Children's Food Choices during Kindergarten Meals

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Abstract

The aim of the present study was to examine children's food choices during lunch in a small case study, and how the food choices contributed to children's dietary intake.

The case study was carried out at two kindergartens in Norway. Data was collected through individual interviewing of principals, focus-group interviewing of staff, observations of the lunchtime meal and individual registration of 40 children's dietary intake during lunch.

The two kindergartens offered lunch predominantly as a cold meal involving open sandwiches and various types of toppings, vegetables and milk or water. The principal and the staff decided which food to put on the table, and children's food choices were limited by the availability and accessibility of the food items available during mealtimes. The children helped themselves during lunch or expressed their food choices in various ways. The freedom of the children to choose the food they wanted, kindergarten staff's mild influence on children's food choices and stricter regulation of children's food intake were all observed in the two kindergartens. Half of the children in the study experimented with various combinations of sandwich toppings on the bread, some of which could be considered part of a typical Norwegian diet, but others not. Children's freedom to choose their own food and their experimentation with food items could all be seen as steps toward a transformation of children into independent food consumers, and as respect for children's views in line with article 12 in the United Nations Convention on the Rights of the Child.

Keywords

food consumers – freedom to choose – food choice – children's diet – transformation

1 Introduction

Most children aged 1–5 in Norway spend much of their time in kindergarten, viz. in 2020 92% of children attend kindergarten – most of them full-time (Statistics Norway, 2020). It is common for children to eat open sandwiches for lunch at kindergartens in Norway. According to the national survey of food and meals in Norwegian kindergartens from 2012 (Norwegian Directorate of Health, 2012), most kindergartens served wholemeal bread, vegetable margarine and sandwich toppings such as liver pâté, fish, cheese and meat cuts. Sweet sandwich toppings such as jam were less common. The national survey reported that the food offered in kindergartens was generally of a good nutritional quality (Norwegian Directorate of Health, 2012), though there were some challenges, one of the most important of which was the low number of kindergartens serving vegetables daily. Correspondingly, results from national dietary surveys of children aged 1, 2 and 4 showed that their diets were mostly consistent with the dietary guidelines (Kristiansen, Andersen, & Lande, 2009; Øverby, Kristiansen, Andersen, & Lande, 2009). However, challenges were also reported, the most prominent ones being a low intake of vegetables and vitamin D and a high intake of saturated fat. Correspondingly, similar dietary challenges have been reported for older children, and for these children a low intake of fish and a high intake of added sugar were also reported (Hansen, Myhre, Johansen, Paulsen, & Andersen, 2015).

Food consumed in kindergarten constitutes a substantial part of the children's daily food intake, as they usually eat three meals daily there (breakfast, lunch and afternoon meal), five days a week. Evidence from longitudinal studies has suggested that eating behaviors established in childhood are likely to persist into adulthood (Craigie, Lake, Kelly, Adamson, & Mathers, 2011; Mikkilä, Räsänen, Raitakari, Pietinen, & Viikari, 2004), and this makes kindergartens important settings for children's diets and meal practices. According to socio-ecological models (Sallis, Owen, & Fisher, 2008), the physical and social environment we live in influences our health-related behavior. In kindergarten social factors could, for instance, be the staff's knowledge, attitude and behaviors, and physical factors could, for instance, be the food served for lunch.

The kindergarten staff may influence children's food choices and food consumption during meals by using various feeding styles (Gubbels, Gerards, & Kremers, 2015; Gubbels et al., 2010; Ward, Belanger, Donovan, & Carrier, 2015; Ward et al., 2017). These feeding styles include authoritarian, authoritative and permissive behaviors. Hughes et al. (2007) describe the authoritative feeding style as staff having adequate control over children's eating through reasoning

and involvement. An authoritarian feeding style, on the other hand, was characterised by extensive external control with high use of restrictive behavior and power-assertive directives. Lastly, a permissive feeding style was described, in which little or no structure was provided. Nicklas et al. (2001), Ward et al. (2017) and Dev, McBride, Speirs, Donovan and Cho (2014) used similar descriptions of various feeding styles in studies of childcare providers' influence on children's food consumption at kindergartens.

