



Staff feeding practices, food neophobia, and educational level in early education and care settings: A cross-sectional study

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ABSTRACT

Feeding practices in early childhood education and care (ECEC) settings are important for the development of healthy eating habits early in life. However, there is limited research on feeding practices among ECEC staff working with infants and toddlers, and how these practices relate to staff education. This study assessed the feeding practices, level of food neophobia, and participation in shared meals among ECEC staff, and examined whether there were differences in feeding practices related to education and shared meals. Furthermore, we explored the association between food neophobia levels among ECEC staff and their respective feeding practices in ECEC. In total, 130 ECEC teachers and other staff from two Norwegian ECEC trials completed a questionnaire about feeding practices and level of food neophobia. Our results showed that ECEC staff commonly used *modelling* and *encouraging balance and variety* feeding practices, but used *food as a reward* and *emotion regulation* less often. These practices differed by staff educational level, favoring highly educated staff. We found that more than half of ECEC staff ate lunch together with the children every day, and those who did so used positive feeding practices (*encouraging balance and variety* and *modelling*) more than those who did not eat with children; however, they also used *restriction for health* more often. Higher scores on food neophobia were associated with less use of *emotion regulation* and *restriction for health* when adjusted for relevant variables. In conclusion, our results show there is potential to improve feeding practices in ECEC, especially focusing on ECEC staff with low education. Suggested ways forward are updating guidelines to cover feeding practices and working on implementing these guidelines.

1. Background

The kinds of foods we like and dislike can be shaped as early as the first years of life (Birch & Anzman, 2010; Maynard et al., 2006; Mennella, Jagnow, & Beauchamp, 2001; Northstone & Emmett, 2008; Skinner, Carruth, Bounds, & Ziegler, 2002) and predict eating habits later in life (Gluckman & Hanson, 2009; Mikkilä, Rasanen, Raitakari, Pietinen, & Viikari, 2005; Nicklaus, Boggio, Chabanet, & Issanchou, 2005; Skinner, Carruth, Bounds, Ziegler, & Reidy, 2002). The influence of caregivers and their feeding behavior play a key role in development of early healthy eating habits (Kaar, Shapiro, Fell, & Johnson, 2016; Wood et al., 2020). Factors affecting healthy eating habits include parental feeding practices and parental food neophobia (reluctance to taste new food) (Kaar et al., 2016; Schwartz, Scholtens, Lalanne, Weenen, & Nicklaus, 2011). In Western societies, increasing numbers of

young children attend early childhood education and care (ECEC) (Engel, Barnett, Anders, & Taguma, 2015; OECD, 2017). Therefore, in addition to parental practices, feeding practices and food neophobia among ECEC staff may influence the establishment of healthy eating habits at an early age. The importance of feeding practices in ECEC has been recognized (Byrne et al., 2021), although there are relatively few studies in this field.

A Canadian cross-sectional study that included 50 ECECs found that staff who served as role models by enthusiastically eating healthy foods talked to children about eating healthily and self-regulation, and avoided using food as a reward, helped children's healthy eating. That study recommended future interventions should use ECEC teachers to promote healthy eating habits among preschool children (Ward et al., 2017). Furthermore, an observational study involving 2- to 3-year-olds in nine Dutch ECECs found that children ate more when staff ate together with

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them, regardless of whether they were eating the same or unhealthy foods (Gubbels et al., 2010). That study also reported talking about healthy foods was associated with higher fiber intake whereas encouragement to overeat was associated with lower intake during lunch. Giving a child food without them asking was also associated with higher dietary fiber intake, whereas using food to control behavior was associated with lower fiber intake (Gubbels et al., 2010). Although ECEC staff may have good intentions when pushing children to eat more than they want, this strategy may hinder early development of healthy eating.

Identifying current feeding strategies used in the ECEC setting is an essential starting point to help ECEC staff make informed choices when supporting children to eat healthily. Research on parental feeding practices has shown that feeding strategies such as pressuring or urging a child to eat can reinforce a child's food neophobia, whereas offering children new foods facilitates their willingness to try and learn to like new foods (Kaar et al., 2016). A recent study reported that children cared for by staff members who frequently used indulgent feeding practices had greater odds of demonstrating high willingness to try new foods compared with children cared for by staff members who reported lower use of this feeding practice (Behbehani, Hurley, & Black, 2021). It is therefore important that caregivers of young children model healthy eating and offer new foods in an unconditional manner (Kaar et al., 2016; Schwartz et al., 2011).

