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Morbidity in early Childhood, Sex Differences, Birth Order and Social Class

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Study objective **– The aim of the study was to investigate the relationship between morbidity in early childhood and gender, birth order, and social class.**
Design **– The study used data collected in the Nijmegen Continuous Morbidity Registration. All presented morbidity and a number of personal data were available.**
Setting **– The survey population was regional; four general practices in the east of The Netherlands.**
Participants **– The study population included all children born in the four practices from 1971 to 1984. They were followed up till the age of five (1537 children).**
Measurements and main results **– Morbidity of children in the first five years was allocated to three degrees of seriousness and to 14 diagnosis groups. The morbidity of all children was analysed for boys and girls, first-born, second-born, and later-born children, and low, middle, and high social class. Boys presented more morbidity than girls; in particular, nervous disorders, lower respiratory tract infections, and accidents. First-born children presented more morbidity than later-born children; in particular, non-serious diseases, nervous disorders, and colds. Lower social class children presented more moderately serious and non-serious morbidity, colds, lower respiratory tract infections, and skin diseases. Logistic regression analysis showed that high social class, being the first-born child, and male gender were the most important factors related to presented morbidity in general practice.**
Conclusions **– High social class, low social class, gender, and being the first-born child were, in this sequence, related to morbidity in early childhood presented to the general practitioner in this study population.**

Key words: morbidity, childhood, gender, birth order, social class.

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Early childhood is a period of life with a high level of morbidity (1). Respiratory diseases in particular are often presented to the general practitioner (2). The development of immunity is one of the factors implicated in this process: the child's immunity system has to adapt itself to the many viruses and other pathogens circulating in the environment.

There is a large individual variation in the frequency of morbidity presented during early childhood. Gender (3), social class (4), family size (5), and parental illness behaviour (6) have been described as factors that influence both health and the levels of professionally recorded morbidity of children. One of the most important aspects identified when studying family size and childhood morbidity is birth order.

Chromosomal differences between boys and girls (7), lower protein intake in the lower social classes (8), and more birth trauma in the first-born in a family are factors that are used to explain individual variation of health problems in early childhood. On the other hand, gender, birth order, and social class can also influence illness behaviour in families and the presentation of morbidity to the general practitioner (9). Besides, the relation of these factors to health problems is not the same for all diagnoses.

Table I. *Morbidity of children aged 0–4 years. Number of diagnoses/1000 patient years for boys and girls; statistical significance.*

	boys n=801	girls n=736	sig.
total morbidity	2834	2530	**
serious	64	62	
moderately serious	1052	922	*
non-serious	1580	1438	*
exanthematous diseases	215	230	
nervous disorders	40	30	
behaviour disorders	6	2	*
nocturnal enuresis	2	4	
acute otitis media	252	206	*
'colds and flu'	812	746	
other upper respiratory disease	542	452	*
lower respiratory disease	164	124	*
gastro-enteritis	162	136	*
urinary tract infection	6	30	**
eczema	44	46	
other skin diseases	302	296	
neonatal morbidity	24	24	
congenital diseases	26	18	
all accidents	238	176	**

*=$p < 0.01$, **=$p < 0.001$

The Nijmegen Continuous Morbidity Registration (CMR) enables an analysis of the relation of socio-demographic factors and differences in morbidity of children.

Gender, birth order position, and social class are related for their influence on presented morbidity. Most other studies have analysed those factors separately. The aim of our study was to analyse the inter-relationship between gender, birth order position, and social class on the morbidity of children presented to the general practitioner and the importance of each of these factors separately.

METHOD

Continuous Morbidity Registration

The data used for this study come from the Nijmegen Continuous Morbidity Registration. This registration has been going on continuously since 1967 in a stable population of 12000 people. The methods of this registration have been described elsewhere (2). The registration includes four general practices (seven GPs). The following information is available for each patient: data of birth, gender, birth order position, family composition, family social class. The practice list of each practice is continuously updated. Every episode of illness presented to the general practitioner is included in the database. Coding follows the adapted E-list (10), which was later extended according to the criteria of the ICHPPC-2 (11).

The general practitioner is responsible for coding. Diagnoses made in specialist care after referral or if patients contact specialists on their own initiative are included as well. An episode is defined according to the WONCA glossary (the complete period of illness from onset until resolution). Repeat contacts for already coded episodes are not recorded.

The quality and consistency of classifying/coding in the CMR is an essential point of attention (2).

Each diagnostic code in the system has been assessed in terms of seriousness (2):

serious – the disease is threatening the patient's life, or influencing functional capacity for a long period of time,
moderately serious – the disease is temporarily interfering with the patient's functional capacity,
non-serious – the disease is not influencing the patient's functional capacity.

Diagnostic groups containing more than one disease were not classified by severity. Assessment of severity was based on the expert opinion of a group of experienced general practitioners. This procedure has been followed by others as well (12).

Patients

All the children born in the practices in the period from 1971 till 1985 and still registered with the practice five years or more after they were born were selected. The socio-economic status of the children was classified according to the occupation of the main breadwinner. Three socioeconomic classes (low, medium, and high) were used following the standardized occupation list for this country (13). Birth order position of the children was classified as first-born, second-born, and all later-born children.

The average yearly morbidity scores for the first five years of life were calculated for all the children. The incidence rates were expressed per 1000 patient years in that age group.