The food environment at the kindergarten defines what food is available and accessible to the children. Availability is related to the physical presence of food, for instance the food served in the kindergarten. Accessibility, on the other hand, is defined as food being available in a form and location that facilitate their consumption (Story, Kaphingst, Robinson-O'Brien, & Glanz, 2008). Availability and accessibility of food are associated with children's dietary behavior (Pearson, Biddle, & Gorely, 2009; Rasmussen et al., 2006). There is an interplay between the various levels of factors affecting an individual's dietary behavior (Kremers et al., 2006). The physical factors may be influenced by individual factors, e.g. food preferences and social factors, for instance the feeding styles mentioned above. The aim of this study was to examine children's food choices during lunch in a small case study of two kindergartens, and how the food choices contributed to children's dietary intake. The study will provide new insight into how children's food intake is affected by a combination of physical and social regulations within the kindergarten and of children's own opinions and expressions of food choices. Respect for children's views and opinions in matters affecting them, and in accordance with his or her age and maturity, is stated in United Nations Convention on the Right of the Child, article 12 (United Nations, 1989).

2 Methods

2.1 *Study Design*

The study used a case design with an exploratory approach (Yin, 2003) in two kindergartens with departments for the youngest children (ages 1–2) and for older children (ages 3–5) that offered lunch every day, mainly as cold lunch-time meals based on open sandwiches. The study was conducted in accordance with the Helsinki Declaration, and the protocol was approved by the Norwegian Centre for Research Data. Prior to commencement of the study, kindergarten staff and parents were informed of the study in writing. Written informed consent was obtained from parents of the participating children, and oral consent was given by the kindergarten staff during the interviews.

2.2 Case Description

The two kindergartens were located in a municipality in Western Norway and were run by the municipality. Kindergarten A consisted of two departments, one of the departments having 10 children aged 1–2 and three employees, the other department having 14 children aged 3–5 and four employees. Kindergarten B consisted of two departments with 10–15 children aged 1–2 and three to four employees per department, and two departments with 15–20 children aged 3–5 and three employees per department. Lunch was offered in both kindergartens. During lunch the children were placed at 2–3 tables in each department, and the food and beverages were presented on the tables.

2.3 Dietary and Meal Registration

Dietary registration and observation of the meal in each kindergarten were conducted in one department with children aged 1–2 and in another department with children aged 3–5. Individual food and beverage intake were registered during lunch. Dietary intake was registered for a total of 40 children, and during three visits to each of the kindergartens within a period of seven months. The goal was to register the dietary intake of each child three times, but because of illness and other absences some children were registered once or twice. A total of 93 individual dietary registrations were performed (Table 7.1).

TABLE 7.1 Informants and number of participating children at the two kindergartens

		Kindergarten A	Kindergarten B
Occupation, department (Interview code)			
<i>Interviews</i>			
Focus-group interviews		Assistant, ages 3–5 (A2)	Pedagogical leader, ages 3–5 (B2)
		Assistant, ages 1–2 (A3)	Pedagogical leader, ages 1–2 (B3)
		Student, ages 3–5 (A4)	Assistant, ages 1–2 (B4)
Individual interviews		Principal (A1)	Assistant principal (B1)
		Number of children	
<i>Participating children</i>		19	21
<i>Dietary registrations</i>			
Registration No. 1	13		18
Registration No. 2	14		19
Registration No. 3	13		15

Food and beverage intake was recorded continuously for each child on a semi-structured dietary registration form. The number and type of different food items served at each department were recorded immediately prior to the start of the dietary registration. The weight of slices of bread, vegetables and sandwich toppings as well as the volume of drinking glasses were recorded in order to improve the accuracy of the dietary registration. One child ate food brought from home at one of the three dietary registration days, and this registration was omitted from further analyses. The staff's interactions with the children were noted throughout the meal. Pilot testing of the observation form was conducted before data collection, and some changes were made based on the pilot test.

2.4 *Interviews*

One individual interview of the principle and one focus-group interview of three employees were performed in each kindergarten (Table 7.1). Semi-structured interview guides were used for both types of interview, with questions related to the lunch and the food served during lunch. Pilot testing of the interview guides was performed prior to data collection, resulting in a few changes to the interview guides.

2.5 *Data Analysis*

The interviews were transcribed by the authors. The data was analysed using case-oriented analysis (Miles & Huberman, 1994). Analysis of the qualitative data comprised data reduction, preparation and comparison of the kindergartens or kindergarten departments. Dietary intake was analysed using the diet tool *Kostholdspanleggeren* (Dietary Planner) (Norwegian Food Safety Authority), and calculated using Microsoft Office Excel 2010 and SPSS Statistics, Version 24 (SPSS-Inc.). Triangulation was performed by comparing data from interviews, observations and dietary registration when appropriate.

2.6 *Strengths and Limitations*

The present study has strengths and weaknesses that need consideration when interpreting the data. The small sample of kindergartens was a limitation of the study. Strengths of the study were the combination of dietary registrations, observations and interviews, and the fact that different informants participated in the interviews. The study could be further strengthened by interviewing children. The findings cannot be generalised, but the study contributes knowledge on the social and physical influences on children's food choices during lunch at kindergarten.

