

This article was downloaded by: [Radboud Universiteit Nijmegen]

On: 30 January 2012, At: 05:02

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Early Child Development and Care

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/gecd20>

Parent-reported feeding and feeding problems in a sample of Dutch toddlers

Jan de Moor^a, Robert Didden^a & Hubert Korzilius^a

^a Radboud University Nijmegen, The Netherlands

Available online: 20 Feb 2007

To cite this article: Jan de Moor, Robert Didden & Hubert Korzilius (2007): Parent-reported feeding and feeding problems in a sample of Dutch toddlers, *Early Child Development and Care*, 177:3, 219-234

To link to this article: <http://dx.doi.org/10.1080/03004430500402192>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Parent-reported feeding and feeding problems in a sample of Dutch toddlers

Jan de Moor*, Robert Didden and Hubert Korzilius

Radboud University Nijmegen, The Netherlands

Little is known about the feeding behaviors and problems with feeding in toddlers. In the present questionnaire study, data were collected on the feeding behaviors and feeding problems in a relatively large ($n = 422$) sample of Dutch healthy toddlers (i.e. 18–36 months old) who lived at home with their parents. Results show that three meals a day was standard and the mean mealtime duration was 22 minutes. Most children eat independently and sit in a high chair. All of the generally recommended foods were consumed with a decreasing tendency across age groups. Of the total sample, 65% had at least one type of feeding problem. In seven percent of the cases feeding problems were moderate to severe and significantly related to parental concern. However, few had sought professional help. Two dimensions of feeding problems (i.e. pickiness and disturbing mealtime behavior) and three dimensions of parental management techniques could be identified. Several significant associations were found. For example, associations were found between pickiness and variables such as parental concerns, difficulties in learning to eat solid foods, and several food items. No associations were found between pickiness and mealtime duration. In conclusion, implications of the findings are discussed in relation to the treatment of severe feeding problems in toddlers with developmental disabilities.

Keywords: Mealtime habits; Toddlers; Feeding problems; Parental concerns; Parental management techniques

Introduction

Feeding problems during mealtime are common in young children (Mayes & Volkmar, 1993). For example, in a study by Reau *et al.* (1996) parents ($n = 281$) reported that 54% of toddlers 'are not always hungry at mealtime', 33% 'do not always enjoy a feeding' and 52% 'have strong food preferences'. In 26% of the cases a meal was refused, 21% requested specific foods, but then refused them again, 42% tried to end a meal after a few bites and 36% were picky eaters. Parental concerns about at least one of these feeding problems were raised in 62% of the cases. The significance of

* Corresponding author. Radboud University Nijmegen, Department of Special Education, PO Box 9104, 6500 HE Nijmegen, The Netherlands. Email: J.deMoor@pwo.ru.nl

conclusions raised in such studies, however, remains unknown, because (1) consistent criteria to identify feeding problems have not yet been established (see Chatoor, 2002); (2) large-scale studies that (also) use standardized systems for the classification of feeding problems are lacking (see Kedesdy & Budd, 1998); and (3) parents are only asked to indicate presence or absence of feeding problems in their child, and not asked to rate its severity or to express their degree of concern about it.

In most very young healthy children, feeding problems are either mild and transitory or easily addressed by health care professionals. Based on standardized interviews with mothers ($n = 1265$) of children who were two, three and four years old, Beautrais *et al.* (1982) found feeding problems in 24%, 19% and 18% of the children in these age groups, respectively. They also found that only 3% of the mothers had sought medical or other professional advice for child-rearing difficulties, such as feeding problems. This finding suggests that feeding difficulties were rarely considered severe. Finney (1986) noted that parents who have mild concerns about their child's feeding behavior can easily be guided by relatively simple pediatric measures that may prevent minor feeding difficulties from developing into severe feeding problems.

Children with health problems in terms of (chronic) medical conditions are at high risk for developing severe feeding problems, with malnutrition, growth retardation, lethargy, impaired intellectual and academic functioning, and invasive medical procedures as its adverse consequences. Prevalence of feeding problems in children with such conditions is relatively high, ranging from 26% to 90% in children with physical disabilities, from 23% to 43% in children with mental retardation, and from 10% to 49% in children with medical illness, prematurity, and low birth weight (see Kerwin, 1999). Since feeding problems tend to persist and worsen in these children, tube-feeding is often considered the final solution for a life-threatening situation.

Treatment of severe feeding problems in children with medical conditions has included several approaches, such as, for example, behavioral interventions, individual child psychotherapy, hypnosis, cognitive-behavioral intervention, interactional therapy and family-oriented interventions. Especially in young handicapped children with feeding problems the contribution of behavioral interventions, even within the context of a medical setting, is broadly accepted (Babbitt *et al.*, 1994). This is also the case in the Netherlands. In early intervention units of Dutch Centres for Rehabilitation Medicine, behavioral interventions are being used to establish and/or restore normal oral feeding (see, for example, Didden *et al.*, 1999; de Moor *et al.*, 2002, 2004a, b).

