Perinatal Risk Factors for Feeding and Eating Disorders in Children Aged 0 to 3 Years

Carolina Hvelplund, MD,[a,b] Bo Mølholm Hansen, MD, PhD,[b] Susanne Vinkel Koch, MD, PhD,[c,d] Mikael Andersson, MSc,[e] Anne Mette Skovgaard, MD, DMSc[f]

abstract

OBJECTIVE: To describe the incidence, age at diagnosis, and associations between perinatal risk factors of feeding and eating disorders (FED) diagnosed at hospital in children aged 0 to 3 years.

METHODS: A nationwide cohort of 901 227 children was followed until 48 months of age in the national registers from 1997 to 2010. Multivariable Cox proportional hazards regression was used to estimate hazard ratios (HRs) for FED diagnosis according to the *International Classification of Diseases* and associations with perinatal risk factors.

RESULTS: A total of 1365 children (53% girls) were diagnosed with FED at hospital, corresponding to a cumulative incidence of 1.6 per 1000 live births. High risk of FED was seen in children born before gestational week 28 (HR, 3.52; 95% confidence interval [CI], 2.15–5.78). HRs were 3.74 for children small for gestational age ≤3 SD (95% CI, 2.71–5.17) and 4.71 in those with congenital malformations (95% CI, 3.86–5.74). Increased risk of FED was associated with female gender (HR, 1.2; 95% CI, 1.08–1.34), maternal smoking in pregnancy (HR, 1.24; 95% CI, 1.08–1.42), immigrant status (HR, 2.24; 95% CI, 1.92–2.61), and being the firstborn (HR, 1.33; 95% CI, 1.19–1.50).

CONCLUSIONS: FED in referred children aged 0 to 3 years are associated with perinatal adversities, female gender, maternal smoking in pregnancy, being firstborn, and having immigrant parents. The results suggest complex causal mechanisms of FED and underscore the need for a multidisciplinary approach in the clinical management of young children with persistent problems of feeding, eating, and weight faltering.

[a]*Department of Pediatrics and Adolescence, University Hospital Rigshospitalet, Copenhagen, Denmark;* [b]*Department of Pediatrics, University Hospital Herlev, Copenhagen, Denmark;* [c]*Child and Adolescent Psychiatric Centre, Mental Health Services, Copenhagen Region, Denmark;* [d]*Institutes of Clinical Medicine and* [f]*Public Health, Faculty of Health Sciences, University of Copenhagen, Denmark; and* [e]*Department of Epidemiology Research, Statens Serum Institut, Copenhagen, Denmark*

Dr Hvelplund conceptualized and designed the study and drafted the initial manuscript; Dr Hansen conceptualized and designed the study, critically reviewed the perinatal and birth defects data, and reviewed and revised the manuscript; Dr Koch conceptualized and designed the study and reviewed and revised the manuscript; Mr Andersson carried out the initial analyses and reviewed and revised the manuscript; Dr Skovgaard coordinated and supervised the study and critically reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

DOI: 10.1542/peds.2015-2575

Accepted for publication Nov 10, 2015

Address correspondence to Carolina Hvelplund, MD, Department of Pediatrics, University Hospital Herlev, Ringvej 75, 2730 Herlev, Denmark. E-mail: hvelplund@dadlnet.dk

WHAT'S KNOWN ON THIS SUBJECT: Eating and weight problems in children are common causes of referral to pediatric services. Perinatal adversities are associated with increased risk of impaired eating. Knowledge about the frequency of and risk factors for feeding and eating disorders (FED) is scarce.

WHAT THIS STUDY ADDS: The cumulative incidence of FED diagnosed in children aged 0 to 3 years was 1.6 per 1000. Female gender, maternal smoking in pregnancy, prematurity, small for gestational age, congenital malformations, being the firstborn, and immigrant status were associated with increased risk of FED.

