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Food consumption and nutrient intake in day care and at home in 3-year-old Finnish children

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Abstract

Objective: To assess and compare the food consumption and nutrient intake between 3-year-old children cared for at home full-time and those attending day care outside the home. Nutrient intake on weekdays and weekends was also studied.

Design: Cross-sectional sample of children invited to the nutrition study within the Type 1 Diabetes Prediction and Prevention (DIPP) birth cohort born in 2001. Families returned 3-d food record completed close to the child's third birthday.

Subjects: A total of 471 pre-school children aged 3 years of whom 285 had only been cared for at home during the recording time and 186 had attended day care outside the home.

Results: Among the children cared for outside the home, there were more consumers of recommendable foods as fresh vegetables, fruits, berries, rye bread, fish, skimmed milk and vegetable margarines, than among those cared for at home. The day-care group had higher intake of protein, dietary fibre, thiamine, potassium and magnesium, and lower intake of sucrose compared with the group cared for at home. Adjustment for sociodemographic factors did not change the results. In all children, food consumption was more varied on weekdays compared with weekends. On weekdays, children had higher intake of dietary fibre and protein and lower intake of sucrose compared to weekends.

Conclusions: The type of day care was associated with food consumption and nutrient intake among pre-school children and hence might have an impact on their nutrition and health. The diet of the children attending day care outside the home was more balanced and closer to the national recommendations.

Keywords
Child
Day care
Food use
Home
Nutrient intake

Children establish eating behaviour in early life and eating environment is important in shaping their food preferences[1]. The basis for dietary habits is built in everyday situations at home and in day care, when food is selected and prepared and meals are served. Accordingly, day care and day-care personnel share with parents the responsibility for a child's nutrition. In Finland approximately half of the children aged 0–6 years, 50 % in 2004[2], are enrolled in the municipal day-care system. Of these children, 70 % are cared for in an institutional day-care centre and 30 % in family day care, which typically takes place in the care giver's home with only a few other children. According to the Finnish recommendation[3] meals eaten in day care should cover two-thirds of a child's daily energy intake.

There is limited data available on children's food habits and nutrition in day care outside the home. Most studies have only reported consumption of selected foods[4,5] or evaluated the menus of the child-care centres[6,7]. Previous data on nutrient intakes suggest that energy intake in day care is lower than recommended[8,9] although this might be compensated for by the meals taken at home[9]. When single meals were compared, the intake of several vitamins at lunch was higher in day care than at home[10]. Micronutrient intake over the whole day was also shown to be greater in the group of children spending all day at pre-school compared with the half-day group[8]. To our knowledge, there are no previous studies comparing food consumption or nutrient intake between children cared for full time at home and those attending day care outside the home.

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The aim of the present study is to assess children's food consumption and nutrient intake at home and in day care outside the home. The primary interest is the differences between the children cared for at home and those attending day care outside the home. Differences in food consumption and nutrient intake between weekdays and weekends are also examined.

Subjects and methods

Subjects

The subjects in the present study are participants of the Type 1 Diabetes Prediction and Prevention Study (DIPP)-cohort (http://www.dipp.fi/e_index.htm)[11]. In study hospitals, all families with newborn babies were invited to participate in screening of genetic susceptibility for type 1 diabetes and written informed consent was requested from the parents. Babies carrying high-risk or moderate-risk human leukocyte antigen (HLA) class II genotypes (15 % of all) were recruited for the study and observed for diet, growth, viral infections and type 1 diabetes-associated autoantibodies at 3-month to 12-month intervals. The study was approved by the ethics committee of the participating hospitals. The present study cohort includes the at-risk children born in 2001 in Tampere and Oulu University Hospitals (*n* 836). Both hospitals operate on a wider area; the Oulu area covers forty-two municipalities in Northern Finland and the Tampere area thirty-four municipalities in Southern Finland, including urban and rural areas.