Sitting together at the table and sharing a meal (e.g., family shared meals) offers a specific setting for feeding practices, and recent literature has shown that this is a way of promoting healthy eating, modelling, and socializing. Including even the youngest children in family meals was reported to be linked to healthy dietary behavior among children and more positive parental feeding practices (Verhage, Gillebaart, van der Veen, & Vereijken, 2018). However, few studies have described shared child-adult meal practices in the ECEC context. Lehto et al. (2019) reported that there is a large variation in prevalence (29–81%) of at least one ECEC staff "sitting together with the children at mealtimes" (mainly American ECEC studies with children aged 2–5 years). While the practice of "eating the same food as the children" vary from 36% to 61%. Lehto reports that these practices are quite common in Finland (90–95%), however detailed knowledge in other countries is lacking. A recent study from Australia that explored meal settings with children aged 3–5 years in ECECs reported that these settings were a unique cultural phenomenon co-constructed by the ECEC community of children and educators (Harte, Theobald, & Trost, 2019). Their findings highlighted the importance of mealtimes as a time for learning and socialization.

Food neophobia in parents can affect the kind of feeding practices used. Kaar et al. (2016) revealed that parents who were less food neophobic themselves tended to give their children more eating autonomy and offer new foods. Parents who had less fear of trying new foods may provide a more positive feeding environment at home for their children and have more constructive mealtime interactions that positively influence food acceptance (Kaar et al., 2016). Whether the same is the case in ECEC settings has not yet been explored. An obvious difference in such settings is the number of adults who may regulate each other's feeding practices and food neophobia.

ECEC settings differ in different countries. In Norway, 93% of children aged 1–5 years spend 7–9 h per day in private or public kindergartens (about 41 h/week), where they normally eat three meals daily (The Norwegian Ministry of Education and Research, 2020). Children may bring a packed lunch from home, eat food prepared in the ECEC, or there may be a mix of these approaches (Norwegian Directorate of Health, 2018). It is noteworthy that a steadily increasing percentage of children aged 1–2 years are attending ECEC (87%) (Statistics Norway, 2022). The amount of time spent in ECEC and the number of children attending shows the enormous influence of ECEC staff on children's health and development. In Norway, ECEC staff include pedagogical leaders, childcare and youth workers, and assistants, who work in teams to provide care and education for the children. Regulations on

pedagogical staffing specify there must be a minimum of one pedagogical leader per seven children aged under 3 years (The Norwegian Ministry of Education and Research, 2020). Pedagogical leaders must be educated ECEC teachers (i.e., have a bachelor's degree). Childcare and youth workers have lower education and assistants do not need formal qualifications. In addition, there must be a head teacher who has the main responsibility for initiating and developing practices consistent with ECEC legislation and government guidelines (Ministry of Education and Research, 2020).

Using data from ECEC staff responsible for groups of infants and toddlers, this study aimed to: 1) assess the feeding practices used by ECEC staff and their level of food neophobia and participation in shared meals, 2) explore differences in feeding practices among ECEC staff by educational level and frequency of shared meal participation, and 3) explore the association between food neophobia levels among ECEC staff and their respective feeding practices in ECEC.

2. Methods

2.1. Overview of the study design and recruitment

Data for the present study were derived from two studies that were conducted in ECEC settings: *Preschoolers' Food Courage 1.0* (Helland, Bere, & Øverby, 2016) and *Preschoolers' Food Courage 2.0* (Blomkvist, Helland, Hillesund, & Øverby, 2018). These two studies were Norwegian cluster randomized dietary intervention trials among children aged 2 years and 1 year, respectively. In short, both interventions aimed to promote a healthy child diet and reduce the level of food neophobia through a focus on healthy menus and pedagogical sessions aimed at staff feeding practices. In this study, we present baseline data from these studies, and therefore do not present data on the intervention content.

Study 1 (*Preschoolers' Food Courage 1.0*) was conducted in 2014 and study 2 (*Preschoolers' Food Courage 2.0*) was conducted in 2017–2018, with the latter study using a web-based design.