To cite: Hvelplund C, Hansen BM, Koch SV, et al. Perinatal Risk Factors for Feeding and Eating Disorders in Children Aged 0 to 3 Years. *Pediatrics.* 2016;137(2):e20152575

Problems of feeding and weight are common causes of parental concern and referrals to pediatric services in early childhood.[1,2] Feeding and eating problems affect 25% to 40% of infants and young children with normal development and 80% of those with chronic or serious medical conditions or developmental disorders.[3] In the *International Classification of Diseases, 10th Revision* (*ICD-10*),[4] the diagnosis of feeding and eating disorders (FED) in infancy and early childhood is made in accordance with clinical guidelines and diagnostic criteria that include the failure to eat adequately, failure to gain weight or loss of weight over a period of at least 1 month, with no organic disease or mental disorder to account for the failure to eat. In the *ICD-10*, FED in infancy and early childhood is differentiated from eating disorders with later onset, whereas the *Diagnostic and Statistical Manual, Fifth Edition*, does not differentiate between developmental subtypes.[5] The diagnostic concept of feeding disorder of infancy and childhood is still under revision. The ZERO-to-THREE *Diagnostic Classification of Mental Health Disorders of Infancy and Early Childhood* proposes 6 subcategories[6,7] for feeding behavior disorders. It subclassifies feeding disorders according to various organic and nonorganic causes and comprises a broader understanding of the etiology of these disorders. Thus, it is difficult to define FED accurately and to quantify the prevalence of FED precisely because of the inconsistencies in these different classification systems.[8] Because the *ICD-10* diagnoses are used in the Danish health care system, they are used to define FED in this study.

Research on problematic eating in early childhood falls into 2 major areas: studies of weight faltering or failure to thrive (FTT) and studies of feeding and eating problems.[2] However, the literature on FED is hampered by methodological shortcomings regarding validated measures to assess clinically impairing feeding and eating behavior[9] and consensus regarding the definitions of weight faltering.[10] Epidemiologic data on FED in young children diagnosed using to the current diagnostic practice are scarce.[11,12] It is presumed that FED are multifactorial in nature and involve interactions among biological, environmental, and behavioral factors.[11,13–16] Some predisposing factors for FED may originate from the perinatal period. Low gestational age and birth weight have been identified as risk factors. Follow-up studies of very preterm infants (<32 weeks' gestation) and infants born with very low birth weight (<1500 g) have shown an increased risk of feeding and eating difficulties.[17–19] This has also been found in moderate preterm infants (33–36 weeks' gestation).[20–24] Preterm infants are predisposed to neurologic difficulties[25–27] and often require nasogastric tube feeding, sometimes for prolonged periods (several weeks). Therefore, it is expected that some of the preterm infants develop feeding and eating problems.[7] However, the magnitude of these problems has not been investigated thoroughly, and the attributable risk of prematurity to FED is unknown.

Term-born children[28] may also develop FED, and some of these children may be predisposed to FED because of biological factors,[28] such as congenital malformations or being small for gestational age (SGA).[29] It has been suggested that different risk mechanisms may be involved at different neonatal ages; these mechanisms may vary according to the stage of development and may be related to the sensorimotor development related to feeding, eating, and the processes of individuation and self-regulation of the child.[9] In a general population birth cohort study, the Copenhagen Child Cohort (*N* = 6090), Olsen et al investigated FTT and found it to be closely related to contemporary measured feeding problems; however, the risk mechanisms involved seem to differ according to age of onset within the first year of postnatal life.[29] Thus, the onset of FTT within the first weeks of life was associated with low birth weight and gestational age, single parenthood, and maternal smoking in pregnancy. The onset of FTT between 2 weeks and 4 months was associated with congenital disorders, serious somatic illness, and deviant mother–child relationship; the onset of FTT between 4 and 8 months was related to feeding problems arising de novo in otherwise healthy children. To our knowledge, this hypothesis has not been corroborated in other studies.

In the current study, we used the data in Danish registries to investigate children diagnosed with FED at public hospitals, with the aim of describing the incidence and the time of onset of FED in a national cohort of children aged 0 to 3 years. We studied the relationship between FED and predefined, predominantly biological, perinatal risk factors. We hypothesized that the risk of FED would be associated with perinatal factors such as gestational age and birth weight and that the risk pattern would vary according to family variables and the age of first diagnosis of FED.