The present study comprises all children whose families returned the 3-year structured dietary questionnaire with the 3-d food record attached (*n* 484, 58 % of the children recruited in 2001). The children for whom food consumption had been recorded only for 2 d (*n* 20; 4 %) or 1 d (*n* 7; 1 %) were included. Altogether 13 (3 %) food records were excluded due to inadequate information giving a total of 471 (57 % of those recruited) children with acceptable dietary data. Data on parental education and number of siblings were obtained from a questionnaire completed at 3 months after the baby's birth.

Among the participants, there were three different types of day care: 285 (60 %) had only been eating and cared for at home by parents or relatives during the recording period, 136 (29 %) had attended an institutional day-care centre and 50 (11 %) had attended small-sized family day care. In the analysis, the two latter groups were combined giving one group of children cared for exclusively at home in addition to another group also cared for at day care outside the home. As it is not possible to determine the duration of day-care time for children at home, all foods eaten during the day (24 h) were included in the analysis in comparing the groups. For day-care children, the meals eaten both at home and at day care were included.

Dietary data

Data on each child's diet were obtained from a questionnaire and a 3-d food record completed close to the child's third birthday. The 3-d food record consisted of consecutive days, two weekdays and one weekend day (Thursday–Saturday or Sunday–Tuesday). A separate food record was given to day-care personnel if the child was attending day care outside the home during the recording days. The families and day-care personnel were given written instructions to record with household measures all the foods the child had eaten and all vitamin and mineral supplements given to the child. They were also asked to record the type, brand and preparation method of foods. Trained study nurses checked the questionnaire and food records during respective visits and missing data were added after discussion, when needed. Thereafter, the study nutritionists checked the food records and confirmed the data by phone if necessary.

Dietary data were typed and analysed using a software program developed at the National Public Health Institute and the food composition database Fineli[12] (http://www.fineli.fi, for more detailed description, see articles Kyttälä *et al.* and Reinivuo *et al.* in this issue). The program allows modification of standard recipes and personal recipes were used whenever possible.

For food consumption, foods and beverages were categorised and summarised and the proportion of consumers was calculated for each food and food group. To be considered as a consumer a child must have consumed a certain food at least once during the recording period. Amount consumed was calculated as a median of food records because the data did not meet the assumptions for normal distribution. For nutrient intake, an estimate of the average daily intake was calculated by means of food records and intakes from both foods and supplements were included. Proportions of consumers and means of food and nutrient intake were assessed separately for weekdays and weekends.

Statistical analyses

Nutrient intake on weekdays and weekends were compared using the paired-samples *t* test. In those analyses all children were handled as one group. None of the children were cared for outside the home during weekends and therefore all analyses by the type of day care were based on dietary data from weekdays only. Proportions of consumers and non-consumers for food consumption were analysed using the Fisher's exact test and differences in food amounts consumed with the Mann–Whitney *U* test. Nutrient intakes were analysed using the *t* test for independent samples. A logistic regression analysis was applied to study food consumption and nutrient intake in relation to selected sociodemographic variables. The endpoints were determined as consumption *v.* no consumption of food during the recording period and belonging to the highest terter of energy-adjusted intake

v. belonging to the other terters. Parental education and number of siblings were included in the final multivariate analyses as confounding variables based on evidence from the literature and, accordingly, associations observed in the present study. Associations between the type of day care and sociodemographic variables were also tested using the χ^2 test. Adjustment for energy intake was calculated as proportion of energy (E%) for energy nutrients and nutrient intake per 1 MJ of energy for vitamins and minerals. The statistical packages for the social sciences statistical software package version 14 for Windows (SPSS Inc., Chicago, IL, USA) was used for the statistical analyses.

Results

The characteristics of the participants according to the type of day care are presented in Table 1. Altogether seventy-five children (16 %) followed a special diet having at least one allergy or other diet restriction (data not shown). The children born in Northern Finland and the ones having two or more siblings were more commonly cared for at home (Table 1). There was no sex difference in relation to the type of day care. Boys did, however, have a higher intake of energy (5·35 MJ *v.* 5·07 MJ, $P = 0{\cdot}002$) compared with girls and hence higher intake of several nutrients also. Differences were not significant when adjusted for energy and, consequently, nutrient intakes are presented and analysed as energy-adjusted values combining boys and girls.

