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SHORT REPORT

Child-care environment and dietary intake of 2- and 3-year-old children

J. S. Gubbels,* S. P. J. Kremers,* A. Stafleu,† P. C. Dagnelie,** N. K. de Vries* & C. Thijs††

*NUTRIM School for Nutrition, Toxicology and Metabolism, Department of Health Promotion, Maastricht University Medical Centre+, Maastricht, The Netherlands
†Department of Clinical Studies, TNO Quality of Life, Zeist, The Netherlands
**NUTRIM School for Nutrition, Toxicology and Metabolism & School for Public Health and Primary Care (CAPHRI), Department of Epidemiology, Maastricht University Medical Centre+, Maastricht, The Netherlands

Introduction

The childhood prevalence of being overweight is increasing worldwide (WHO, 2006), with dietary intake playing a crucial role (Rennie et al., 2005). Moreover, eating habits are often established at a young age (Savage et al., 2007) and maintained throughout life (Kelder et al., 1994).

Child-care attendance is increasing (Portegijs et al., 2006), implying a potentially large influence of this setting on children’s development. It has been recommended that a child who spends a full day (i.e. 8 h or more) in child-care should consume one-half to two-thirds of his or her daily dietary intake when in child-care (American Dietetic Association, 1994). Various studies in the USA have shown that children in child-care do not meet dietary intake recommendations (Bollella et al., 1999; Briley et al., 1999; Padget & Briley, 2005; Ball et al., 2008). Specific features of the child-care environment may underlie such findings. Hughes et al. (2007), for example, found that indulgent and authoritative feeding styles of child-care staff were positively associated with vegetable and dairy consumption. In addition, just as par-
ents can apply certain parenting practices to influence their child’s dietary intake (e.g. Gubbels et al., 2009), child-care staff also apply specific supervision practices.

The present study explored dietary intakes (i.e. saturated fat, dietary fibre and energy intake) and the presence of various environmental factors (i.e. physical environment, food serving style, supervision practices and staff behaviour) in Dutch child-care centres. Observations were executed during the three meals that children in the Netherlands usually receive when in child-care: a morning snack, lunch and an afternoon snack. In addition, the associations between these variables were explored.

Materials and methods

Participants and setting

The study complied with the Dutch ‘Medical Research Involving Humans Act’. All nine child-care centres of the coordinating organisation MIK (Maastricht, the Netherlands) were contacted and agreed to participate. MIK provided consent for the study. Parents were informed in a letter; none refused participation.

Assessment of dietary intake and child-care environment

Observations took place in May and June 2008. Children were observed during their morning snack and lunch on 1 day, and during their afternoon snack on a second day, in a nonconsecutive week. At each meal, five children were randomly selected, resulting in a total of 135 observations (nine centres, three meals per centre, five children per meal). The intake and environment were observed for each child separately, and recorded simultaneously by two observers, who did not interact with each other and were trained in the use of the observation protocol.

Dietary intake was estimated in standard food units (e.g. cups, pieces) and recorded on a structured form developed for the present study, listing common food items and their type (e.g. whether milk was skimmed, semi-skimmed or whole). Only actually consumed foods were recorded, and not leftovers and spoiled foods.

The child-care environment was assessed using items from the Environment and Policy Assessment and Observation instrument (Ball et al., 2005), which were selected, translated and adjusted to fit the Dutch child-care system. Table 1 lists the environmental factors assessed. In addition, children’s gender and age were assessed by asking staff after the observations.

Statistical analysis

Dietary intake was calculated as the mean of the observations by the two observers, after converting standard food units into grams and, subsequently, into intake of energy, saturated fat and dietary fibre (Stichting NEVO, 2006). Cohen’s kappa was 0.84 (SD 0.15), intra-class correlation was 0.91 (SD 0.14), with both indicating good inter-observer agreement (Field, 2005). Total mean intake was calculated as the sum of the mean intakes at each meal per child-care centre. Associations between intake and environment were explored using Point biserial correlations. \( P < 0.05 \) was considered statistically significant.

Results

In total, 135 children were observed. Five children (during lunch) were excluded from the analyses because they were not simultaneously observed by both observers. Forty-three percent of children were 2 years old, and the remaining 57% were 3 years old. Fifty-four percent were male.