However, despite an increasing number of intervention studies, detailed information about the following issues is still scarce: normal feeding behavior and mealtime habits in healthy young children in the home setting (e.g. information on types of dietary intake, frequency and duration of meals and usual position during scheduled meals); parental concerns about feeding; and child and family characteristics that are associated with problematic feeding behavior. This type of information is needed and may be used as background knowledge for early identification and assessment of

feeding problems. It may also be used as a frame of reference for decision-making with respect to the design of effective treatment procedures for (non)handicapped children with severe feeding problems.

The aim of the present study was to assess mealtime habits and feeding problems in young children as reported by their parents. More specifically, our aim was to: assess the prevalence of mealtime habits in a sample of 422 healthy Dutch toddlers who lived at home; assess the nature and severity of feeding problems as well as parental concerns about dietary intake and receipt of professional help; identify dimensions of feeding problems and parental management techniques; and, finally, explore associations between feeding problems and management techniques and important mealtime, child and family characteristics.

Method

Participants and procedure

Children were recruited from a primary health care unit in the mixed rural–urban district of Arnhem, located in the eastern part of the Netherlands. In this district, 97% (i.e. $n = 8809$) of all children 1–36 months old were registered. To use 95% level confidence intervals and 5% level significance tests for this population, a sample of 369 children was needed (Aczel, 1995). A response percentage of 55% is often found in epidemiological studies (de Leeuw & Hox, 1998), but because of a downward trend in recent years a response percentage of 50% was expected. As a result, a questionnaire (see ‘Instruments section’) was sent to 738 children. A systematic sampling procedure with random start was used to select this sample (Aczel, 1995).

Following selection, parents were sent a covering letter, explaining the nature and purpose of the study; that is, collecting detailed information on mealtime habits and feeding problems in healthy toddlers, to provide contextual knowledge of treatment of such problems in handicapped children. The letter was accompanied by a questionnaire (see later) and a letter of recommendation from the manager of the primary health care unit. The questionnaire could be returned anonymously to the authors in a stamped addressed envelope. A total of 422 questionnaires were returned, constituting a response rate of 57.1%. This sample is representative of the population of toddlers living in the eastern part of the Netherlands.

Of the children, 95.3% were from a two-parent family and only 3.6% were from a single-parent family. Ethnic background was predominantly Dutch (i.e. 92.8%); in 7.2% of the cases, families had another ethnic background (e.g. Turkish, Moroccan, Indo-Dutch, and Antillean). The mean number of children per family was 2.08 (standard deviation = 0.97; range: 1–7). Educational level of mothers was low, middle, and high in 23%, 45%, and 31% of the cases, respectively. Educational level of the fathers was low, middle and high in 26%, 33%, and 41% of the cases, respectively. Mean age in years of mothers was 33.4 (standard deviation = 4.1; range: 20–45), and mean age in years of fathers was 36.0 (standard deviation = 4.8; range: 24–55). Table 1 presents demographic characteristics of the children.

Table 1. Demographic characteristics of children ($n = 422$)

Variable	<i>n</i>	%
Gender ($n = 421$)		
Male	215	51
Female	206	49
Age group ($n = 416$)		
18–24 months	155	37
25–30 months	131	32
31–36 months	130	31
Birth order ($n = 421$)		
First born	175	42
Second born	155	37
Third born	58	14
≥ Fourth born	33	8
Childcare arrangements ($n = 413$) ^a		
At home with parent(s) only	101	24
At home with baby-sitter	110	27
Outside home with baby-sitter	106	25
Playgroup	113	27
Day care	79	19

^aMultiple answers could be given. n = number of children.

Instruments

Questionnaire on mealtime habits. The questionnaire included six topics addressing mealtime habits: (1) type of dietary intake, (2) frequency of scheduled meals, (3) frequency of snacks, (4) duration of scheduled meals, (5) the child's usual position when eating a scheduled meal, and (6) level of self-feeding (see *Reau et al.*, 1996). To measure type of dietary intake we used the regular Dutch food groups chart, encompassing eight categories of food items: breads and cereals, potatoes, rice and pasta, milk and dairy products, meat and meat alternatives, vegetables, fruits and juices, and fats and oils. Next to this, one item addressing fried products was added. Their frequency was scored as: daily (i.e. always), five or six days per week (i.e. often), three or four days per week, one day or two days per week, or never. Also, the frequency of scheduled meals and/or snacks per day was measured in the number per day. Duration of scheduled meals was measured in number of minutes. The child's usual position while eating was addressed by three items: (1) sitting on lap at table, (2) sitting on (high) chair at table, and (3) out of chair (e.g. standing at the table or roaming about the room). These items were scored on a five-point scale. For example, the item 'How often is your child eating in his (high) chair' could be scored as: each meal (i.e. always), almost each meal (i.e. often), sometimes, almost no meal, or no meal at all.

Finally, the level of self-feeding was assessed by asking parents whether or not their child was fed by them. This item was scored as: each meal, almost each meal, sometimes, almost no meal, or no meal at all.