Food consumption and nutrient intake in relation to the type of day care

Only weekdays were included when comparing the diets by the type of day care. Of the children cared for at home ten (4 %) had only recorded weekend days and were excluded from the analysis. Altogether 1379 recorded days were eligible for the analysis, of which 920 were weekdays, giving an average of 1·91 weekdays for the children cared for at home and 2·03 for those attending day care (difference not significant).

Overall, the children attending day care outside home consumed higher amounts of foods compared with those cared for at home, whereas the proportions of consumers were similar for most of the main food groups (Table 2). Among the children attending day care outside the home, there was a higher proportion of consumers of fresh vegetables and salads, fresh fruit, bread, porridge, savoury baked goods, milk, fish dishes and vegetable fat than among the ones cared for at home. Among the children cared for at home, there were more consumers of soft drinks and sweet baked goods.

Energy intake on weekdays was similar in the day-care group and in the group cared for at home, but sources of energy varied according to the type of day care (Table 3). The proportion of energy from protein was higher in the group cared for outside home, whereas the proportion of energy from sucrose was lower. Children cared for outside home also had a higher intake of dietary fibre, both with and without energy adjustment.

Vitamin and mineral intakes are presented as energy-adjusted values (Table 4). When not adjusted for energy,

Table 1 Characteristics of the children (*n* 471) cared for at home (*n* 285, 60 %) and in day care outside home (*n* 186, 40 %)

	Cared for at home		In day care outside the home		
Characteristics (*n*)	*n*	%	*n*	%	*P* value*
Sex					0·163
Girls (237)	136	48	101	54	
Boys (243)	149	52	85	46	
Region					0·013
Northern Finland (174)	118	41	56	30	
Southern Finland (297)	167	59	130	70	
Maternal education*					0·371
No vocational education (35)	21	7	14	8	
Vocational school or course (134)	79	28	55	29	
Upper secondary vocational education (179)	118	41	61	33	
Academic education (112)	63	22	49	26	
Missing information (11)	4	2	7	4	
Paternal education*					0·602
No vocational education (20)	12	4	8	4	
Vocational school or course (176)	113	39	63	34	
Upper secondary vocational education (154)	96	34	58	31	
Academic education (105)	59	21	46	25	
Missing information (16)	5	2	11	6	
Number of siblings†					<0·001
None (217)	126	44	91	49	
One (145)	78	27	67	36	
Two or more (94)	76	27	18	10	
Missing information (15)	5	2	10	5	

*Pearson χ^2.
†At the time of birth of the child.

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Table 2 Consumption of food groups and selected foods as median daily consumption and proportion of consumers on weekdays in children aged 3 years cared for at home (*n* 275) and in day care outside home (*n* 186)

	Proportion of consumers (%)			Median amount consumed (all children, g/d)		
Food group	Cared for at home	In day care outside the home	*P* value*	Cared for at home	In day care outside the home	*P* value†
Vegetables and vegetable dishes	79	94	<0·001	29	43	0·002
Fresh vegetables and salads	63	88	<0·001	15	21	0·001
Cooked vegetables	11	15	0·257	0	0	0·362
Fruit and berries	92	98	0·127	119	157	0·018
Fresh fruit	70	79	0·024	40	34	0·692
Fresh berries	16	12	0·182	0	0	0·147
Cereal products	100	100	1·000	190	237	0·001
Rye bread	59	83	<0·001	7	13	<0·001
Other bread	78	92	<0·001	20	29	<0·001
Porridge	71	87	<0·001	107	159	<0·001
Sweet baked goods	70	55	0·001	15	4	<0·001
Savoury baked goods	31	45	0·004	0	0	0·024
Milk products	99	97	0·495	465	509	0·005
Milk, skimmed	46	64	<0·001	0	100	0·001
Milk, fat 1–2 %	64	84	<0·001	100	225	0·000
Soured milks	63	67	0·488	75	64	0·382
Cheese	63	68	0·320	5	5	0·753
Meat dishes	97	99	0·328	133	160	0·006
Meat dishes	86	92	0·055	100	114	0·032
Sausage dishes	63	73	0·033	6	11	0·055
Fish dishes	31	41	0·029	0	0	0·033
Side dishes‡	84	91	0·033	80	90	0·012
Fat spreads	91	98	0·001	9	12	<0·001
Vegetable margarine	44	78	<0·001	0	5	<0·001
Butter and butter spread (fat >60 %)	32	38	0·194	0	0	0·188
Beverages	92	87	0·112	225	150	0·001
Juice drinks	72	65	0·124	88	50	0·153
Soft drinks	23	15	0·031	0	0	0·018
Added sugars and sweets	78	77	0·910	5	4	0·251
Added sugar	35	35	1·000	0	0	0·790
Chocolate and confectionery	68	67	0·840	3	2	0·319