3 Results

3.1 *Decisions on What Food to Put on the Table*

As regards *who* decided which type of food to offer in the kindergarten, there was consensus in the two kindergartens amongst the staff (principal, pedagogical staff and assistants). However, during the interviews it was obvious that the children also had some influence: "We have also asked the children what they like" (B1). The staff also pointed out that they observed what the children were fond of and took that into consideration when deciding which food to serve.

As regards *why* they offered the specific food items at lunch, perceptions of healthiness seemed to be of importance to the staff in both kindergartens. However, daily routines and the staff's own preferences and opinions also seemed to affect the types of food served at lunch.

What determines things is our own daily routine and our own perception of what is healthy to eat. And we think it is important that there are vegetables, i.e. tomato, sweet pepper, cucumber, although they may not always eat it. My opinion of what one should eat affects my choices. I would not have chosen white bread; I think that is more like candy. (A2)

In Kindergarten B the staff for children aged 1–2 expressed that the most important consideration was that the children should eat.

In our department, with small children, it is very important that they get enough food. Many of them are small and flimsy and need a lot of fat. We want the children to get the nutrients their body needs. (B3)

Furthermore, the staff at both kindergartens seemed to think that it was important for the children to have a variety of food items to choose from during lunch, as well as variations in their food intake. "A variety of sandwich toppings, within reasonable limits. Meat, cheese, a regular lunch table" (B2).

3.2 *Children's Expression of Food Choices*

Observations in both kindergartens revealed that the meal started by sending the basket of bread around the table so the children could help themselves. The staff asked the children several times during the meals to send the basket of bread or plates of sandwich toppings around the table for them to help themselves. During lunch the children prepared the open sandwiches by themselves. The staff at both kindergartens expressed during the interviews that the

children would get help if they needed to, but that the children first tried to manage by themselves. The youngest children were also allowed to try to manage by themselves, or the staff asked them what they wanted to eat: We then ask “Do you want any cheese?” to be absolutely sure they will get what they want on the slice of bread (B3). We observed that the staff asked the youngest children several times during the meals what type of sandwich topping they wanted on the slice of bread, whether they wanted more food or more to drink, and whether they had finished eating.

The youngest kindergarten children expressed their food preferences in various ways. According to the staff at both kindergartens, understanding what the youngest children wanted to eat was not a problem. The staff explained that the children expressed themselves by pointing at the food or nodding/shaking their head. Crying could also be a sign of a small child not getting his or her needs satisfied. Pointing, nodding, gesticulation, yes/no answers, noises and crying were also noted during observation of the meals as part of the youngest children's expressions of food preferences. In these situations we observed that the staff asked the children if they had understood correctly, whereupon they responded. For instance, in Kindergarten B one of the youngest girls pointed at the tube of mackerel in tomato sauce and responded by nodding when one of the staff asked if she wanted mackerel on the slice of bread.

3.3 *The Staff's Influence on Children's Food Choices*

The interviews indicate that the staff wanted to influence the children's food choices during the meals by encouragement.

They are allowed to choose, of course, but we often ask: don't you want to try that? You cannot know if you like it or not if you haven't tried it, you know. But we do not force anyone to eat sausage if they tell us all the time that they want cheese. We just don't do that. Because we do not think that is our task. But we can encourage, and we do that. (A2)

The staff also tried to influence the youngest children's food choices by asking if they wanted certain food items: “Then you ask them, just as you do with the older children, but you point and ask: don't you want that on (the bread)?” (A3).

Observations were in line with results from the interviews. For instance, during an observation in one of the departments for children aged 1–2 one of the staff helped the children put sandwich toppings on the bread slices, and continually asked if they wanted mayonnaise. Luring was also used as a strategy to encourage the youngest children to eat the food. For example, adding extra mayonnaise to the last part of the slice of bread to encourage the child to finish

the meal, or comments like “eat the bread – it will give you strong teeth” when the child preferred to eat only the sandwich topping. The staff also encouraged some of the children to try sandwich toppings on the slice of bread other than the ones they usually ate, or to take a bite of the bread before they started to drink milk. There did not seem to be any consistency about commenting on a child for eating or not eating all the food on the plate, as we observed both practices during our observations in the two kindergartens.