2.1.1. Recruitment: study 1

In total, 45 ECECs from southern Norway were invited to participate in 2014, of which 18 facilities signed up, giving a participation rate of 40%. Two ECECs participated with two groups of children, and the other ECECs participated with one department. The head of each ECEC provided consent on behalf of the ECEC through a study web page. One ECEC withdrew before study started because of closure. Another ECEC failed to recruit any parents for the parental version of the study and was excluded. Finally, 16 ECECs representing 18 groups of children aged 1–3 years were included, from which 75 of 85 ECEC staff responded to the questionnaire (see Helland et al., 2016 for details).

2.1.2. Recruitment: study 2

For the second study, ECECs were recruited in 2017 from among all public and private ECECs in four Norwegian counties (Telemark, Oppland, Sør-Trøndelag, and Møre og Romsdal). In total, 1043 ECECs met the inclusion criterion of having children of the appropriate age (i.e., born in 2016). These four counties covered two different geographical areas of Norway and included ECECs located in both rural and urban settings. Invitations to participate were sent to 1006 ECEC headteachers by email after excluding ECECs that were not eligible (see protocol: Blomkvist et al., 2018). In total, 48 ECEC registered for the study (4.8%), but two ECECs were excluded shortly after registration because they had fewer than three children born in 2016. This left 46 ECECs for inclusion in the study and 55 ECEC staff out of 56 who were provided with the questionnaire responded (see Blomkvist et al., 2018 for details).

2.2. Sample used for the present study

The sample used in the present study (N = 130) included 75 ECEC staff from study 1 and 55 from study 2. These staff were asked to

complete a questionnaire that collected background data and covered questions regarding feeding practices, food neophobia, and shared meals.

2.3. Assessment of level of food neophobia among ECEC staff

ECEC staff completed a questionnaire incorporating a version of Pliner's 10-item Food Neophobia Scale (FNS) (Pliner & Hobden, 1992). Study 1 used a six-item version of the FNS, but study 2 used the full 10-item version. To merge the datasets, we only included data from the six items that were completed for both studies. These six items were: 1) "I am constantly sampling new and different foods" (reverse scored); 2) "I do not trust new foods"; 3) "If I don't know what's in a food, I won't try it"; 4) "I am afraid to eat things I have never had before"; 5) "I am very particular about the foods I will eat"; and 6) "I will eat almost anything" (reverse scored). Responses were on a 7-point Likert scale from 1 ("strongly disagree") to 7 ("strongly agree"), resulting in a total score of 6–42 points. A higher score represented a higher levels of food neophobia. Two items (#1 and #6) used opposite phrasing, and the responses were reversed. In the present sample, the six items showed questionable to acceptable internal consistency (defined by George & Mallery, 2003), with Cronbach's alpha values of 0.591 (study 1) and 0.697 (study 2), respectively. The Norwegian translation of the FNS has been described previously (Helland, Bere, Bjørnarå, & Øverby, 2017).

2.4. Assessment of feeding practices among ECEC staff

ECEC staff feeding practices were assessed with the Comprehensive Feeding Practices Questionnaire (CFPQ). This questionnaire is age appropriate and has previously been validated (Musher-Eizenman & Holub, 2007). We used a moderated version of the CFPQ that was adapted to ECEC settings (see Table S1), with questions covering different feeding practices domains (subscales). Responses were on a 5-point Likert scale from 1 ("disagree") to 5 ("agree"). The seven subscales included in both studies were: *child control* (i.e., staff allowed the children control of their eating behaviors and staff-child feeding interactions: five items), *emotion regulation* (i.e., staff used food to regulate the child's emotion states: three items), *encouraging balance and variety* (i.e., staff promoted well-balanced food intake, including the consumption of varied foods and healthy food choices: four items), *food as reward* (i.e., staff used food as a reward for child behavior: three items), *modelling* (i.e., staff actively demonstrated healthy eating for the children: four items), *pressure to eat* (i.e., staff pressured the child to consume more food at meals: four items), and *restriction for health* (i.e., staff controlled the child's food intake with the purpose of limiting less healthy foods and sweets: four items). The reliability of these scales, as measured by the Cronbach's alpha coefficient are presented in Table 2. The scales *encouraging balance and variety* and *modelling* were found to be good with Cronbach's alphas of 0.8 (defined by George & Mallery, 2003), *restriction for health* was found to be acceptable (0.7), *emotions regulation* was questionable (0.6) while the other scales *pressure to eat*, *food as a reward*, *child control* being unacceptable respectively at 0.4, 0.3 and 0.1.