*Fisher's exact test.
†Mann–Whitney *U* test.
‡e.g. potatoes, rice and pasta.

the children cared for outside the home had higher intakes of niacin, riboflavin, calcium, iron, zinc and selenium compared with those cared for at home (data not shown). As for the energy-adjusted intakes, higher intake in the group attending day care remained for thiamine, potassium and magnesium. There were no differences in favour of the group cared for at home.

Food consumption and nutrient intake in relation to sociodemographic variables

Food consumption was further analysed using a logistic regression model to examine relations with sociodemographic variables (Table 5). The type of day care was associated with the food consumption; attending day care outside home predicted being a consumer of vegetables, bread, porridge, milk, margarine, sausage dishes and side dishes compared with home care. Having a father with academic education predicted consumption of fresh vegetables, skimmed milk, rye bread and other bread compared with having a father with no vocational education. Having a mother with vocational education predicted consumption of sweet baked goods compared with having a mother with no vocational education. Maternal or paternal upper secondary vocational education was associated with consumption of skimmed milk compared with non-educated parents. Having two or more siblings predicted not consuming any fresh fruit compared with having no siblings (*P* for all <0·05, data not shown).

Adjustment for sociodemographic factors did not change the results for nutrient intake and the type of day care, except for thiamine (data not shown). In a logistic regression model, attending day care outside home predicted having a high intake of protein (OR = 1·769, *P* = 0·007), dietary fibre (OR = 1·578, *P* = 0·036), potassium (OR = 1·670, *P* = 0·017) and magnesium (OR = 1·679, *P* = 0·015). Day care outside the home was also associated with lower intake of sucrose (OR = 0·594, *P* = 0·019). In terms of the other background variables, maternal education was not associated with nutrient intake. Having a father with academic education predicted a higher proportion of energy from protein and a higher energy-adjusted intake of dietary fibre compared with having a father with no vocational education.

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Table 3 Mean intake of energy and macronutrients on weekdays in children aged 3 years cared for at home (*n* 275) and in day care outside the home (*n* 186)

	Cared for at home		In day care outside the home			
	Mean	SD	Mean	SD	*P* value*	Recommendation†
Energy (MJ)	5·1	1·1	5·3	1·0	0·057	4·9/5·5‡
Protein (g)	46	12	50	13	0·001	
Protein (E%)	15·6	3·1	16·1	2·5	0·049	15
Carbohydrate (g)	159	38	166	35	0·071	
Carbohydrate (E%)	53·3	7·0	53·3	5·8	0·912	55
Sucrose (E%)	13·4	5·7	11·6	4·6	<0·001	10§
Fibre (g)	9·3	3·4	10	2·9	<0·001	
Fat (g)	42	14	43	12	0·648	
Fat (E%)	30·4	6·6	29·9	5·1	0·296	30
Saturated fatty acids (SFA) (E%)	12·6	3·4	12·2	2·9	0·284	10‖
Monounsaturated fatty acids (E%)	9·8	2·6	9·8	2·0	0·989	10–15
PUFA (E%)	3·8	1·4	3·9	1·3	0·262	5–10

E% = proportion of daily energy.
**t* test.
†Finnish Nutrition Recommendations, which are based on Nordic Nutrition Recommendations (Nordic council of Ministers, 2005).
‡Girls/boys.
§Sum of refined sugars added by manufacturers and consumers, approximately 10 % of energy intake.
‖SFA and *trans* fatty acid together, maximum 10 % of energy intake.