Although the staff expressed that they encouraged the children to try different food items and that they wanted the children to be independent, they also wanted to regulate the intake of some food items. Several times during the observations we noticed that the staff commented when a child added too much sandwich topping on a slice of bread. One example was observed in Kindergarten A, when one of the staff told a child “Enough!” when he put too much cream cheese on the slice of bread. The child also wanted egg slices on top of the cream cheese and was allowed to add the egg. When the child wanted even more egg on the bread, the staff told him “I think it is enough because there is no more room on top of the slice of bread.” This form of regulation was also expressed during the interviews:

We encourage the children to be as independent as possible. There may be too much butter or too little butter (on the slice of bread), they are allowed to have a little control. But of course, we limit it, we don't let them add butter as thick as the bread slice. (B2)

Some children turned to the staff for help on decisions regarding the amount of sandwich topping to put on the slices of bread after the staff had commented on it, as exemplified by a short conversation in Kindergarten B: Now you have far too much margarine on the slice of bread (staff). How much should I remove? (child). Almost everything (staff). Like this? (child). Yes, now it is fine (staff).

More strict regulation of the food choices was observed during the meals in the departments of 1- to 2-year-olds. Examples are one child who wanted crispbread instead of the slice of bread, but was told that she first had to eat the slice of bread, or comments like “You must eat the slice of bread before you get milk.” Furthermore, comments like “Take one more slice of bread” and “Eat your food” occurred several times during the observations.

3.4 *Presence of Food Items and Children's Food Choices*

The two kindergartens offered differing numbers of food items for lunch, and at Kindergarten A the number of different food items was almost twice that at

Kindergarten B (Table 7.2). The difference in availability of food items at the two kindergartens resulted in a difference in the number of food items chosen by the children, as shown in Table 7.3.

TABLE 7.2 Types of food item registered at lunch during four observations at each kindergarten

	Kindergarten A								Kindergarten B							
	Ages 3–5				Ages 1–2				Ages 3–5				Ages 1–2			
	Registration No.				Registration No.				Registration No.				Registration No.			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Bread</i>																
Bread, coarse flour	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Crisp bread, wholemeal flour ^a	x	x	x	x	x	x	x	x								
<i>Spread</i>																
Margarine	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mayonnaise	x	x	x	x	x											
<i>Meat-based sandwich fillings</i>																
Cured mutton sausage	x	x	x	x	x				x	x		x				
Salami sausage	x	x		x	x					x				x		x
Bologna sausage									x	x	x	x		x		
Ham (turkey or pork) ^a	x		x	x	x		x									
Liver pâté (pork or chicken) ^a	x	x		x	x		x		x	x	x	x	x	x	x	x
Sausage	x															
<i>Dairy-based sandwich fillings</i>																
Cheese, hard	x	x	x	x	x	x	x	x	x	x	x	x				x
Whey cheese, hard ^a	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Whey cheese, spread	x	x	x	x	x		x	x								
Cheese spread ^a	x	x	x	x	x		x		x	x		x	x	x	x	x
<i>Seafood-based sandwich fillings</i>																
Mackerel fillets in tomato sauce	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Cod-roe spread	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
<i>Eggs</i>	x	x		x	x	x		x								

(cont.)

TABLE 7.2 Types of food item registered at lunch during four observations at each kindergarten (*cont.*)

	Kindergarten A								Kindergarten B							
	Ages 3–5				Ages 1–2				Ages 3–5				Ages 1–2			
	Registration No.				Registration No.				Registration No.				Registration No.			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Jam	x	x	x	x	x											
Vegetables																
Tomato			x	x	x		x	x	x	x	x		x			
Cucumber	x	x	x	x	x	x	x	x	x				x			
Sweet pepper	x	x	x	x	x	x		x			x					
Carrot	x	x	x	x	x	x		x								
Broccoli	x	x		x	x											
Beverage																
Milk, semi-skimmed	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Water	x	x	x	x	x			x	x	x	x		x	x	x	
Total	23	22	19	23	22	11	11	17	14	15	10	13	10	10	9	10

a 1–2 different types of food items

TABLE 7.3 Number of food items eaten and availability of various food items for each individual child at lunchtime at the two kindergartens

Kindergarten A (n = 19)		Kindergarten B (n = 21)	
Food items during lunch	Mean ± SD ^a	Mean ± SD	p-value ^b
Eaten	6.7 ± 1.8	5.5 ± 1.2	0.017
Available	21 ± 3.7	12 ± 1.4	0.001

- a The mean and the SD were calculated from the average of up to three lunches for each individual child.
b Independent t-test.

Sandwich toppings served during lunch on all observation days were chosen by a higher percentage of children at the two kindergartens than were toppings served on only one or two of the observation days (Figure 7.1A). Sandwich

FIGURE 7.1 Effect of availability and accessibility on food-item intake. The data is shown as mean $\pm$ standard deviation of the percentage of children who chose the food items

toppings that were prepared in one way or another were chosen more often than those in a tube (Figure 7.1B).