2.5. Shared meals in ECEC

Regarding shared meals, ECEC staff responded to a question that assessed lunch habits: "How often do you sit by the table and eat the same food as the children in your ECEC setting?" The question was framed in the same way in both studies; however, the response categories differed somewhat and were therefore recoded as: 5 days a week, 1–4 days a week, and seldom/never. This variable was then dichotomized into those sharing meals 5 days a week and ≤ 4 days a week.

2.6. Sociodemographic characteristics of ECEC staff

ECEC staff were asked to report their highest completed education level, with the same six response alternatives in both studies: <10 years of primary school, primary school, secondary school, ≤ 4 years of university, >4 years of university, and other education. Herein, ECEC staff without university background was recoded into low educational level, whereas ECEC staff with university background was recoded into high educational level. In addition, ECEC staff entered their sex and age. The categories used in this study were: <20 years, 20–25 years, 26–29 years, 30–39 years, 40–49 years, 50–59 years, 60–65 years, and >65 years. Study 1 also included ≤ 16 years, 16–20 years, 65–70 years, and ≥ 70 years or older; these were recoded into the categories presented above and used throughout the paper. Characteristics of the ECEC staff are presented in Table 1.

2.7. Statistical analysis

All statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY). Descriptive socio-demographic characteristics are presented as numbers and percentages within each category (Table 1). Continuous variables were described with mean and standard deviation, and categorical variables with frequencies and percentages. Independent samples t-tests were used to compare the difference in means scores between groups, while chi-square tests were used for comparisons of proportions between groups. Linear regression was conducted between food neophobia and the seven dependent variables for feeding practices, which were merged from studies 1 and 2 and adjusted for age and educational level using multiple regression analysis. A moderate correlation was revealed in the covariates, and were further checked for multicollinearity as this may reduce the precision of the estimated coefficients. However, the variance inflation factor revealed low correlations (<1.1). P-values <0.05 were considered statistically significant.

3. Results

3.1. Participants

In total, 130 ECEC staff (96% female) participated in this study. Table 1 presents the descriptive characteristics of the total sample. Participants' age ranged from 20 to 65 years, with an even distribution of participants across the age groups (Table 1). About two-thirds of participants reported full-time employment status, which indicated a

Table 1
Descriptive statistics for the sample (N = 130).

Characteristics	Values	n (%)
Sex,	Male	5 (3.8)
	Female	125 (96.2)
Age (years),	20–29	29 (22.3)
	30–39	33 (25.4)
	40–49	42 (32.3)
	50–59	20 (15.4)
	60–65	6 (4.6)
Educational level ^b , (n = 125) ^a	Low	37 (29.6)
	High	88 (70.4)
Employment status	Full-time	82 (63.1)
	Part-time	48 (36.9)
Shared lunch meal, (n = 123) ^a	Everyday	68 (55.3)
	Less than everyday	55 (44.7)
	Food neophobia (range 6–42)	Mean (standard deviation)

^a Missing data: Of the 130 participating ECEC staff, there were missing data for educational level and shared lunch meal, with a loss of n = 5 and n = 7, respectively.

^b Educational level: High and low categories refer to ECEC staff with and without university background.

high level of everyday presence in the ECEC, and about 70% reported higher education. When asked whether they shared lunch with the children, 55% of staff said they did so daily. Furthermore, the mean score for staff food neophobia was 19.8.

3.2. Staff feeding practices and food neophobia scores

ECEC staff feeding practices are presented in Table 2. The highest total mean (standard deviation [SD]) scores relative to the number of items were observed for the feeding practice *encouraging balance and variety* at 16.60 (3.04) and *modelling* at 15.95 (3.35), whereas the lowest total mean (SD) scores were reported for *food as reward* at 3.65 (1.26) and *emotion regulation* at 4.85 (1.75).