METHODS

Study Population

The study population was all children born in Denmark during a 14-year period from January 11997 to December 31, 2010 (*N* = 918 280). They were identified from the Danish Civil Registration system, and we included children alive and living in Denmark until the age of 48 months. All Danish residents are included

in the Danish Civil Registration system and, since 1968, are assigned a unique personal identification number. At present 5.6 million people live in Denmark. The system includes gender, date of birth, and continuously updated information on vital status. The personal identification number is used in all national registries and allows precise linkage between Danish public registries while avoiding duplication of other information from elsewhere. In Denmark, medical treatment is provided by the government health care system without charge to the patient, with national and prospective registration for all individuals in secondary care since 1969. The study was approved by the Danish Data Protection Agency. By Danish law, informed consent is not required for register-based studies.

Assessment of FED

ICD-10 diagnoses on FED were obtained from the Danish National Patient Register,[30] where diagnoses from all admissions to public hospitals are registered, including both inpatient and outpatient admissions. In clinical practice at public hospitals in Denmark, all referred patients are diagnosed according to *ICD-10*. The FED diagnoses are mainly given at pediatric departments and are based on information from medical health records, parent information, and clinical and paraclinical assessments. The final diagnosis is made by a medical doctor. The Danish National Patient Registry has, since 1995, recorded all referrals and discharge diagnoses from public hospitals[30] and contains data on all inpatient and outpatient patient admissions to all somatic and psychiatric hospitals. We included the following *ICD-10* diagnoses of FED: Feeding disorder of infancy and childhood (F98.2) and Other eating disorder (F50.8). Because we hypothesized that the incidence of childhood eating disorders and the effects of covariates differed according to the age at the first diagnosis and because our preliminary analyses showed that most children were diagnosed within their first 12 months of life, we performed a stratified analysis by dividing the patients into 3 age groups for the analysis of FED: very early onset (0–4 months), early onset (5–11 months), and late onset (≥12 months).

Identification of Covariates

In the Danish Medical Birth Registry,[31] we identified the following perinatal factors: gestational age, birth weight, Apgar score <7 at 5 minutes, cesarean delivery, admission to a neonatal department (newborn infants who need intensive medical attention; eg, being born prematurely, having a difficult delivery, birth defects), and maternal smoking during pregnancy and parity. The parents' ethnicity (ie, country of birth) and maternal and paternal ages were obtained from the Danish Civil Registration system. Information about serious congenital malformations was retrieved from the Danish National Patient Registry; this included hydrocephalus, spina bifida, malformations of vital organs, metabolic diseases, and Down syndrome. A complete list of the congenital malformations included is shown in the Supplemental Data.

Because some gestational ages were evidently registered incorrectly, we excluded children with improbable measures of gestational age, and only children with a gestational age between 23 and 43+6 weeks were included in the study population. SGA was defined as a birth weight less than −2 SD according to the growth chart developed by Maršal et al.[32] To exclude outliers with probable coding errors, only children with a birth weight between −6 SD and +6 SD according to the growth chart were included.

Study Design

Children in the study population were followed up from birth until they were diagnosed with FED, reached the age of 48 months, emigrated, or died or until the end of follow-up on December 31, 2010, whichever came first.

Statistical Methods

Cumulative incidence was estimated by using the Aalen-Johansen method.[33] Risk factor analysis was performed as univariate and multivariate Cox regression analyses (SAS version 9.4 for Windows), which yielded hazard ratios (HRs) of having a FED diagnosis. Putative risk factors of FED according to the literature or factors that were associated with FED in the univariate analyses at the statistical level of $P < .20$ were subsequently included in a multivariable Cox regression analysis. The variables in the final model were gender, gestational age, parents' ethnicity, parity, SGA, cesarean delivery, Apgar score <7 at 5 minutes, and congenital malformations. Because of a potential birth cohort effect, all analyses were adjusted for year of birth as stratum.