The prepared food items could be slices of various types of meat and hard cheese on plates, whey-cheese spread, jam and margarine in small bowls and slices of various types of vegetable on plates. Unprepared sandwich fillings could be mayonnaise, various types of cheese spread and cod-roe spread, all from tubes, and mackerel fillets in tomato sauce from a tin or a tube. The proportion of children who chose prepared food items was different to the proportion who chose unprepared food items amongst 3- to 5-year-olds, but not amongst 1- to 2-year-olds (Figure 7.1B).

Fifty percent of the children experimented with combinations of various sandwich toppings on the slice of bread on one or more of the observation days. The combination of sandwich toppings was more common in children aged 3–5 than in children aged 1–2 (Table 7.4).

Furthermore, experimentation with various combinations of sandwich toppings on the slices of bread was more common at Kindergarten A than at

TABLE 7.4 Combination of toppings and spreads on the slices of bread for different age groups at the two kindergartens

Age group	Kindergarten A		Kindergarten B	
	Combinations (n)	Children (n)	Combinations (n)	Children (n)
Ages 3–5	10	12	6	13
Ages 1–2	4	7	0	8

Note: The data shows the number of children combining toppings and spreads on one or more of the observation days at the two kindergartens.

TABLE 7.5 Combination of toppings and spreads on the slices of bread at the two kindergartens

	White cheese (hard)	Whey cheese (hard, spread)	Meat (cured mutton sausage, ham, salami)
Jam	4	1	5
Fish spread	3	4	3
White cheese		2	3
Whey cheese	2		8
Meat	3	8	
Egg	3	1	3
Mayonnaise		4	1

Note: The data shows the number of combination of toppings and spreads chosen by the children during three observations at each of the two kindergartens.

Kindergarten B. The various combinations of sandwich toppings are shown in Table 7.5.

For instance, jam is normally added to cheese in Norway, but not to meat toppings. For children in the present study it was just as normal to combine jam with meat as to combine it with cheese. Furthermore, it is considered normal to combine meat with white cheese but not with whey cheese. The children in the present study, however, combined meat with whey cheese more often than with white cheese. Norwegians also normally combine egg or mayonnaise with meat, but not with cheese. For the children in the present study

it was more common to combine egg or mayonnaise with cheese than with meat. The children also combined fish spread with cheese or meat, although these combinations are not considered part of a typical Norwegian diet. In addition, vegetables were included on top of the sandwiches by some of the children, but this data was not included in the analysis of combinations of sandwich toppings.

3.5 *Dietary Challenges: Vegetables, Fish and Jam*

Kindergarten A served 3–5 different types of vegetable at each of the registered lunchtime meals (cucumber, sweet pepper, tomato, carrot, broccoli), whilst Kindergarten B served two vegetables at two of the three registered lunchtime meals at Kindergarten B (tomato, cucumber or sweet pepper), and only for children in the age group 3–5 (Table 7.2). Table 7.6 shows the average dietary intake of various sandwich fillings, including vegetables. The average daily vegetable intake was 16.6 g for children that had access to vegetables for lunch, and 28.5 g for children that consumed vegetables.

TABLE 7.6 Dietary intake of various sandwich fillings from the lunch at two kindergartens

	Intake in children who ate the sandwich fillings (g)	Intake in all children offered the sandwich fillings (g)
Meat-based sandwich fillings	15.5 ± 13.5	9.9 ± 12.6
Dairy-based sandwich fillings	14.7 ± 8.7	10.1 ± 10.0
Seafood-based sandwich fillings	15.5 ± 10.1	5.5 ± 9.5
Jam	10.8 ± 3.5	3.9 ± 5.7
Vegetables	28.2 ± 47.6	16.6 ± 38.9

Note: Data is shown as mean ± standard deviation in 40 children for up to three dietary registrations for each child.

The availability of various vegetables was higher at Kindergarten A than at Kindergarten B. The children seemed to have similar preferences as regards types of vegetable in the two kindergartens (Figure 7.2). Carrot, cucumber and sweet pepper were preferred to tomato and broccoli at Kindergarten A, and cucumber and sweet pepper were preferred to tomato at Kindergarten B.

In Norway, cod-roe spread and mackerel fillets in tomato sauce are common as sandwich toppings. The children in Kindergarten A and Kindergarten B had access to both cod-roe spread and mackerel fillets in tomato sauce for lunch on

FIGURE 7.2 Distribution of vegetable intake when offered at Kindergarten A (A) and Kindergarten B (B)

all observation days, with one exception: children aged 1–2 in Kindergarten A had access to one or two of the fish products. Children consumed more dairy- and meat-based sandwich fillings than fish products at lunch (Table 7.6).