3.3. Educational differences in feeding practices and food neophobia

Comparisons of ECEC staff feeding practices between those with low educational level (high school or less) and those with high educational level (university) are presented in Table 3. Significant group differences were found for *encouraging balance and variety*, and *modelling* (both $p < 0.01$) and *restriction for health* ($p = 0.02$), with higher scores among those with higher education.

Differences in the *encouraging balance and variety*, *restriction for health*, and *modelling* feeding practices were revealed between ECEC staff who shared lunch with the children each day compared with those that shared meals less often ($p = 0.01$ and $p < 0.01$, respectively). There was no significant difference in education level between participating in shared lunch and education (Table 3).

Staff with lower education levels had higher mean (SD) levels of food neophobia compared with staff with higher education levels: 19.46 (7.15) vs. 16.38 (7.10) ($p = 0.03$).

3.4. Associations between staff food neophobia and feeding practices

ECEC staff food neophobia was negatively associated with *emotion regulation* ($B = -0.05$, 95% CI -0.09 , -0.01) and *restriction for health* ($B = -0.11$, 95% CI -0.20 , -0.02) in both unadjusted and adjusted analyses, with higher levels of food neophobia yielding lower score on the two feeding practices (Table 4).

4. Discussion

The ability of ECEC staff to create meal environments that support the development of healthy eating habits early in life is important for the individual child and for public health. A recent Finnish study supports this by concluding that although food quality and access to vegetables in ECEC are important for children's diet, ECEC staff's feeding practices and opinions of the food also influence (Lehto, Ray, et al., 2019). To our knowledge, this is one of the first papers to present the feeding practices ECEC staff used with groups of infants and toddlers in ECEC settings. Two recent papers reported staff feeding practices in Australian ECEC settings, but they were not specifically focused on infants and toddlers

Table 2
ECEC staff feeding practices and food neophobia scores.

Feeding practices	Reliability, Cronbach's alpha	Mean total score (SD)
Child control (5–25)	0.198	14.32 (2.14)
Emotion regulation (3–15)	0.646	4.85 (1.75)
Balance and variety (4–20)	0.818	16.60 (3.04)
Pressure to eat (4–20)	0.440	10.65 (2.49)
Restriction for health (4–20)	0.700	9.49 (3.65)
Food as a reward (3–15)	0.386	3.65 (1.26)
Modelling (4–20)	0.802	15.96 (3.35)

SD: standard deviation.

(Byrne et al., 2021; Wallace, Lombardi, Backer, Costello, & Devine, 2020). Overall, our results indicated that the core practices reported by Norwegian ECEC staff were broadly consistent with positive, health-promoting feeding practices, and the greatest potential for development was related to the *child control* and *pressure to eat* feeding practice domains. Practices that fit within the domains of *modelling* and *encouraging balance and variety* were most used, but staff used *food as a reward* and *emotion regulation* feeding practices less often. Use of these practices differed according to staff educational level.

Role modelling by caregivers is an essential component for development of healthy eating habits early in life (Schwartz et al., 2011). Staff modelling healthy practices can improve children's diet in the ECEC setting (Matwiejczyk, Mehta, Scott, Tonkin, & Coveney, 2018; Ward et al., 2017). Young children's eating behaviors can be influenced through observational learning and copying the behaviors of ECEC staff (Paroche, Caton, Vereijken, Weenen, & Houston-Price, 2017). Our data do not indicate the extent to which enthusiastic role modelling was performed and this point requires further examination. For example, an Australian study showed by direct observation that enthusiastic role modelling occurred at only one in every five meals (Byrne et al., 2021). An interesting point in the Australian study was that there was a lack of correlation between observed behavior and staff self-report of modelling behaviors (Byrne et al., 2021). Our results were based on self-reported data from staff enrolled in two randomized controlled trials in ECEC settings; therefore, our results must be interpreted with caution as they might be positively biased. However, the importance of balanced nutrition is well known, and feeding practices that facilitate this are extremely important for growth and development in early childhood (Haines et al., 2019; Schwartz et al., 2011). Therefore, it will be of value for public health if all staff in ECEC settings, regardless of educational level, emphasize the *modelling* and *encouraging balance and variety* feeding practices.