Questionnaire on feeding problems, parental concerns and professional help. This questionnaire consisted of three main topics. The first main topic addressed the nature of feeding problems and was divided into 11 items: (1) eats very little, (2) eats very slowly, (3) refuses specific foods or drinks, (4) prefers specific foods or drinks, (5) insists on being fed, (6) exhibits disturbing behavior, (7) expulses food, (8) refuses to swallow food, (9) prefers drinking in stead of eating, (10) eats to much, and (11) persists in certain mealtime routines. The items were introduced as 'Did the child exhibit one or more of the following behaviors at mealtime during the last week?', and were scored on a five-point scale: always, often, half of the time, seldom, or never. The severity of feeding problems was based on the number of times parents rated 'always' and 'often' on each item (maximum score: 11). We established four levels of severity: no feeding problems (total score 0), mild feeding problems (total score 1–4), moderate feeding problems (total score 5–7), and severe feeding problems (score 8–11). The second main topic addressed parental concerns about feeding and was introduced as 'Are you worried about the dietary intake of your child?' The scoring of this item was identical to the scoring of the first main topic. Finally, the third main topic, 'At this moment do you receive professional help regarding feeding?', required an answer in a yes/no format.

Independent measures

Mealtime, child and parent and family characteristics were measured to explore their association with severity of feeding problems. *Mealtime characteristics*, in terms of mealtime habits, were described in the previous paragraph.

Information on *child characteristics* comprised the following variables: (1) gender, (2) age in months, (3) birth order, (4) type of childcare arrangements, and (5) pediatric feeding problems during the first 12 months. Type of childcare arrangements were represented by five items (i.e. at home with parents only, at home with baby-sitter, outside home with baby-sitter, in playgroup, and at daycare centre) and was measured in number of half-days (i.e. four hours). To assess the frequency of occurrence of pediatric feeding problems during the first year of life we used all items (i.e. 11) of a Dutch questionnaire on eating difficulties in infants and toddlers (Hofman-van den Hoogen, 1998). For our purpose, several items were split or their content was modified. Instead of a three-point scale for scoring, a five-point scale was used; that is, always, often, half of the time, seldom, or never.

Factor analysis on the earlier 11 items addressing feeding problems during the first year of life, followed by a varimax rotation, was performed and two dimensions were identified; five items were removed. These dimensions were labeled as 'Somatic problems with feeding during the first year of life' and 'Learning to eat solid foods'.

Table 2. Dimensions of pediatric feeding problems during the first year of life, items per dimension and factor loadings ($n = 422$)

Dimensions and items	Loading
Dimension I: Somatic problems with feeding	
Colic	0.75
Problems with defecation (diarrhea and/or constipation)	0.60
Crying after feeding	0.57
Vomiting	0.41
Dimension II: Learning to eat solid foods	
Problems with transition from liquid to solid foods	0.74
Refusal of pureed fruit or vegetables	0.74

The proportion of explained variance was 15% for the first dimension and 13% for the second dimension. Internal consistency (i.e. Cronbach's alpha) for the two dimensions was 0.65 and 0.69, respectively. Both dimensions, items belonging to each dimension and factor loadings are presented in Table 2. The severity of pediatric feeding problems was measured for each dimension and mean scores of all items were calculated.

Data on *parent and family characteristics* were collected on age, ethnic background, family type and type of management technique of feeding problems during mealtime. Educational level was distinguished as low, middle and high, according to criteria established by van Westerlaak *et al.* (1975). To assess prevalence and type of management techniques implemented by parents, we used all 11 items from the Van den Hoogen questionnaire; two items were added. In a number of cases, item content was redefined and a five-point scale was used.

Table 3. Dimensions of management techniques of feeding problems, items per dimension and factor loadings ($n = 422$)

Dimension and items	Loading
Dimension I: Positive Behavioral Support	
Praising the child each time s/he accepts a bite of food	0.71
Feeding the child in a relaxed way	0.58
Explaining the importance of eating to the child	0.51
Dimension II: Negative Behavioral Support	
Grousing at the child	0.72
Demonstrating disappointment	0.62
Sending the child to his/her room or elsewhere	0.42
Tapping the child's hand or elsewhere on the body	0.33
Dimension III: General Management Techniques	
Altering the environment (e.g. feeding location, and feeding time)	0.84
Distracting the child (e.g. with toy, play, and video)	0.48

Factor analysis followed by varimax rotation identified three dimensions of parental management techniques. These were labeled as 'Positive Behavioral Support' (Dimension I), 'Negative Behavioral Support' (Dimension II) and 'General Management Techniques' (Dimension III). Four out of 13 items were removed from this questionnaire because these did not load high enough on one of the dimensions. Table 3 presents the three dimensions as well as items and loadings that contribute to each dimension. The proportion of explained variance was 13%, 12%, and 8% for the three dimensions, respectively. Cronbach's alpha's for the three dimensions was 0.67 (Dimension I), 0.66 (Dimension II) and 0.58 (Dimension III). Mean scores were calculated.