In the univariate models, we tested whether the Cox proportional hazards assumption held by dividing the models into different age groups: 0 to 4 months, 5 to 11 months, and 12 to 47 months or 0 to 47 months. This was done by the log likelihood test. When the test gave a nonsignificant result, the factor was considered to have the same effect in ages 0 to 47 months, and this age range was used in the models; otherwise, the models were analyzed according to the distinct age strata.

RESULTS

Of the study population of 918 280 children, 17 053 (1.9%) were excluded because of missing or implausible predictor variables, leaving 901 227 children. We

TABLE 1 Parental and Child Characteristics

	Entire Cohort, %	Cases (F50.2 + F98.2), %
	(*N* = 901 227)	(*n* = 1365)
Gender		
Female	48.7	53.0
Male	51.3	47.0
Ethnicity		
2 parents born in Denmark	79.7	70.8
1 parent born in Denmark	11.0	12.6
0 parents born in Denmark	9.3	16.6
Maternal age at birth, y		
<20	1.5	1.9
20–40	96.1	95.5
40–47	2.4	2.6
>47	0.02	0
Paternal age at birth, y		
<20	0.3	0.2
20–40	63.1	61.8
40–47	5.8	5.3
>47	1.2	1.1
Missing	29.6	31.6
Mother's marital status, married		
Yes	35.6	36.0
No	29.1	26.1
Missing	35.1	37.9
Smoking during pregnancy		
Yes	78.9	74.3
No	18.0	21.3
Missing	3.2	4.4
Parity		
1	43.7	52.7
2–3	50.6	41.8
≥4	5.2	4.8
Missing	0.6	0.7
Singleton/multiple birth		
Singleton	95.9	95.6
Multiple	4.1	4.4
Cesarean delivery		
No	80.7	71.7
Yes	19.3	28.3
Apgar score after 5 min		
<7	1.3	3.0
8–10	98.1	96.0
Missing	0.6	1.0
Gestational age, wk		
<28	0.2	1.9
28–31	0.7	3.5
32–36	5.5	10.4
>36	93.6	84.2
Birth wt, g		
<1500	0.8	6.2
1500–2499	4.3	10.0
2500–4499	91.3	81.4
>4500	3.6	2.3
Size for gestational age		
LGA		
>2 SD	3.5	3.4
AGA		
−2 to +2 SD	92.9	84.9
SGA		
−2 to −3 SD	2.9	7.9
Below −3 SD	0.5	3.8
Admission to a neonatal department		
0–24 h	54.5	46.7

identified 1365 children (723 girls; male/female ratio 0.9:1.1) with a diagnosis of FED, giving a cumulative incidence of 1.6 per 1000 live births.

Parent and child characteristics are shown in Table 1. Preterm children were more likely to be diagnosed with FED. Of the children diagnosed with FED, 84% were term born, which corresponded to an attributable risk of prematurity of 63.6, meaning that only 4.7% of the 1365 diagnoses were related to prematurity.

Cox regression analyses of the perinatal variables are shown in Table 2. Prematurity, SGA, and congenital malformations were strongly associated with FED in both the univariate and multivariate analyses. We found an inverse stepwise dose–response relationship between FED and prematurity and SGA. In the multivariable analysis, the HRs for FED were 3.52 (95% confidence interval [CI], 2.15–5.78) in extremely preterm children (gestational weeks <28), 2.97 (95% CI, 2.12–4.15) in very preterm children (gestational weeks 28–31), and 1.71 (95% CI, 1.40–2.08) in moderately preterm children (gestational weeks 32–36). A similar dose–response pattern was found between FED and SGA at birth; the HRs were 3.74 (95% CI, 2.71–5.17) for an SGA ≤3 SD and 2.28 (95% CI, 1.85–2.82) for an SGA ≤2 SD.

A significantly increased risk of FED was seen in girls (HR, 1.20; 95% CI, 1.08–1.34), firstborn children (HR, 1.33; 95% CI, 1.19–1.50), and children of mothers who smoked during pregnancy (HR, 1.24; 95% CI, 1.08–1.42). The risk of FED was also increased in children of immigrant parents; the HRs were 1.30 (95% CI, 1.10–1.54) if 1 parent was born outside Denmark and 2.24 (95% CI, 1.92–2.61) if both parents were immigrants.