In Kindergarten A children aged 3–5 had access to jam on all observation days (Table 7.2). Six of the 12 children aged 3–5 ate jam on all or most of the observation days, corresponding to 10.8 g jam per day (Table 7.6), whilst the other children in that age group did not eat any jam at all. Children aged 1–2 had access to jam on one of the observation days, but none of the children ate jam during that observation day. Kindergarten B did not offer jam for lunch on any of the observation days.

3.6 Nutrient Intake and Nutritional Challenges

As shown in Table 7.7, lunch contributed to 24% of the daily energy requirement for children aged 2–5. A large part of the energy intake was through fat, especially saturated fat and polyunsaturated fat. When the intake of fat is presented as an energy percentage of the meal (E%), the data shows that a large amount (42E%) of the energy intake was in the form of fat, and that the intake of saturated fat was high during lunch (16E%). Although the average intake of sugar during lunch was low (Table 7.7), some of the children ate jam on all observation days, thereby contributing to an elevated intake of added sugar for these children.

The average intake of vitamins and minerals was generally at least 24% of the daily recommendations (data not shown). The dietary intake of vitamin D and of sodium during lunch is shown in Table 7.7. Vitamin D intake was only 11% of the daily requirement. The dietary intake of sodium, however, was high, and the children in our study consumed an average of 42% of their daily recommended intake of sodium at lunch alone (Table 7.7).

TABLE 7.7 Intake of nutrients during lunch at two kindergartens

	Amount	Percentage of daily need (%)	E% in the meal
Energy, kJ	1283 ± 506	24 ± 10	
Protein, g	11.5 ± 4.2	29 ± 11	16 ± 3
Fat, g	15.0 ± 7.0	30 ± 14	42 ± 7
– saturated fat, g	5.5 ± 2.6	36 ± 17	16 ± 3
– monounsaturated fat, g	3.9 ± 1.7	20 ± 9	11 ± 1
– polyunsaturated fat, g	4.2 ± 2.6	37 ± 22	12 ± 5
Carbohydrate, g	29.5 ± 11.7	18 ± 7	42 ± 6
– added sugar, g	1.1 ± 1.3	3.7 ± 4.3	2 ± 5
Dietary fiber, g	4.0 ± 1.8	25 ± 11	
Sodium, mg	545 ± 263	42 ± 20	
Vitamin D, µg	0.79 ± 0.56	11 ± 7	

Note: Data is shown as mean ± standard deviation in 40 children. The mean of up to three dietary registrations for each child was used in the calculations. The percentage of the daily requirement was calculated in accordance with the recommended daily nutrient requirement of children aged 2–5 (Norwegian Directorate of Health, 2014).

4 Discussion

In the present study we aimed to examine children's food choices during lunch in a small case study of two kindergartens, as well as how the food choices contributed to children's dietary intake. We found that the children expressed their food choices and had varying degrees of freedom to make their own food choices and experiences during lunch. However, the availability or accessibility of the food items at kindergarten limited these choices. Differences were found at the two kindergartens regarding the variability of food items served during lunch, including vegetables. Children's food choices were therefore based on a framework set by the adult staff at the kindergartens.

Our results showed that the pedagogical staff and the principals decided together what food to put on the table. Although these decisions were influenced by the children's requests, other aspects were more influential, e.g. the healthiness of the food offered, the routines at the kindergarten and the staff's personal preferences. In addition to deciding what type of food was to be offered at the kindergarten, thereby affecting children's food choices at a physical level, the staff also influenced children's food choices at a social level.

This was seen to different degrees, and the results can be seen in connection with the emerging literature on different feeding styles (authoritative, authoritarian and permissive). The staff's influence on children's food choices generally appeared to be in line with an authoritative feeding style, i.e. a feeding style whereby the staff have adequate control of children's eating through reasoning and involvement (Hughes et al., 2007). For instance, the staff in the departments for children aged 3–5 allowed the children to serve themselves, and helped them if necessary. Giving the children freedom to decide which sandwich topping to choose and letting them prepare the sandwiches by themselves was pointed out by one of the staff at Kindergarten B as a way of making the children more independent.

The staff frequently used encouragement in an attempt to influence children's food choices, and they sometimes guided the children on how much sandwich topping to put on the slice of bread. The authoritative feeding style was observed amongst the staff in the departments for the youngest children, for instance when the children were asked about what they wanted on the slice of bread and were encouraged to eat/try something new, and so on. However, more strict influences on the children's food choices were also observed, e.g. when the staff told the children to eat one type of food before they could get another type – which could be interpreted more as an authoritarian feeding style (Hughes et al., 2007).