Statistical analyses

First, frequency distributions are given for mealtime habits, feeding problems, parental concerns with respect to dietary intake and receipt of professional help and advice. Frequencies were calculated for the whole sample ($n = 422$) as well as for three age groups: 18–24 months ($n = 155$; 37%), 25–30 months ($n = 131$; 32%) and 31–36 months ($n = 130$; 31%). Second, next to computing severity of feeding problems, principal axis factor analysis with varimax rotation was performed to investigate whether one or more dimensions of feeding problems could be distinguished. We also calculated internal consistency (i.e. Cronbach's alpha) of these dimensions. Finally, associations were explored (t -tests and F -tests, chi-square test) between dimensions of 'Pickiness' and 'Disturbing mealtime behavior' on the one hand, and several mealtime, child, parent and family variables and pediatric feeding problems and management techniques on the other.

Results

Mealtime habits

Table 4 presents percentages of certain mealtime habits of all children across three age groups. Most children (i.e. $\geq 90\%$) consumed 'bread, cereals', 'milk/dairy products', 'fruits and juices' and 'fats/oils' on five days or more per week. Percentages of children that consumed 'vegetables', 'meat and meat alternatives' and 'potatoes, rice, pasta' on five or more days per week were somewhat lower, at 81%, 84% and 89% of the whole sample, respectively. This holds especially true for toddlers in the 31–36-month age group, with percentages of children being 72%, 80% and 84%, respectively. Compared with other types of food, these foods (i.e. vegetables, meat and meat alternatives, and potatoes, rice and pasta) composing regular dinner seem less preferred at the upper end of the toddler period. Except for some cases, 'fried products' were not consumed, probably because parents do not offer them.

The mean number of scheduled meals for the total sample (i.e. 3.02) and across all three age groups (3.04, 3.02, and 3.00, respectively) suggest that three meals a day

Table 4. Percentages of mealtime habits of all children and for each age group ($n = 422$)

Variable (n)	All children (18–36 months)	Age group		
		18–24 months	25–30 months	31–36 months
Type of dietary intake (% always/often)				
Bread, cereals ($n = 419$)	98	99	98	97
Potatoes, rice, pasta ($n = 415$)	89	92	91	84
Milk/dairy products ($n = 418$)	96	97	96	95
Fried products ($n = 417$)	1	1	2	–
Meat or alternatives ($n = 418$)	84	84	88	80
Vegetables ($n = 416$)	81	86	87	72
Fruits and juices ($n = 418$)	90	92	91	87
Fats/oils ($n = 417$)	97	95	97	98
Scheduled meals ($n = 421$) (% per day) ^a				
1 meal	0	–	–	–
2 meals	2	2	1	1
3 meals	95	93	95	96
≥ 4 meals	4	5	4	2
Frequency of snacks ($n = 422$) (% per day) ^b				
1–2	26	29	26	23
3–4	63	61	65	62
5–6	10	8	8	13
≥ 7	1	2	1	2
Duration of scheduled meals ($n = 422$) (%) ^c				
0–10 min	10	11	10	7
11–20 min	51	56	47	50
21–30 min	31	28	33	32
≥ 31 min	8	4	10	11
Usual position (% always/often)				
Sitting on lap at table ($n = 359$)	2	3	1	1
Sitting on (high) chair ($n = 415$)	90	93	91	86
Out of chair (standing or roaming ($n = 351$))	1	–	3	2
Fed by parents ($n = 369$) (% always/often)				
	19	27	18	7

^aAll children: mean = 3.02, standard deviation = 0.26, range = 2–5. Age group 18–24 months: mean = 3.04, standard deviation = 0.32; age group 25–30 months: mean = 3.02, standard deviation = 0.23; age group 31–36 months: mean = 3.00, standard deviation = 0.18.

^bAll children: mean = 3.23, standard deviation = 1.32, range = 1–20. Age group 18–24 months: mean = 3.20, standard deviation = 1.70; age group 25–30 months: mean = 3.18, standard deviation = 0.97; age group 31–36 months: mean = 3.33, standard deviation = 1.11.

^cAll children: mean = 22.1, standard deviation = 9.62, range = 1–90. Age group 18–24 months: mean = 20.41, standard deviation = 8.03; age group 25–30 months: mean = 22.59, standard deviation = 9.52; age group 31–36 months: mean = 23.80, standard deviation = 11.20.

Note: % refers to ≥5 times a week.

was standard, irrespective of the child's age. Compared with scheduled meals, the mean number of snacks per day was somewhat higher for the total sample (i.e. 3.23) as well as for each of the three age groups (i.e. 3.20, 3.18 and 3.33, respectively).

The mean duration of scheduled meals for the total sample was 22.1 minutes. An increasing trend in mean duration can be seen across age groups (i.e. from 20.4 to 23.8 min), with an accompanying increase in standard deviation (i.e. from 8.0 to 11.2). During meals, most children (i.e. 90%) were sitting on a (high) chair. While 27% of the toddlers in the 18–24-month age group were fed by their parents, only 7% of the older children were fed in this way.