Table 3 shows the HRs for the first FED diagnosis in the different age

TABLE 1 Continued

	Entire Cohort, %	Cases (F50.2 + F98.2), %
	(*N* = 901 227)	(*n* = 1365)
>24 h	7.1	18.5
Missing	38.3	34.7
Congenital malformations		
No	98.3	89.6
Yes	1.7	10.4

AGA, appropriate for gestational age; LGA, large for gestational age.

TABLE 2 Univariate and Multivariate Cox Regression of Perinatal Associations With FED at 0 to 47 Months

	Univariate			Multivariate		
	HR	95% CI	*P*	HR	95% CI	*P*
Female	1.19	1.07–1.32	.002	1.20	1.08–1.34	.001
No. of parents born in Denmark						
2	Ref.		<.001	Ref.		<.001
1	1.30	1.12–1.55		1.30	1.10–1.54	
0	2.06	1.78–2.39		2.24	1.92–2.61	
Mothers age, y						
20–39	Ref.		.42	Ref.		.87
<20	1.29	0.87–1.92		0.93	0.62–1.40	
>40	1.07	0.76–1.50		1.07	0.76–1.51	
Mother smoking						
No	Ref.		<.001	Ref.		.002
Yes	1.28	1.12–1.46		1.24	1.08–1.42	
Missing	1.52	1.16–1.99		—[a]	—[a]	—[a]
Parity						
2nd or 3rd child	Ref.		<.001	Ref.		<.001
First child	1.45	1.29–1.62		1.33	1.19–1.50	
≥4th child	1.13	0.87–1.46		0.84	0.64–1.10	
Multiple birth						
Singleton	Ref.		.65	Ref.		<.001
Twin/triplet	1.06	0.82–1.39		0.48	0.35–0.64	
Gestational age, wk						
<28	12.67	8.52–18.8		3.52	2.15–5.78	
28–31	6.07	4.54–8.13		2.97	2.12–4.15	
32–36	2.07	1.73–2.47		1.71	1.40–2.08	
>36	Ref.		<.001	Ref.		<.001
SGA						
Below −2 SD	3.04	2.49–3.71	<.001	2.28	1.85–2.82	<.001
Below −3 SD	8.27	6.23–10.98	<.001	3.74	2.71–5.17	<.001
Cesarean delivery	1.61	1.43–1.82	<.001	1.24	1.08–1.41	.002
Apgar <7 after 5 min	2.55	1.86–3.49	<.001	1.44	1.03–2.03	.03
Hospitalization >24 h				—[a]	—[a]	—[a]
Yes	2.69	2.25–3.22				
No	Ref.		<.001			
Missing	0.79	0.62–1.02				
Congenital malformation	7.01	5.88–8.37	<.001	4.71	3.86–5.74	<.001

Ref., referrant.
[a] Not included in the adjusted analysis.

ranges. A total of 550 children (40.2%) were diagnosed within the first 4 months of life, 416 children (30.5%) between ages 5 and 11 months, and 399 (29.2%) between ages 12 and 47 months. Overall, there were only small variations in the age bands; in this analysis, the influence of age at first diagnosis did not have a major effect on the associations found for the entire age range (0–47 months). However, female gender was significantly related to FED only when the diagnosis was made in the first 12 months of life, and maternal smoking was significantly related to FED only when the diagnosis was made in the first 4 months of life. The HR for SGA seemed to increase during the 3 time periods.