The staff did not comment when the children experimented with several layers of toppings on the slices of bread. Children being allowed to experiment with different combinations of sandwich toppings on the slices of bread without any regulations could be seen as a permissive feeding style, i.e. a feeding style without any structure, whereby the children can eat whatever they want (Hughes et al., 2007). However, this experimentation with combinations of sandwich toppings could be part of children's exploration of taste and texture and could also be interpreted as growth of the child's autonomy. This experimentation was more common amongst children aged 3–5 than amongst children aged 1–2, which could partially be explained by the more regulated feeding style observed by the staff of the departments for the youngest children.

Some of the combinations of sandwich toppings were considered normal in a Norwegian diet. However, for the children in our study it was just as normal to try combinations not considered part of a typical Norwegian diet, and children and adults may have different views on what are considered proper food choices (Karrebæk, 2012). Although the data on combinations of sandwich toppings on the slices of bread only involved 20 children, it shows a tendency of the children to be creative and combine sandwich toppings irrespective of whether or not they form part of a typical Norwegian diet. Andersen and Holm

(2013) argue that it is important for the staff to show children confidence and respect their way of doing things, even though it is different from the way an adult would do it. Whether or not children's decisions and experimentation with various food items are in line with national recommendations for food and meals at kindergartens (Norwegian Directorate of Health, 2018) is dependent on the availability and accessibility of healthy food for lunch.

The availability of food at kindergarten is an important physical factor that may affect children's food choices during lunch. Our study revealed that the two kindergartens displayed different variabilities of food items available during lunch, and there was also a difference between the departments for the youngest and the oldest children within the same kindergarten. The differences in food variety affected children's food choices, as a higher number of different food items available during lunch resulted in consumption of a higher number of different food items. It is recommended that the food served at kindergartens be in accordance with national recommendations on food and meals at kindergarten (Norwegian Directorate of Health, 2018), i.e. the food should be healthy and in line with the national food guidelines (Norwegian Directorate of Health, 2014). Children who are offered a variety of healthy foods from early childhood onward appear to have healthier diets throughout childhood (Cooke, 2007). Thus, both the healthiness and the variability of the food offered in kindergartens contribute to formation of the child's future food choices. The lower variability for various food items for 1- to 2-year-olds than that for 3- to 5-year-olds found in our study should be taken into consideration. Exposure to a variety of food items early in life could help prevent reluctance to try new foods (food neophobia) – something that emerges at around two years of age and is associated with lower dietary quality and variety (Helland, Bere, Bjornara, & Overby, 2017).

The frequency of the various food items offered during lunch is also of importance. Our study showed that sandwich toppings served during lunch on all observation days were chosen by a higher percentage of children than toppings served on only one or two of the observation days. These results seem to be in line with Cooke (2007), who argues that the most important determinant of a child's liking for a particular food seems to be the extent to which it is familiar. That is, children prefer the food that is familiar to them. It is reasonable to suggest that the children in our study were familiar with the food items served daily. However, caution should be exercised in interpreting the data, as we do not know whether the results were caused by the familiarity of the sandwich toppings or whether the kindergarten served some sandwich toppings less often because they experienced that they were less popular amongst the children.

Not only availability but also accessibility may affect children's food choices. In our study the accessibility of the various sandwich toppings seemed to be a factor in food choices amongst the older children, aged 3–5, but not amongst the younger children, aged 1–2. Tubed sandwich toppings may appear less accessible to children serving themselves than toppings prepared on plates. However, the lack of differences between the more easily accessible food items and the tubed/canned food items in the departments for children aged 1–2 may be due to the staff helping these children during lunch.

Our study showed that the two kindergartens and the different departments within the same kindergarten displayed differing frequencies of and variation in vegetables served for lunch. The frequency of and variation in serving vegetables is important for vegetable intake, and two recent review articles showed that repeated exposure to vegetables increased children's vegetable consumption (Hodder et al., 2018; Holley, Farrow, & Haycraft, 2017). Advocating daily serving of a variety of vegetables at kindergarten is in line with studies showing that vegetable consumption in childhood is associated with lower rates of non-communicable diseases in adulthood (Maynard, Gunnell, Emmett, Frankel, & Smith, 2003; Ness et al., 2005). However, in our study the amount of vegetables consumed in relation to the total amount of food ingested during lunch did not seem to be affected by the variability of vegetables offered, but the sample of our study was small. Our results are in contrast to recent studies showing that an intervention at kindergartens, focusing on availability and accessibility of vegetables, encouragement and role modelling, was successful in increasing children's consumption of vegetables (Kristiansen et al., 2019). The vegetable intake in our study, were, however, higher than has been reported in a Dutch study serving lunch based on open sandwiches (Gubbels et al., 2015).