Table 5 presents the nature of feeding problems, appearing hungry, parental concerns with respect to dietary intake and receipt of professional help. Of the parents of the total sample, 42% reported that their child 'prefers specific foods or drinks' most often as feeding problem, 19% reported 'prefers drinking instead of eating', 19% reported 'persists in certain mealtimes routines' and 17% reported 'refuses specific foods'. In addition, 28% of the parents mentioned that their child did not appear 'hungry at mealtime' most of the time. By contrast, 'eats too much' (1%), 'refuses to swallow food' (3%) and 'expulses food' (3%) were rarely reported as being a feeding problem. Furthermore, an increasing trend across age groups may be seen in children who 'eat very little', 'eat very slowly', 'prefer specific foods or drinks',

Table 5. Type of feeding problems, parental concerns regarding dietary intake and received help for total sample and age group ($n = 422$)

Variable (n)	All children (18–36 months)	Age group		
		18–24 months	25–30 months	31–36 months
Feeding problems (% always/often)				
Eats very little ($n = 420$)**	12	6	14	19
Refuses specific foods ($n = 418$) ^{ns}	17	15	15	20
Eats very slowly ($n = 419$)**	14	7	14	21
Prefers specific foods or drinks ($n = 420$) ^{ns}	42	37	42	48
Insists on being fed ($n = 421$) ^{ns}	8	8	8	8
Demonstrates disturbing behavior ($n = 422$) ^{ns}	11	7	15	15
Expulses food ($n = 421$) ^{ns}	3	3	5	2
Refuses to swallow food ($n = 421$) ^{ns}	3	1	5	5
Prefers drinking instead of eating ($n = 418$)*	19	13	25	19
Eats too much ($n = 414$) ^{ns}	1	2	3	–
Persists in mealtime routines ($n = 414$)*	18	13	20	24
Not hungry at mealtime ($n = 420$)*	28	20	31	34
Parental concerns regarding dietary intake ($n = 422$) (% yes) ^{ns}				
Receiving professional advice/help ($n = 422$) ^{ns}	3	4	1	2

Chi-square test: * $p < 0.05$; ** $p < 0.01$; ^{ns} non-significant. Underscored figures refer to adjusted standardized residual $> |1.96|$, indicating that there are less or more cases in the cell than there would be if the row and column variables were independent.

Table 6. Severity of feeding problems according to our criteria ($n = 416$)

Severity	All children (18–36 months) ($n = 416$)	Age group		
		18–24 months ($n = 155$)	25–30 months ($n = 131$)	31–36 months ($n = 130$)
No feeding problem	146 (35)	65 (42)	44 (33)	37 (29)
At least one feeding problem	270 (65)	90 (58)	87 (67)	93 (71)
Mild feeding problem	243 (58)	86 (55)	76 (58)	81 (62)
Moderate feeding problem	25 (6)	3 (2)	11 (8)	11 (8)
Severe feeding problem	2 (1)	1 (1)	0 (0)	1 (1)

Data are n (%). $\chi^2(2) = 5.83, p = 0.054$ (the association between age group and no feeding problems versus at least one feeding problem approaches significance). Due to low cell frequencies, association between age groups and severity levels of feeding problems could not be explored.

‘persist in mealtimes routines’ and ‘not hungry at mealtime’. Although 32 parents (i.e. seven percent) were always or often concerned regarding their child’s dietary intake, only two of them had asked for professional help. But the percentage of parents in the total sample that had asked for professional guidance was also rather low (i.e. three percent). Finally, parental concerns about dietary intake was significantly associated with the non-presence of hunger in the child ($\chi^2_{(1, n = 420)} = 131.52, p < 0.001$), and never hungry or less hunger was significantly associated with ‘prefers specific foods or drinks’ and ‘refuses specific foods’ ($\chi^2_{(1, n = 418)} = 9.82, p < 0.01$ and $\chi^2_{(1, n = 416)} = 20.16, p < 0.001$, respectively).

Based upon our criteria (see the questionnaire on feeding problems under the heading ‘Instruments’), 35% had no feeding problems and 65% at least one feeding problem. Furthermore, 58% of the feeding problems were mild, whereas 7% were moderate to severe (see Table 6). Visual inspection of the percentages depicted in Table 6 does not reveal trends across age groups. The presence of moderate and severe feeding problems was significantly associated with parental concerns (i.e. always/often) regarding food intake ($\chi^2_{(1, n = 422)} = 67.73, p < 0.001$).

Dimensions of feeding problems

To investigate whether one or more dimensions of feeding problems could be distinguished, a principle axis factor analysis followed by varimax rotation was performed. The number of dimensions was established on the basis of the scree plot, item loadings higher than 0.40 and factor interpretability. Two dimensions of feeding problems were identified. The first dimension was related to the amount of food intake and type of food, and was labeled ‘Pickiness’. The second dimension described mealtime problem behaviors, and was labeled ‘Disturbing mealtime behavior’. The proportion of explained variance was 22% and 13% for the two dimensions, respectively. Three out of 11 items were removed. These were ‘eats very slowly’, ‘eats too much’ and ‘persists in certain mealtimes routines’. Table 7 shows the two dimensions and the items

Table 7. Dimensions of feeding problems, contributing items and factor loadings ($n = 422$)

Dimensions and items	Loading
Dimension I: Pickiness	
Eats very little	0.74
Refuses specific food	0.72
Prefers specific food or drinking	0.64
Prefers drinking in stead of eating	0.59
Dimension II: Disturbing Mealtime Behavior	
Refuses to swallow food	0.55
Demonstrates disturbing behavior	0.53
Expulses food	0.50
Insists on being fed	0.43

contributing to each of them. Internal consistency (Cronbach's alpha) was 0.78 for Dimension I and 0.61 for Dimension II. Mean dimension scores were calculated.