Our data indicated that there is potential to use some feeding practices more, as staff had low scores for some practices. For example, it may be beneficial to pay more attention to feeding practices with lower focus on *pressure to eat* and more on *child control*, which are key components of supporting autonomy. In the early feeding period, it is crucial to learn how to eat and how much to eat. In early childhood where eating habits are established, it is especially important that caregivers do not override a child's innate ability to self-regulate, (e.g., force the child to eat more when they signals they are full) as reported in another ECEC study (Gubbels et al., 2010; Schwartz et al., 2011). Advice on responsive feeding and less use of *pressure to eat* and *child control* feeding practices in national dietary guidelines for ECEC settings is important (Schwartz et al., 2011), and current Norwegian ECEC guidelines lack this advice (Norwegian Directorate of Health, 2018). Although advice on responsive feeding is included in guidelines from Health ministries, there is no guarantee that such recommendations will be implemented in ECEC. Malek-Lasater et al. (2022) open the important discussion that high-quality meal practices in ECEC exist between educational and health disciplines. They highlight the need for bridging the gap between the disciplines. They suggest that responsive feeding practices should be incorporated into quality measurements, and teaching practices endorsed by education-related entities, to ensure they are understood and implemented in the ECEC.

Sharing family meals is increasingly viewed as an important behavior to form children's diet and dietary behavior (Byrne et al., 2021), and enjoyable social meals are related to pleasure in eating, and therefore well-being and health (Haines et al., 2019). We found that staff who habitually shared lunch with the children scored higher on positive feeding practices (e.g., *encouraging balance and variety* and *modelling*); however, they also used *restriction for health*. In general, the first two practices are viewed as positive, leading to a varied diet, whereas restrictions may somehow have the opposite effect than intended (e.g., that the preference for restricted food increases) (Rollins, Loken, Savage, & Birch, 2014). A possible explanation for lower *modelling* among ECEC

Table 3

ECEC staff feeding practices and food neophobia by educational level (low and high) and sharing lunch (every day and less often).

Variables (range)	Low educational level mean (SD)	High educational level mean (SD)	p-value	Shared lunch everyday mean (SD)	Shared lunch less than everyday mean (SD)	p-value
Feeding practice						
Child control (5–25)	13.97 (2.33)	14.52 (2.06)	0.22	14.51 (2.12)	14.05 (2.17)	0.24
Emotion regulation (3–15)	5.08 (1.72)	4.71 (1.69)	0.26	4.97 (1.72)	4.89 (1.90)	0.80
Balance and variety (4–20)	14.59 (3.63)	17.48 (2.27)	<0.01	17.28 (2.58)	15.85 (3.46)	0.01
Pressure to eat (4–20)	10.78 (2.41)	10.50 (2.54)	0.56	10.37 (2.60)	10.89 (2.25)	0.24
Restriction for health (4–20)	8.27 (2.76)	9.95 (3.86)	0.02	10.25 (3.74)	8.80 (3.52)	0.03
Food as a reward (3–15)	3.86 (1.64)	3.54 (1.03)	0.19	3.65 (1.23)	3.71 (1.36)	0.79
Modelling (4–20)	14.32 (2.88)	16.82 (2.92)	<0.01	17.07 (2.74)	15.07 (3.35)	<0.01
Food neophobia (6–42)	19.46 (7.15)	16.38 (7.10)	0.03	16.78 (7.19)	18.56 (7.27)	0.18
Shared lunch everyday (n (%))	16 (47.1)	50 (58.8)	0.24	N/A	N/A	–

Independent samples t-tests were used to compare the difference in means scores between groups, and the Pearson’s chi-square test for comparing the categorical variable shared lunch every day.

Table 4

Unadjusted and adjusted associations between staff food neophobia and feeding practices.