Table 4 Intake of nutrients on weekdays in children aged 3 years cared for at home (*n* 275) and in day care outside the home (*n* 186), adjusted for energy (amount of nutrient/MJ of energy)

	Cared for at home*		In day care outside the home†		
Nutrient (per MJ)	Mean	SD	Mean	SD	*P* value‡
Vitamin A (RE)	148	159	147	149	0·928
Vitamin E (α-TE)	1·2	0·59	1·2	0·48	0·541
Vitamin D (μg)	1·4	1·0	1·4	0·88	0·531
Vitamin C (mg)	13	9·5	13	7·1	0·998
Folate (μg)	26	11·6	26	8·7	0·762
Niacin (NE)	3·4	1·2	3·5	0·92	0·541
Pyridoxine (mg)	0·27	0·14	0·28	0·12	0·585
Riboflavin (mg)	0·31	0·12	0·33	0·11	0·053
Thiamine (mg)	0·17	0·09	0·19	0·09	0·041
Calcium (mg)	179	59	184	46	0·335
Iron (mg)	1·3	0·49	1·4	0·92	0·120
Potassium (mg)	438	104	477	104	<0·001
Magnesium (mg)	39	8·1	41·2	6·6	<0·001
Selenium (μg)	6·7	1·76	6·8	1·54	0·582
Zinc (mg)	1·40	0·37	1·45	0·34	0·177

RE, retinol equivalent; α-TE, alphatocopherol equivalent; NE, niacin equivalent.
*Daily energy intake 5·10 MJ/d.
†Daily energy intake 5·30 MJ/d.
‡*t* test.

Having two or more siblings was associated with having a higher intake of iron and a lower intake of vitamin D and having one sibling with a higher intake of fibre, all compared with having no siblings. Having siblings predicted a higher intake of thiamine (*P* for all <0·05, data not shown) compared with having no siblings.

Nutrient intake on weekdays and weekends

Daily energy intake was similar on weekdays and weekends, but macro- and micronutrient intakes varied according to the type of the day (Table 6). Altogether 413 children had both weekdays and weekends recorded and were eligible for the analysis. On weekdays, the energy-adjusted intakes of protein and dietary fibre were higher, while the intake of sucrose was higher on weekends. Diet on weekends was similar for all children regardless of the type of day care.

Discussion

In the present study of 3-year-old Finnish children, the quality of diet and intake of nutrients varied with the type of day care. The children attending day care outside the home consumed more food and a wider variety of different foods compared with the children cared for at home. Being cared for outside the home on weekdays seems to improve the quality of diet. The children cared

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Table 5 OR for consumption of selected foods and food groups during weekdays in relation to the type of day care in children aged 3 years: a logistic regression model*

	Day care type: in day care outside the home *v.* cared for at home		
Consumer of	OR	95 %CI	*P* value
Fresh vegetables and salads	3·79	2·23, 6·42	<0·001
Cooked vegetables	1·38	0·77, 2·48	0·274
Fresh fruit	1·50	0·95, 2·39	0·085
Fresh berries	0·63	0·36, 1·12	0·115
Rye bread	3·14	1·95, 5·06	<0·001
Other bread	3·39	1·79, 6·39	<0·001
Porridge	2·38	1·42, 3·99	0·001
Sweet baked goods	0·52	0·35, 0·80	0·002
Savoury baked goods	1·58	1·03, 2·35	0·035
Milk, skimmed	2·11	1·40, 3·20	<0·001
Milk, fat 1–2 %	3·08	1·88, 5·05	<0·001
Soured milks	0·97	0·64, 1·48	0·895
Cheese	1·49	0·97, 2·27	0·068
Meat dishes	2·07	1·05, 4·10	0·037
Sausage dishes	1·57	1·02, 2·43	0·042
Fish dishes	1·47	0·97, 2·23	0·072
Side dishes†	2·53	1·29, 4·96	0·007
Margarine	4·99	3·17, 7·85	<0·001
Butter and butter spread (fat >60 %)	1·14	0·75, 1·73	0·536
Juice drinks	0·77	0·50, 1·18	0·226
Soft drinks	0·63	0·37, 1·07	0·087
Added sugar	1·28	0·84, 1·94	0·252
Chocolate and confectionery	0·84	0·55, 1·28	0·410