There were a mean (SD) of 11.5 (2.3) children and 2.2 (0.5) staff members (all female) present at the meals. In most cases, staff ate together with the children, and they mostly ate the same food (Table 1). More than half of the children were stimulated to eat more than they wanted to (e.g. ‘Finish your sandwich!’), for an average of 1.8 times, but ranging up to 10 times per child during one meal. Children were encouraged to try an alternative option at most once per meal (e.g. ‘We’re out of apples, don’t you want to try this tasty pear?’), whereas punishment by (temporarily) taking food away happened twice per meal at most.

Children’s dietary intake

The children generally consumed fruit in the morning, sandwiches at lunch and snacks (e.g. biscuits) during the afternoon. Total mean energy intake during a full day in child-care was 3237 kJ (773 kcal) (Table 2). Three-year-olds had higher saturated fat intakes at lunch than 2-year-olds (8.6 versus 6.7 g; \( P = 0.04 \)); boys consumed more energy than girls during the afternoon [770 versus 628 kJ (184 versus 150 kcal); \( P = 0.04 \)].

Environmental factors and background characteristics

Staff were less inclined to encourage girls to try new things (\( r = -0.20, P < 0.05 \)) and more often used food to control girls’ behaviour (\( r = 0.19, P < 0.05 \)). Staff more often talked about healthy foods to older children (\( r = 0.18, P < 0.05 \)). Staff at larger centres less often used food to control behaviour (\( r = -0.43, P < 0.01 \)), but more often ate unhealthy foods in front of the children (\( r = 0.47, P < 0.01 \)). When more children were present, staff were more likely to decide how much a child should eat (\( r = 0.49, P < 0.01 \)), instead of deciding together with the child or applying a family style (\( r = -0.18, P < 0.05 \)).
for both variables), and were also more likely to eat the same food as the children ($r = 0.19$, $P < 0.05$).

Dietary intake and environmental factors

A family serving style was associated with higher saturated fat and dietary fibre intake (Table 3). Children ate more when staff ate together with them, regardless of whether they were eating the same or unhealthy foods. Talking about healthy foods was associated with higher fibre intake. Encouragement to overeat was associated with lower intakes during lunch. Giving a child food without asking was associated with higher dietary fibre intake.

Using food to control behaviour was associated with lower fibre intake.

Discussion

Total mean energy intake in the current sample (3237 kJ, 773 kcal) was in the upper range of the recommended intake (2512–3349 kJ (600–800 kcal)); saturated fat and fibre intake complied with recommendations (American Dietetic Association., 1994; Voedingencentrum, 2007). Note that, these mean intakes merely provide an indication of total intake: they reflect a summed total of the means per meal, incorporating intakes of different children, though from the same centre.

As far we are aware, this is the first study to examine dietary intake and environment at European child-care centres, and the first to describe associations between distinct environmental characteristics and intake. The results obtained extend those found by Hughes et al. (2007), who examined the association between feeding style and dietary intake. Note, however, that the current research was explorative. The findings need to be confirmed in larger samples, allow-
ing correction for potential bias introduced by the multilevel design. Strong points were the validated observation protocol (Ball et al., 2005) and high inter-observer reliability.

The family serving style appeared to induce children to eat more, regardless of the food served, which is interesting. Previous research indicated that a family style, in which children can respond to satiation cues and are less likely to overeat, is best for the child’s eating habits development (Johnson & Birch, 1994; Fisher et al., 2003). The children in the present study might have been too young to regulate their own intake. Further research should examine at what age the family style would be desirable. Encouragement to overeat was associated with lower intakes, probably indicating that picky or slow eaters were encouraged to eat more.

Staff appeared to function as role models, with higher intake by children when staff ate together with them. This is inconsistent with earlier findings showing that teacher modelling was unrelated to preschool children’s intake. Enthusiastic modelling (i.e. promoting food after eating it), however, was reported to be effective (Hendy & Rau denbush, 2000), which is in line with the current findings.

The present study underlines the importance of child-care in determining children’s dietary intake. However, more research is needed to examine the mechanisms underlying the association between child-care environment and children’s dietary intake. In addition, cultural differences warrant caution when generalising the results of US studies to the European context. In summary, intervening in the child-care setting, with special attention to staff behaviour, could help children to establish healthier eating habits and prevent them becoming overweight.

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Conflict of interest, source of funding and authorship

The authors declare that they have no conflicts of interest.

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