Feeding practice	B	95% CI Unadjusted	p-value	B	95% CI Adjusted	p-value
Child control	−0.04	−0.09, 0.12	0.14	−0.03	−0.08, 0.02	0.22
Emotion regulation	−0.05	−0.09, −0.00	0.04	−0.05	−0.09, −0.01	0.01
Balance and variety	−0.06	−0.13, 0.01	0.10	−0.06	−0.13, 0.01	0.08
Pressure to eat	0.06	0.00, 0.11	0.05	0.05	−0.01, 0.11	0.09
Restriction for health	−0.10	−0.19, −0.02	0.02	−0.11	−0.20, −0.02	0.01
Food as a reward	−0.01	−0.04, 0.02	0.50	−0.01	−0.04, 0.02	0.58
Modelling	−0.05	−0.13, 0.03	0.21	−0.03	−0.11, 0.04	0.40

B: Beta, CI: confidence interval. Adjusted for age and educational level.

staff who share lunch less than everyday (Table 3) can be that they simply spend less time with the children. The varied use of modelling can also be explained by the fact that modelling as a pedagogical strategy was novel to several ECEC staff. From the qualitative interviews previously reported on these two samples post-intervention, several ECEC staff expressed that mealtime modelling was new to them (Helland et al., 2021; Johannessen, Helland, Bere, Øverby, & Fegran, 2018). Klette, Drugli, and Aandahl (2016) have previously investigated the quality of interactions between Norwegian ECEC staff and toddlers during a lunch and concluded, that the staffs’ focus was on serving food, and interaction with the toddlers were limited. Similar findings were made in an American study by Hallam, Fouts, Bargreen, and Perkins (2016). It is natural that those who share meals with children each day felt more responsible for the development of the children’s eating habits and therefore encouraged balance and variety and emphasized being role models in their feeding practices. As restriction for health is closely related to encouraging balance and variety, it was expected that staff would also score highly on that practice. Interestingly, the results of a recent study showed that when food was family-provided, staff were more likely to use controlling feeding practices, including restricting food choices (Searle, Staton, Littlewood, & Thorpe, 2022). In further studies, it would be interesting to examine if there were differences in practices related to restriction for health between ECEC meals where children bring packed lunches from home and meals where the ECECs provided children’s food. To explore what identifies those practicing shared meals in ECEC would also be interesting. One could speculate whether it is just the staff in ECEC where they do not provide lunch, who do not report participating in shared meals. Unfortunately, we do not

have data to explore this in both the included studies. However, it seems that most ECECs provided children’s lunch in one of our two studies (data not shown), so this speculation is probably not fully accurate. We checked whether sharing meal practices was related to educational level, but it was not. In future studies identifying why shared meals are not practiced would be important.

The meal setting in ECECs offers potential to model healthy behavior, talk about food, and for children to socialize with peers and adults. The Norwegian national curriculum, Framework Plan for the Content and Tasks of kindergarten, has highlighted this (Norwegian Directorate for Education and Training, 2017). However, our findings showed that there is room for improvement in shared meal practices. Although more than half of the ECEC staff reported that they ate the same food for lunch as the children each day, it would promote positive feeding practices if more staff prioritized this practice. Even if staff want to share meals with the children, there may be organizational barriers that prevent this, such as children bringing lunches from home, reluctance to consume the food that is provided for children, staff breaks at scheduled times (Byrne et al., 2021), or that staff must pay board fees if they eat the food served. Optimally, organizational factors should support desired practices such as sharing meals.

We identified that ECEC staff with lower education levels had lower scores for the modelling, encouraging balance and variety, and restriction for health feeding practices. There is a large body of evidence regarding the association between education and dietary behavior in parents (Musher-Eizenman & Holub, 2007), but we are unaware of anyone describing this among ECEC staff. In Norway, around 67% of staff working directly with children in ECECs have low or no formal education (Statistics Norway, 2022). A practice where teachers (with higher education) leave lower educated staff to be responsible for meals seems to be to the children’s disadvantage. Further research should explore this issue. Our findings highlighted the importance of head teachers and teachers in ECECs to educate staff and for these topics to be included in courses and education for lower educated ECEC staff.