*Adjusted for maternal and paternal vocational education and number of siblings.
†e.g. potatoes, rice and pasta.

Table 6 Mean intake of energy and macro-nutrients on weekdays and weekends in children aged 3 years (all children, *n* 413)

	Weekdays		Weekends		
	Mean	SD	Mean	SD	*P* value*
Energy (MJ)	5·15	1·1	5·17	1·3	0·071
Protein (g)	48	13	45	15	0·001
Protein (E%)	15·8	3·0	15·1	3·9	<0·001
Carbohydrate (g)	161	37	162	45	0·679
Carbohydrate (E%)	53·4	6·6	53·7	8·5	0·619
Sucrose (E%)	12·8	5·4	14·7	6·7	<0·001
Dietary fibre (g)	9·7	3·3	8·4	3·4	<0·001
Fat (g)	42	14	44	17	0·098
Fat (E%)	30·1	6·1	30·8	7·5	0·071
Saturated fatty acids (E%)	12·4	3·3	12·7	3·9	0·128
Monounsaturated fatty acids (E%)	9·8	2·4	9·9	2·9	0·277
PUFA (E%)	3·8	1·3	3·8	1·5	0·896

E%, proportion of daily energy.
*Paired *t* test.

for outside the home more often consumed recommendable foods such as fresh vegetables, fruit, berries, rye bread, fish, skimmed milk and vegetable margarines, than did the children cared for at home. The day-care group had a higher intake of protein, dietary fibre, thiamine, potassium and magnesium, and a lower intake of sucrose compared with the group cared for at home. Associations between the type of day care and food consumption or nutrient intakes remained after adjustment for parental education and number of siblings. In all children, intake of dietary fibre and protein was higher and intake of sucrose was lower on weekdays compared with weekends.

There have been only two previous studies on the diet of children attending day care in Finland[13,14]. In both those studies, energy intake during day care as a proportion of total daily energy intake did not meet the Finnish recommendation, i.e. two-thirds of the total daily energy intake[3]. That was, however, compensated for by the meals consumed at home. The same was observed in a Swedish study[9]. Energy intake during day care as a proportion of total daily energy intake was not examined in the present study, since some children were only attending day care for half the day. On average, in the present study, nutrient intake was relatively close to the

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Nordic recommendations[15]. The proportions of energy from fat, protein and carbohydrates were in accordance with the nutritional recommendations, but the proportion of energy from saturated fat was higher while that from polyunsaturated fats was lower than recommended. In all children, the intake of energy was at the same level as in previous Finnish studies among 3-year-olds[16,17]. Intake of sucrose in the present study was higher than in another study from the beginning of the 1990s[16].

To our knowledge, no previous studies have compared food consumption and nutrient intake between children cared for at home and children cared for outside the home. However, Garemo *et al.*[18] have reported children spending more time at day care having higher intakes of energy, protein and fat and a lower intake of sucrose. Other previous studies in day-care centres have mainly focused on monitoring and evaluating nutritional goals and recommendations for day-care meals[4,5,8,9,13]. The quality of school meals and packed lunches differed in British primary schools[19]. Even though British school lunches and Finnish day-care meals are not fully comparable, there were interesting similarities, e.g. higher intake of potassium in the children eating school lunches, and higher intake of sugar among children eating packed lunches from home.