In Table 8, significant correlations between the dimension 'Pickiness' and the dimension 'Disturbing mealtime behavior' and other variables and dimensions are presented. For example, we found significant negative associations between disturbing mealtime behaviors and several food items. Positive associations were found between disturbing mealtime behavior and variables, such as, duration of a scheduled meal, learning to eat solid food, and several parental management techniques. Pickiness was negatively associated with almost all food items (e.g. potatoes, rice and pasta, and vegetables), and was positively associated with the child's age, feeding problems during the first year of life, and parental management techniques.

Finally, no statistically significant associations were found between the child's gender, types of childcare arrangements, ethnic background of either parent, and 'pickiness' and 'disturbing mealtime behaviors'.

Discussion

In our sample, we found that Dutch children in the 18–36-month age group usually consume three scheduled meals and three snacks per day. During scheduled meals, most children sit in a high chair and consume all types of food (i.e. on five days or more per week). The duration of a scheduled meal is about 22 minutes on average. A minority of children were fed by their parents. Results of our study indicate that for the 31–36-month age group 'potatoes, rice, pasta', 'meat or meat alternatives' and 'vegetables' belong to the less preferred foods. Children in our sample who do not eat these types of food can be considered selective or picky eaters (also see Kedesdy & Budd, 1998). Next, children in our sample who need more than 30 minutes to complete a scheduled meal are, according to the same criterion given by Reau *et al.* (1996), considered slow eaters (i.e. 8% on average in our sample). Children aged between 31 and 36 months, and who are still fed by their parents, may be identified as having problems with independent eating (i.e. 7%).

Table 8. Correlation coefficients between dimensions of 'pickiness' and 'disturbing mealtime behavior' and other dimensions and variables

Variables and dimensions	Dimension I: Pickiness	Dimension II: Disturbing mealtime behavior
Variable		
Type of dietary intake		
Bread, cereals	-0.14**	-0.11*
Potatoes, rice, pasta	-0.32**	-0.12**
Milk and dairy products	-0.09 ^{ns}	-0.01 ^{ns}
Fried products	0.14**	0.08 ^{ns}
Meat or meat alternatives	-0.25**	-0.11*
Vegetables	-0.38**	-0.16**
Fruits and juices	-0.14**	0.02 ^{ns}
Fats and oils	-0.08 ^{ns}	-0.05 ^{ns}
Not hungry at mealtime	0.61***	0.61***
Frequency of meals	-0.03 ^{ns}	-0.01 ^{ns}
Frequency of snacks	0.09 ^{ns}	0.01 ^{ns}
Duration of meals	0.03 ^{ns}	0.18***
Child's age	0.14**	0.08 ^{ns}
Birth order	-0.09 ^{ns}	-0.18***
Father's age	-0.05 ^{ns}	-0.16**
Mother's age	-0.08 ^{ns}	-0.07 ^{ns}
Father's educational level	-0.01 ^{ns}	-0.09 ^{ns}
Mother's educational level	-0.01 ^{ns}	-0.01 ^{ns}
Parental concern regarding dietary intake	0.63***	0.42***
Receiving professional advice/help	-0.03 ^{ns}	-0.01 ^{ns}
Dimensions of feeding problems during first year of life		
Somatic problems with feeding	0.17***	0.14**
Learning to eat solid foods	0.34***	0.32***
Dimensions of management techniques		
Positive Behavioral Support	0.47***	0.46***
Negative Behavioral Support	0.38***	0.47***
General Management Techniques	0.17**	0.28***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; ^{ns} non-significant (alpha = 0.05).

Figures depicted in Table 5 illustrate that the prevalence of problematic feeding behaviors is relatively high. Up to 65% of the children show at least one type of feeding problem (see Table 6). Despite parental reports of frequent occurrence of such problems, only seven percent of all parents were concerned about the feeding problems of their child regarding dietary intake. And even parents of this subgroup did not ask or search for professional help or advice; there was no overlap with the three percent help-seeking parents. It may be hypothesized that most parents do not rate their child's daily feeding problems as severe or as a type of behavioral pathology, but as part of the normal development (i.e. belonging to the category of so-called 'terrible twos'). In general, our findings are in agreement with those found by Reau *et al.*

(1996) and Beautrais *et al.* (1982). *Post hoc* analysis revealed that, among a selected subgroup of children who were between 15 and 27 months of age, feeding problems were found in 59% of the cases. This outcome strongly resembles the outcome (i.e. 62%) found by Reau *et al.* among children who were between 12 and 27 months old. Furthermore, Beautrais *et al.* have found that only 3% of the mothers reported seeking medical or other professional consultation, a finding in strong agreement with our results (see earlier).