Levels of food neophobia among ECEC staff also played a role in their feeding practices. The mean level of food neophobia (19.8) among staff in this study was similar to that reported for adults in other studies (Holley, Haycraft, & Farrow, 2018). We found staff with lower education had higher levels of food neophobia compared with staff with higher education. As a person’s willingness to try new food may affect any feeding practices they use, we explored this association. We found after adjusting for age and education, there was a significant negative association between food neophobia and the restriction for health and emotion regulation feeding practices. Little is known about this association. Tan and Holub (2012) reported that maternal food neophobia was associated with higher use of restriction for weight; however, no associations were found for other feeding practices. Our findings were somewhat surprising, as the higher a participants’ food neophobia, the less

they used the *restriction for health* and *emotion regulation* feeding practices. A possible explanation may be those with a high level of food neophobia may not want to impose any restrictions on what a child can eat, because it is perceived as positive that children eat without fear and of their own free will. By allowing the child to decide for themselves what they want to eat, they become full and therefore happy (Nicklaus, 2015). The disadvantage of this practice is that too little attention to the child's intake and amounts of healthy and unhealthy food can lead to a lack of development of taste preferences and an inadequate diet (Schwartz et al., 2011).

The relationship between food neophobia and *emotion regulation* is difficult to explain and requires further exploration in qualitative studies. Adults with higher levels of food neophobia may experience decreased sensory pleasure and increased negative emotions associated with eating (Coulthard, Aldridge, & Fox, 2022). In the ECEC context, if staff do not associate food and eating with positive emotions, they may use food for emotion-regulating to a lesser extent in their practice. Food neophobia among ECEC staff did not appear to have a particularly negative impact on their feeding practices, at least in this sample, but this should be explored further. It is worth mentioning that the effect size was small.

A strength of this study concerns the diversity of the recruited ECEC staff. The ECEC staff participating in the study was from 59 ECEC representing six counties in different parts of Norway, both large and small. The study sample included staff working in private and public ECEC from both urban and rural areas, so it is probable that our sample is quite representative of ECEC staff in Norway. All ECEC staff worked with the youngest children in ECEC, i.e., children in an early stage of development. In addition, the response rate among ECEC staff was high. This study had some limitations. First, our data were self-reported. As noted in the Australian study, ECEC staff may overestimate or underestimate their own practices; however, the measures used for both feeding practices and food neophobia in this study were validated. However, internal consistency in some presented practices (*pressure to eat*, *food as a reward*, *child control*) were low. Second, the CFPQ was not validated for practices targeting 1-year-olds and was not validated in an ECEC setting. Third, measurements of shared meals were dichotomized, which reduced some of the precision in the data; this method was used because there were different response alternatives in the two studies presented. Fourth, we were not able to take into account the possible clustering of educators within study 1 due to lack of data, which should be considered as a limitation. Finally, our data were cross-sectional, meaning that we cannot imply any causality.

5. Conclusion

Our results indicate that ECEC staff create a positive mealtime environment by using *modelling* and *encouraging balance and variety* feeding practices, and use *food as a reward* and *emotion regulation* to a lesser extent. From a public health perspective, it is important that all staff working with the youngest children in ECECs pay attention to such feeding methods, as the basis for the development of healthy eating habits is formed at this age. Our data suggest attention is required to raising the competence of staff with lower education. In general, it may seem that Norwegian ECECs will benefit from a professionalization of practices related to *pressure to eat* and *child control* for increased emphasis and focus on responsive feeding. Staff may be better supported if this is described in detail in national ECEC dietary guidelines. We found interesting associations between food neophobia and feeding practices that should be replicated in further studies; in particular, qualitative studies will help explain the mechanisms of such relationships. The importance of parental feeding practices is widely acknowledged, and as infants and toddlers spend increasing amount of time in ECEC, staff feeding practices should be further explored.

Author contributions

NCØ and SHH conceived the *Preschoolers' Food Courage study*, and NCØ, TB, EG, SHH designed the present study. EG analyzed the data and SHH, TB, EG and NCØ drafted the manuscript. All authors commented on the drafts and provided critical input. All authors have critically read and approved the final manuscript.

Ethical statement

Both studies from which data were drawn for this study were conducted in accordance with the Declaration of Helsinki, and the protocols were approved by the Norwegian Centre for Research Data (reference numbers 37459 and 49951, respectively). The trials were registered in the ISRCTN Registry with trial registration number ISRCTN74823448 and ISRCTN98064772, respectively. Informed consent was obtained from all ECEC managers and participating ECEC staff. Data can be made available via a request to the Authors, provided that a formal data sharing agreement is entered in line with the University of Agder's policy.

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Declaration of competing interest

The authors declare no conflicts of interest.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.appet.2022.106379>.

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