice, sugar-sweetened beverages, and snack foods.

Statistical analyses performed Generalized linear mixed models were used to examine independent associations of food group servings and low-income status to energy intake and energy intake to child weight status.

Results The mean energy intake consumed away from the center (685±17 kcal) was more than the recommended target range (433 to 650 kcal). Intakes of fruits, vegetables, and milk were less than recommended. Food group servings and overweight/obesity status were positively associated with energy intake while away from the center.

Conclusions Preschool-aged children consume more energy and less fruits, vegetables, and milk outside of child-care centers than recommended. Overweight status was associated with children's dietary intake after leaving the child-care center. It may be beneficial to include parents in obesity prevention efforts targeting children attending child-care centers.

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RECENT EVIDENCE SUGGESTS THAT OVERWEIGHT and obesity established before kindergarten are difficult to reverse.[1] Currently 22.8% of children aged 2 to 5 years are overweight or obese (body mass index [BMI] ≥85th percentile for age and sex),[2] with racial and ethnic minorities[2,3] and lower socioeconomic groups[4,5] being disproportionately affected. Fifty-five percent of US preschoolers aged 3 to 5 years attend child-care centers.[6,7] Some studies have found child-care center use to be positively associated with an increased risk of obesity in later childhood,[8,9] whereas others have found no association.[10,11] An increased risk of obesity among children attending child-care centers compared with those in parental care suggests excess energy intake is either occurring in the child-care center, away from the child-care center, or both, among children attending child care.

Understanding where children's excess energy intake is occurring can better help target obesity-prevention efforts. The challenge is that little attention has focused on the dietary intake of children away from the center[12] due to the predominant focus in recent years on dietary intake at child-care centers.[13] The few studies that have examined diets of preschool children away from child-care centers have found a greater consumption of fat, oils, and sweets away from the center compared with dietary intake while at the child-care center,[12,14-16] indicating the environment away from the center may play an important role in excess energy intake. The Academy of Nutrition and Dietetics (Academy) recommends that child-care centers provide an appropriate diet that meets one-half to two-thirds of children's daily energy and nutrient requirements. This presumes the balance (one-third to one-half) of energy and nutrients will be

provided outside the child-care center by parents and other caregivers.[17]

The objectives of these secondary data analyses were to describe the dietary intake of preschool-aged children while away from the child-care center relative to the Academy's recommendations (ie, one-half to two-thirds proportion of intake[17] recommended by the Dietary Guidelines for Americans[18]); how intake varies by Child and Adult Care Food Program (CACFP) eligibility, a proxy for low-income status; identify contributors (eg, food group servings and low-income status) to children's energy intake away from the child-care center; and evaluate the relationship between energy intake away from the child-care center and weight status.

METHODS

Participants and Setting

Participants in this study were enrolled in a larger observational study of diet and physical activity of children (n=447) who attended 30 randomly selected, licensed, full-time child-care centers in Hamilton County, OH. Two classrooms per child-care center were randomly selected to participate for a total of 60 classrooms. Per state and federal recommendations, children attending these centers full-time are typically served breakfast and/or morning snack, lunch, and an afternoon snack. The Academy recommends that menus at child-care centers should meet one-half to two-thirds of children's energy and nutrient needs.[17] Children who met the following eligibility criteria participated in the larger study: age 36 to 72 months, not enrolled in kindergarten, had attended the child-care center for at least 1 month, and had no chronic disability that prevented their participation in physical activity. Further, only one child per family was eligible to participate. Written informed consent was received from the directors at each child-care center and from a parent of the participating child. The institutional review board at Cincinnati Children's Hospital Medical Center approved the study protocol.

Measures

Dietary Intake. Data collection occurred on Tuesdays and Wednesdays over 15 months between November 2009 and January 2011 to allow for data collection over all four seasons. On data collection days, parents were asked to record all foods and beverages their child consumed from the time of pickup from the child-care center until the time of drop-off at the child-care center the following day on a food record, which is a validated method[19] of measuring dietary intake for this age group. On the food record, parents indicated the time and type of meal (eg, dinner or snack), brand names, and quantity of foods consumed. Detailed instructions with pictures were provided to assist estimation of food quantities and recording of homemade recipes. Research staff reviewed the food records with parents when they were returned the following morning to clarify as necessary quantities consumed, type of preparation (eg, fried or grilled meat), and potential omissions (eg, cereal recorded without milk).

The following inclusion criteria were used for this secondary analysis: parents completed a food record, child attended the child-care center for a full day (≥5 hours) on the study day, and the child was picked up from the center after 3:30 PM and after afternoon snack was served. Although two centers also offered dinner for families working nonstandard hours, children consuming dinner at the child-care center (n=12) were not included in this analysis. Dietary intake away from the child-care center was defined as all foods and beverages reported from the time of pickup from the child-care center to the child's bedtime, to standardize the consumption time frame.

Dietary intake data were analyzed with Nutrition Data System for Research (NDSR) software (versions 2009, 2010, and 2011, Nutrition Coordinating Center, University of Minnesota) to compute energy intake and servings of whole fruits; whole vegetables; white milk; 100% juice; sugar-sweetened beverages, including sweetened milk; and sweet and salty snack foods. Foods were entered as written on the dietary record. For sweet and salty snack foods, we included NDSR codes for fruit-based savory snacks; vegetable-based savory snacks; all crackers; all cakes, cookies, pies, pastries, Danish, doughnuts, and cobblers; all snack bars; all snack chips; all popcorn; meat-based savory snacks; nuts and seeds; nondairy yogurt; frozen dairy and nondairy dessert; all puddings; chocolate and nonchocolate candy; and miscellaneous desserts. Fried fruits and vegetables and fruit and vegetable juices were not counted toward servings of whole fruits and whole vegetables.

Dietary intake away from the center was evaluated relative to the Academy's recommended one-half to two-thirds proportion of intake[17] using the Dietary Guidelines for Americans,[18] which recommends preschool-aged children consume approximately 1,300 kcal/day for a healthy growth,[18] and that energy should come from a balanced diet across food groups (ie, grains, fruits, vegetables, milk, meats, and beans). Thus, energy intake away from the child-care center is expected to be one-third to one-half (433 to 650 kcal) of total energy intake. The guidelines for food groups are operationalized through the US Department of Agriculture My Plate.[20] Similarly, using the Academy's recommendations, target intakes away from the child-care center should be approximately 1 to 1.5 servings of fruits, 1 to 1.5 servings of vegetables, and 0.66 to 1 serving of milk each day for a child attending full-time child care.

Anthropometric Measures. The participants' weight and height were measured at the child-care center in triplicate by trained research staff using a portable scale and stadiometer. BMI was compared with the Centers for Disease Control and Prevention 2000 growth reference for calculation of age-specific percentiles and z scores.[21,22] Children were classified as overweight/obese if their sex-specific BMI-for-age was at or above the 85th percentile.

Demographic Characteristics. Parents completed a demographic characteristics questionnaire that included questions about child age, sex, race, ethnicity, and eligibility status for free/reduced-price lunch in the CACFP. To assess time elapsed between pickup and the child's bedtime, research staff recorded the time of the child's pickup from the center and the parents recorded the child's bedtime that night.

Statistical Analyses

Data were initially checked for distribution and outlying values. To account for the clustered study design within