As shown in Table 5, the highest percentage of parental concerns regarding dietary intake was in the 25–30-month age group (i.e. 10%). From that period on it seems that with increasing age of the child there is a decreasing tendency in the percentage of parents who have concerns: 7% of parents in the 31–36-month age group (present study) and 4% of parents of five-year-old children (found in Dutch studies using representative samples; see Diepenmaat *et al.*, 2001; Kessel-Feddema *et al.*, 2001). Whether the prevalence of the distinctive types of feeding problems also decreases with toddler age is unclear. From the Kessel-Feddema *et al.* study we know that at age five only 5% of the parents reported that their child ‘is not hungry at mealtime’. By contrast, in our sample this percentage was 28%.

Table 7 illustrates that two dimensions of feeding problems may be distinguished: ‘pickiness’ and ‘disturbing mealtime behavior’. This factor analysis solution is consistent with findings from a study by Marchi and Cohen (1990) who subdivided eating behaviors into ‘pickiness’ (e.g. eating little, pickiness, eating slowly, and a low interest in food) and ‘problem meals’ (e.g. unpleasantness at meals and struggles over eating). Furthermore, we also found that pickiness was associated with type of dietary intake, not being hungry at mealtime, feeding problems during the first year of life and parental management techniques. Relatively low levels of intake (in terms of frequency per week) of ‘vegetables’, ‘potatoes, rice, and pasta’ and ‘meat or meat alternatives’ were associated with high levels of pickiness. In a related study by Jacobi *et al.* (2003) among children three-and-a-half and five-and-a-half years old, an association was found between the presence of pickiness and avoidance of vegetables, but such an association was not found for other food items. They also failed to find a relationship between mealtime duration and pickiness, which contrasts findings from Reau *et al.* (1996). It is speculated that pickiness at toddler age and its strong relationship with not being hungry at mealtimes, and problems with learning to eat solid foods during the first year of life, may increase the risk of development of eating problems at later age (see Jacobi *et al.*, 2003). Finally, disruptive mealtime behavior was only weakly related to type of food intake, if at all, but more strongly associated with not being hungry at mealtime and parental management techniques.

Regarding preventive pediatrics, picky eaters in our study were particularly those whose parents recalled problems with learning to eat solid food and demonstrating somatic problems with feeding when their child was still an infant. This should alert general practitioners and pediatricians because a history of early oral–motor dysfunction (Reau *et al.*, 1996) and/or parental behavior mismanagement during mealtime (Palmer *et al.*, 1975) may interfere with the transition process to learn to eat solid food and may cause strong food preferences at a later age. Doctors should

also be alerted in case of severe and enduring disturbing mealtime behavior. This may indicate that the child had difficulty learning to eat solid foods and still has. Although parents may deal with such problems by using different types of management techniques, such techniques may not be effective at all. Anticipatory guidance from health professionals should only be given after a comprehensive oral–motor and feeding examination has been conducted.

Results from this study may contribute to the understanding and treatment of pediatric feeding problems in children with developmental disorders (see de Moor *et al.*, 2004b). Specifically, they support decision-making on environmental interventions by providing background knowledge about feeding problems in typically developing children. Different from medical treatment, such as surgery, medication or nutritional supplements, environmental interventions typically focus on changing conditions associated with feeding to influence ongoing behaviors. These cover a wide array of aspects, including meal characteristics, schedule of intake, setting characteristics and interactions (see Kedesdy & Budd, 1998). Regarding meal characteristics, data in this study may provide suggestions about what may be considered as ingredients for an appropriate feeding menu integrated in the intervention plan for children in the 18–36-month age group. In general, all the recommended food groups depicted in Table 4 may be included in the menu and targeted when designing an intervention plan, since a high percentage of children already consume most of these food items at this age. Regarding the schedule of intake, the intervention protocol should ultimately focus on the consumption of three main meals per day, if possible. After all, we found that most children (i.e. 95%) consumed three main meals per day (see Table 4). During training sessions, irrespective of whether this occurs at the hospital or at home, scheduled meals should not take longer than about 20 minutes, as this approximates the average duration of meals in our study (i.e. 22 minutes). This holds especially true for parents who conduct the training at home, because it is our experience that even after parent training some parents tend to extend the duration of a meal. Regarding setting characteristics, one should realize that standard feeding position during training for this age group is to be held on the caregiver's lap and be fed, because of increased control of behavioral reactions, such as, refusing to accept food (de Moor *et al.*, 2004b). This is highly different from our normative findings where most children (i.e. 90%) sit in a high chair and eat independently (see Table 4), a fact that may explain why some children heavily resist being fed on a caregiver's lap during the first treatment sessions. For some children, readiness training aimed at sitting on the lap and being fed should precede formal treatment

Finally, we found a significant association between parental management techniques and pickiness and disturbing mealtime behavior (see Table 8). Due to the lack of a theoretical model, we failed to analyze (e.g. by regression analyses) the direction of the relationships between these variables. We hypothesize that pickiness and disturbing mealtime behaviors both evoke different types of parental management techniques. Relatively high correlations between pickiness and disturbing mealtime behaviors and both dimensions of parental management techniques suggest that parents are not consistent and systematic in the way they deal

with feeding behaviors, which in turn may lead to aberrant feeding behaviors. During intervention in children with feeding problems these management techniques should be implemented consistently and systematically (see Babbitt *et al.*, 1994; de Moor *et al.*, 2004b).