It is noteworthy that children attending day care outside the home consumed more food but did not have a higher intake of energy. That implies their diet was not as dense with energy as that of the children cared for at home. These results also indicate that the children cared for outside home had a diet with higher nutrient density; when calculated per MJ of energy, they had higher intakes of protein, dietary fibre, thiamine, magnesium and potassium compared with the children cared for at home. Bollella *et al.*[8] discovered that children attending preschool all-day had higher intakes of calcium and vitamins A, E and B_{12} compared with children attending preschool for only half the day, even when intakes at home were taken into account. That suggests that meals consumed at day care have a higher nutrient density than meals consumed at home.

Although the observed differences in food consumption did not lead to such substantial differences in nutrient intake, they might still be of importance. Children's food preferences are shaped via early experiences of food and eating[1] and food preferences established in childhood persist into adulthood[20]. At day care, children seem to be offered a greater variety of foods leading to a more diverse diet that can have a long-term impact on their health. It is also noteworthy that the intake of sucrose was lower in the children cared for outside the home. Frequent consumption of snacks appear to be associated with higher sucrose intake[21], and a snack-dominating meal pattern might be more frequent among children cared for at home, whereas eating occasions are more regulated in day care. We have earlier shown that a high intake of sucrose is associated with poor nutritional quality in children[22].

There are certain limitations to the present study. The dietary assessment method employed was an unweighed food record. In general, however, food records are considered a reliable method for estimating the food intake in young children[23] and unweighed records have performed well when compared with weighed records[24]. It has also been shown that parents are generally accurate reporters of their child's diet[25] but, to our knowledge, there are no validation studies of other surrogate reporters for children. Livingstone and Robson[26] suggest that other care takers of children might have varying levels of motivation and interest. Ball *et al.*[5] used the structured observation method for estimating dietary intake in day care. Observation, however, usually limits the amount of day-care centres in the study and the results cannot be generalised. In this study, we were able to collect information from more than 100 different locations.

Determining the day-care time for the children cared for at home was considered not plausible and all meals eaten during the day were included when comparing the types of day care. Hence analysing the quality of the meals served in day care was not possible and food served at home may have contributed to healthier food consumption and nutrient intake among the day-care group. However, there were no differences between the groups during the weekends when all children were only eating at home.

Although the recording period was 3 d, not all days were eligible for the analysis by type of day care. None of the children attended day care on weekends, and hence only weekdays were included in the comparison of the types of day care. Consequently, for most of the participants, only 2 d were included when calculating the means, which made the actual recording period rather short. However, only group comparisons were used in the analysis and there was no ranking of the participants.

We did not exclude potential under-reporters from the analysis. During childhood, diet tends to be highly variable from day to day and the identification of under-reporters is difficult. In a similar Swedish study under-reporting was controlled by calculating energy intake/basal metabolic rate ratio but none of the children were actually excluded because of a low value[9]. Under-reporting seems not to be very common in this population; energy intake of the girls was above the Finnish recommendation and that of the boys met the recommendation. Ideally, we would have included anthropometric data to have something against which to check the reliability of reporting. However, data on children's weight and height were not available at the time.

Subjects in this study carry increased HLA-conferred susceptibility for type 1 diabetes, but they are expected to be representative of young Finnish children in terms of food consumption. Almost 20 % of the Finnish population

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have HLA-defined predisposition to type 1 diabetes, whereas only 3–4 % of those actually progress to clinical disease. The food consumption and nutrient intake of the participants was comparable with the Finnish children in previous studies[16,17]. The influence of the cohort setting on these results must also be taken into consideration, although that effect most likely reduces the observed differences. Day-care meals are similar for all children but parents are responsible for meals at home and therefore food consumption at home would probably be more affected by potential drop out of less educated or less interested parents.

In conclusion, the diet of children in day care outside the family home was more balanced and closer to the recommendations than the diet of children cared for in the family home, with respect to e.g. sucrose, fibre and some vitamins and minerals. Attention should be paid to the promotion of healthy eating habits in children cared for at home full time. The present findings also emphasise the importance of taking dietary intake in day care into account in nutritional studies among children. Food preferences in early life may help predict later preferences and acquiring a healthy and balanced diet during childhood may contribute to prevention of chronic diseases.

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