DISCUSSION

Feeding and eating problems and associated FTT in infants and young children are common clinical problems in pediatric settings. However, understanding of the epidemiology is limited. Few studies have examined the incidence and risk factors for clinician-diagnosed FED in large samples of hospital-referred children aged 0 to 3 years. Using Danish population registers, we identified a national cohort of 901 227 children born in a 14-year period (1997–2010), 1365 of whom had been referred to hospital and received an *ICD-10* diagnosis of a feeding disorder, which corresponded to a cumulative incidence of 1.6 per 1000 live births. To our knowledge, only 2 other studies have explored the incidence and prevalence of FED in children aged 0 to 3 years; both were based on the Copenhagen Child Cohort (*N* = 6090).[34] A prevalence study found *ICD-10* FED diagnoses in 2.8% (95% CI, 1.1–6.1) of children aged 18 months in the general population. A study of referred children showed an incidence of FED diagnosed at hospital in children aged 0–3 years of 1.5 per 1000,[12] and our findings are consistent with this latter study.

In our study of clinically referred children with FED, children born prematurely, who were SGA, or who had congenital malformations had the highest risk of FED. This finding confirms the results of population-based studies of preterm children with an increased incidence of feeding, eating, and weight problems. In a study of 223 children born at

TABLE 3 Cox Regression of Perinatal Associations According to Age at Diagnosis

	0–4 mo		5–11 mo		12–47 mo		0–47 mo		
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI	*P*
Female	1.23	1.04–1.46	1.42	1.16–1.74	0.98	0.80–1.19	1.20	1.08–1.34	.001
No. of parents born in Denmark									
0	1.58	1.20–2.08	1.19	0.88–1.59	1.83	1.48–2.27	2.24	1.92–2.61	
1	1.17	0.90–1.52	1.46	1.09–1.94	1.33	0.96–1.84	1.30	1.10–1.54	
2	Ref.						Ref.		<.001
Mother smoking									
No	Ref.		Ref.				Ref.		.002
Yes	1.62	1.33–1.98	1.03	0.79–1.33	1.01	0.78–1.31	1.24	1.08–1.42	
Parity									
First child	1.49	1.24–1.78	1.19	0.97–1.46	1.29	1.04–1.60	1.33	1.19–1.50	
2nd or 3rd child	Ref.						Ref.		<.001
≥4th child	0.61	0.36–1.02	0.53	0.29–0.96	1.39	0.95–2.04	0.84	0.64–1.10	
GA									
<28 wk	1.23	0.30–5.03	5.53	2.78–11.0	3.56	1.52–8.34	3.52	2.15–5.78	
28–31 wk	2.78	1.55–5.01	2.57	1.40–4.72	3.45	2.03–5.87	2.97	2.12–4.15	
32–36 wk	2.11	1.59–2.79	1.60	1.12–2.29	1.33	0.91–1.94	1.71	1.40–2.08	
>36 wk							Ref.		<.001
SGA									
Below −2 SD	1.57	1.07–2.29	2.52	1.74–3.65	3.13	2.21–4.42	2.28	1.85–2.82	<.001
Below −3 SD	1.98	1.03–3.81	4.32	2.50–7.48	5.96	3.58–9.94	3.74	2.71–5.17	<.001
Cesarean delivery							1.24	1.08–1.41	.002
Apgar <7 after 5 min							1.44	1.03–2.03	.03
Congenital malformation	3.84	2.73–5.40	5.57	3.96–7.83	5.05	3.56–7.18	4.71	3.86–5.74	<.001

Ref., referrant.

gestational age 25 weeks or earlier,[30] children who were born extremely premature had a 3.6-fold higher risk of eating problems at 6 years of age. However, the inverse dose–response relationship between gestational age and FED found in our study has not been described in a larger study population. As for prematurity, SGA showed a dose–response relationship with FED in our study. Both are associated with neurologic problems,[1,16] and many premature or SGA infants receive tube feeding during their stay in the neonatal department. Although our study design does not allow conclusions about the reasons for the increased FED in preterm and SGA children, we consider that the potential causal factors include neurologic problems, effects of tube feeding, and early mother–infant relationship.[35]

Another factor to consider is the slow weight gain in preterm and SGA infants whose growth does not catch up in the first year of life. Other studies[29] have found that slow weight gain in infancy is strongly associated with FED. This may explain why the risk of FED seemed to increase with increasing age among the SGA infants in our study.