Acknowledgements

The authors would thank Jeff Sigafos and Jules Tolboom for their suggestions in improving the manuscript.

References

- Aczel, A. (1995) *Statistics: concepts and applications* (Chicago, IL, Irwin).
- Babbitt, R., Hoch, T., Coe, D. *et al.* (1994) Behavioral assessment and treatment of pediatric feeding disorders, *Journal of Developmental and Behavioral Pediatrics*, 15, 278–291.
- Beautrais, A., Fergusson, D. & Shannon, F. (1982) Family life events and behavioral problems in preschool-aged children, *Pediatrics*, 70, 774–779.
- Chatoor, I. (2002) Feeding disorders in infants and toddlers: diagnosis and treatment, *Child and Adolescent Psychiatric Clinics North America*, 11, 163–183.
- Didden, R., Seys, D. & Schouwink, D. (1999) Treatment of chronic food refusal in a young developmentally disabled child, *Behavioral Interventions*, 14, 213–222.
- Diepenmaat, A., van der Wal, M. & Pauw-Plomp, H. (2001) Etnische verschillen in ervaren opvoedingsproblemen bij ouders van vijfjarige kinderen [Ethnic differences regarding child rearing difficulties among parents of 5-year-old children], *Tijdschrift voor Sociale Geneeskunde*, 79, 408–412.
- Finney, J. (1986) Preventing common feeding problems in infants and young children, *Pediatric Clinics of North America*, 33, 775–788.
- Hofman-van den Hoogen, E. (1998) Moeilijk etende peuters [Toddlers with feeding difficulties], *Tijdschrift voor de Jeugdgezondheidszorg*, 30, 38–41.
- Jacobi, C., Steward Agras W., Bryson, S. *et al.* (2003) Behavioral validation, precursors, and concomitants of picky eating in childhood, *Journal of the American Academy of Child and Adolescent Psychiatry*, 42, 76–84.
- Kedesdy, J. & Budd, K. (1998) *Childhood feeding disorders* (Baltimore, MD, Paul H. Brookes).
- Kerwin, M. (1999) Empirically supported treatments in pediatric psychology: severe feeding problems, *Journal of Pediatric Psychology*, 24, 193–214.
- Kessel-Feddema, B., Sondaar, M. & Diepeveen, F. (2001) Groei en eetgedrag van premature kinderen in vergelijking met op tijd geboren kinderen [Growth and eating behaviors of prematurely born children compared to children born timely], *Tijdschrift voor Kindergeneeskunde*, 69, 49–56.
- de Leeuw, E. & Hox, J. (1998) Nonresponse in surveys: een overzicht [Nonresponse in surveys: a review], *Kwantitatieve Methoden*, 19, 31–53.
- Marchi, M. & Cohen, P. (1990) Early childhood eating behaviors and adolescent eating disorders, *Journal of the American Academy of Child and Adolescent Psychiatry*, 29, 112–117.
- Mayes, L. & Volkmar, F. (1993) Nosology of eating and growth disorders in early childhood, *Child and Adolescent Psychiatric Clinics North America*, 2, 15–35.
- de Moor, J., Kuijpers, M., Didden, R. *et al.* (2002) Gedragstherapeutische behandeling van voedselweigerig bij een kind met een chirurgisch gecorrigeerde oesofagusatresie: een casusbespreking [Behavioral intervention of food refusal in a child with surgically corrected oesophagus atresia: a case study], *Tijdschrift voor Kindergeneeskunde*, 70, 212–218.

- de Moor, J., Brons, E., Kokke, F. *et al.* (2004a) Extreme voedselselectiviteit na levertransplantatie bij een 5-jarig meisje: een gedragstherapeutische behandeling [Extreme food selectivity following transplantation of the liver in a 5-year-old girl: a behavioral intervention], *Nederlands Tijdschrift voor Geneeskunde*, 48, 791–794.
- de Moor, J., Maas, A., Didden, R. *et al.* (2004b) *De behandeling van eetproblemen bij jonge kinderen met een lichamelijke of meervoudige handicap* [Treatment of feeding problems in young children with a physical or multiple disability] (Utrecht, BOSK).
- Palmer, S., Thompsom, R. & Linscheid, T. (1975) Applied behavior analysis in the treatment of childhood feeding problems, *Developmental Medicine and Child Neurology*, 17, 333–339.
- Reau, N., Senturia, Y., Lebailly, S. *et al.* (1996) Infant and toddler feeding patterns and problems: normative data and a new direction, *Journal of Developmental and Behavioral Pediatrics*, 17, 149–153.
- van Westerlaak, J., Kropman, J. & Collaris, J. (1975) *Beroepenklapper* [Professional directory] (Nijmegen, Instituut voor Toegepaste Sociologie).