A few nutrients will be highlighted in the following discussion. National surveys in Norway have reported that the intake of saturated fat is higher than that recommended for both adults (Totland et al., 2012) and children of various ages (Hansen, Myhre, & Andersen, 2016; Hansen et al., 2015; Kristiansen et al., 2009; Øverby et al., 2009). Also, in our study the relative amount of saturated fat in the food was high. When comparing the nutrient intake to the percentage daily requirement, or calculating it as E% in the meal, it is obvious that the lunchtime meal in our study contributed to a high quantity of saturated fat. Our findings were also higher than has been reported in other European studies (Gubbels et al., 2010; Gubbels, Raaijmakers, Gerards, & Kremers, 2014; Sepp, Lennernas, Pettersson, & Abrahamsson, 2001). There is scope to reduce the intake of saturated fat at the kindergartens in our study. One strategy could be to reduce the availability of meat with a high content of saturated fat, e.g. cured mutton sausage, salami sausage and bologna sausage, and to replace it with

less saturated fat-containing alternatives. Ham of chicken, turkey or pork contains much lower amounts of fat, but this sandwich topping was only served in one of the kindergartens. Cured mutton sausage and salami sausage also contain high amounts of sodium. Our data showed that sodium intake was high during lunch, and contributed to over 40% of the maximum recommended daily sodium intake (Norwegian Directorate of Health, 2014). This constitutes an additional reason to find alternatives to these meat-based sandwich toppings. High sodium intake by children has also been found in other European studies (Huybrechts & De Henauw, 2007; Korkalo et al., 2019; Moreira et al., 2015). However, cod-roe spread is also a source of sodium that contributes substantially to the sodium intake in our study. Cod-roe spread is one of the common fish products served at Norwegian kindergartens along with mackerel fillets in tomato, in line with the results of our study. The kindergarten staff are thus torn between the dietary recommendation that fish and seafood intake be increased and the recommendation that sodium intake be reduced (Norwegian Directorate of Health, 2014). It is questionable whether kindergarten staff have the requisite nutritional expertise to juggle these recommendations, as there has been scant emphasis on food, meals and nutrition in kindergarten teacher education (Norwegian Ministry of Education and Research, 2006, 2012) and the framework plan for kindergartens in Norway (Norwegian Ministry of Education and Research, 2006). Serving additional types of fish product suitable for a sandwich-based lunch, e.g. fish burgers, with a high fish content and a low sodium content could be a strategy to increase the consumption of fish at kindergartens.

Adequate vitamin D intake has been a challenge for the Norwegian population – both children (Hansen et al., 2015, 2016; Kristiansen et al., 2009) and adults (Totland et al., 2012). Vitamin D intake was also low in our study when the data was analysed as a percentage of the daily requirement, and much lower than what was reported in a Finnish study in which hot lunches were served (Korkalo et al., 2019). A simple change that kindergartens could make is replacement of semi-skimmed milk with semi-skimmed milk containing vitamin D.

Although the average intake of added sugar is within the recommended maximum intake for children aged 1, 2 and 4, and is less than in earlier surveys (Hansen et al., 2016; Kristiansen et al., 2009; Øverby et al., 2009), the intake is still higher than that recommended for older children (Hansen et al., 2015) in Norway. It is therefore important to continue to try and limit the intake of added sugar in early childhood. Our study showed that if jam was offered during lunch, as was the case on all observation days in one of the departments of

Kindergarten A, half of the children aged 3–5 chose to eat jam. A strategy could be to avoid offering jam at kindergarten, as was the case at Kindergarten B.

5 Conclusion

This study was conducted as a case study at two kindergartens in Norway, with the aim of examining children's food choices during lunch, as well as how these food choices contributed to children's dietary intake. The findings demonstrate that differences in the variability of food items served during lunch resulted in differences in children's food choices and thus their dietary intake. We recommend daily serving of a variety of sandwich toppings for all children at kindergarten, with a special emphasis on vegetables and various fish products. An effort should be made to ensure that the youngest children, aged 1–2, also get a wide variety of food items for lunch. We observed varying degrees of freedom for children to make their own food choices and experiences during lunch, mostly in line with an authoritative feeding style. Feeding styles whereby children could make their own decisions, be encouraged to expand their food repertoire and be allowed to experiment with several layers of sandwich toppings may potentially empower the children and contribute toward transforming them into independent food consumers. It is also in line with United Nations Convention on the Rights of the Child, article 12, regarding children's rights to express their views.

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