Even though preterm birth, SGA, congenital malformations, and other markers of perinatal adversity were strongly associated with FED, most of the children with FED were term born, with a birth weight >2500 g and lacked congenital malformations. Overall, girls had an increased risk of FED, particularly in the first months of life. This finding is notable because perinatal and neurodevelopmental problems occur more frequent in boys,[36] and FED associated with these problems would be expected to be more common in boys. The present finding should be confirmed; if replicated, these findings suggest that there is an early trajectory of feeding and eating problems in girls.

The association between maternal smoking during pregnancy and FED in the first postnatal months corroborates findings on the risk of early onset FTT.[29] Taken together, the present findings underscore the multifactorial nature of FED in which several biological adversities, together with child and family factors, seem to play a role. Our design does not allow for further conclusions regarding the developmental risk of FED because we measured the time at the first diagnosis and not the time of FED debut. However, our data support the idea that most FED occur in the first year of life. We did not correct for the age of prematurity. The low HRs during the first 4 months of life in infants born before gestational week 28 may be explained by the longer period of admission because most of these children are first discharged when they reach the expected term age (gestational week 36).

The multifaceted pattern of FED in young children suggested by the present findings is consistent with the proposal of subcategories of FED in children aged 0 to 3 years in the Diagnostic Classification DC:0-3R, which considers infant regulatory factors, relational factors,

and the presence of medical and developmental diseases.[9]

The present findings also underscore the need for further research into FED and associated factors, in particular, the role of parity, female gender, and parents' ethnic background as well as the influence of risk related to maternal and relational factors.

The major strength is the large sample (N = 1365) of 0- to 3-year-old children with a clinical diagnosis of FED. The study population was derived from a nationwide cohort, who received treatment provided by the government health care system at no cost to the patient, thus minimizing selection bias due to economical restraints.

Our study had some limitations. As mentioned in the introduction, the FED diagnosis is not consistently defined throughout the different diagnostic systems, and the validity of the FED diagnoses in young children has not yet been fully established.[19] For practical reasons we used the *ICD-10* diagnostic system because it is used in the Danish health care system and included in the Danish public registries. Some misclassification is possible, which potentially may have caused underestimation of the true incidence of FED. We only investigated infants referred to public hospitals who fulfilled the criteria of an *ICD-10* FED diagnosis and referred children with feeding problems that did not meet these criteria remains unknown. Infants who were treated for FED by general practitioners or private practicing pediatricians in the primary health care sector were not included because data from these physicians are not recorded in the public registries. Overall we suggest that this nonparticipation mainly concerns children with less severe forms of FED.

Our cases were identified at hospitals and thus included sick children with severe birth defects, congenital malformations, or metabolic disorders. We were unable to explore the physical illnesses, and we cannot draw conclusions about the association between different kinds of physical disabilities and the risk and time of onset of FED. Our study design did not allow for more detailed investigation of particular sociodemographic and psychosocial factors, however relevant these might be.

Further research should include assessments of the child's somatic illness and cognitive/neurologic development, the family's socioeconomic status, parental educational level, maternal psychiatric illness, and the mother–infant relationship.

CONCLUSIONS

Preterm birth, SGA, and congenital malformations are associated with increased risk of FED in the first 3 years of life. Most children with FED do not experience perinatal or congenital adversities. Being a girl or firstborn, having a mother who smoked during pregnancy, and having immigrant parents are all associated with an increased risk of FED. These results suggest that FED has complex causal mechanisms and that a multidisciplinary approach is needed for the clinical management of young children with persistent problems of feeding, eating, and weight faltering.

ABBREVIATIONS

CI: confidence interval
FED: feeding and eating disorders
FTT: failure to thrive
HR: hazard ratio
ICD-10: *International Classification of Diseases, 10th Revision*
SGA: small for gestational age

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: All phases of this study were supported by a grant of Mrs Herman's Memorial Foundation, Ville Heise's Foundation, and the Queen Louise's Children's Hospital Research Foundation.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

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Pediatrics 2016;137;
DOI: 10.1542/peds.2015-2575 originally published online January 13, 2016;

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