The morbidity was grouped as follows:

1. The total morbidity included all recorded episodes of all diagnostic groups.

Table II. *Morbidity of children aged 0–4 years by birth order, number of diagnoses/1000 patient years; statistical significance.*

birth order	1 n=611	2 n=592	>2 n=334	sig.
total morbidity	2868	2658	2414	**
serious	64	64	58	
moderately serious	1006	990	964	
non-serious	1668	1482	1282	**
exanthematous diseases	228	216	220	
nervous disorders	48	26	30	*
acute otitis media	246	222	212	
'colds and flu'	886	752	642	**
other upper respiratory disease	536	488	450	
lower respiratory disease	114	168	162	
gastro-enteritis	168	140	132	
urinary tract infection	18	16	16	
eczema	48	48	34	
other skin diseases	308	296	286	
all accidents	204	216	202	

*=p < 0.01, **=p < 0.001

Table IV. *Morbidity of children, aged 0–4 years by social status, number of diagnoses/1000 patient years; statistical significance.*

social class	low n=756	medium n=645	high n=136	sig.
total morbidity	2992	2514	1816	**
serious	68	64	36	
moderately serious	1108	914	492	**
non-serious	1698	1412	964	**
exanthematous diseases	220	238	160	*
nervous disorders	44	30	22	
acute otitis media	228	234	164	
'colds and flu'	908	710	412	**
other upper respiratory diseases	554	456	390	*
lower respiratory disease	176	120	90	**
gastro-enteritis	160	144	120	
urinary tract infection	18	18	14	
eczema	46	48	26	
other skin diseases	332	284	190	**
all accidents	228	216	164	

*=p < 0.01, **=p < 0.001

2. A division was made according to degrees of seriousness.
3. Diagnostic codes were aggregated to form 15 important diagnostic groups.

Sex-ratios were calculated by dividing the average number of diagnoses of girls by the average number of diagnoses of boys.

Study design

To study the interrelationship of gender, birth order, and social class on presented morbidity, logistic regression analysis was chosen (14). Five factors were taken into account; sex, being the first-born, being later-born, high social class, and low social class. To avoid spurious relations in this big data set with a large number of variables, only levels of $p < 0.01$ and $p < 0.001$ were regarded as being of statistical significance.

RESULTS

Gender

Table I shows that boys presented more diagnoses categorized as non-serious and moderately serious. Differences were significant for behaviour disorders, acute otitis media, respiratory diseases, gastro-enteritis, and accidents. Girls presented more diagnoses only for urinary tract infections.

Birth order

First-born children presented more diagnoses than second-born, who in turn presented more diagnoses

Table III. *Sex ratios (girl/boy) 0–4 years of life for different birth-order positions, for total morbidity and degrees of seriousness; statistical significance.*

	birth order			social class		
	1	2	>2	low	medium	high
total morbidity	0.90	0.84**	0.98	0.90*	0.89*	0.81
serious	0.89	0.83	1.66	0.94	0.97	1.67
moderately serious	0.88	0.83*	0.95	0.90*	0.87*	0.73*
non-serious	0.92	0.86*	0.99	0.91*	0.91	0.88

*=p < 0.01, **=p < 0.001

Table V. *Statistically significant relations of total morbidity and morbidity in degrees of seriousness of children by birth order, social class, and gender. Children aged 0–4 years of life. Logistic regression analysis. Beta and statistical significance.*

	total morbidity	serious	moder-ately	non-serious
gender	.26*			
first-born	.28*			.31*
later-born				.31*
high social class	.75**	.48*	.52*	.89**
low social class	.45**		.42*	.39**

*=$p < 0.01$, **=$p < 0.001$
gender = boys versus girls; first-born = first-born versus all later-born; later-born = first and second-born versus later-born children; high social class = high social class versus medium and low social class taken together; and low social class = low social class versus medium and high social class taken together.

than later-born (Table II). The differences in total morbidity between all three categories of birth orders were statistically significant. The only significant differences were found for non-serious morbidity.

Looking at specific diagnosis groups, lower respiratory tract infections had a lower incidence in first-born children. 'Colds and flu' and nervous disorders were significantly more often reported in first-born children. The differences in morbidity between girls and boys were small for later-born children (Table III). The lowest sex-ratio was found for second-born children. A reversed sex-ratio was found in later-born children for serious morbidity, but it was not significant.

Social class

Most diagnoses were presented in the lowest social class (Table IV). This was so for all degrees of seriousness and for all important diagnoses except for eczema. The highest level of significance was found for 'colds and flu', lower respiratory tract infections, and skin diseases.

The differences between morbidity of girls and boys were of the same level in all social classes (Table III).

Interrelationship

Logistic regression analysis showed that gender, social class, and being the first-born child in the family had, in this sequence, significant relations to the total number of presented diagnoses (Table V). This was true in particular for non-serious morbidity. Moderate serious morbidity had a relation to social class, and serious morbidity was only related to the highest social class.

DISCUSSION

The results presented in this paper endorse the findings of other studies. As expected, gender, birth order position, and social class had a major influence on the number of diagnoses presented to the general practitioner. These influences were particularly striking in less serious morbidity.

Variation in morbidity between girls and boys can be related to structural chromosomal differences leading to sex-specific morbidity such as phimosis and undescended testicles and to a different susceptibility to infections (7). In our study significant differences were found for diseases of the respiratory tract, urinary tract infections and gastro-enteritis, supporting those findings. Boys demonstrate more risktaking behaviour (15), explaining the differences with girls in reported accidents. Differences in presented nervous disorders indicate that parents have a different way in handling health problems of boys and girls (1).

The number of general practitioners involved increased from four to seven, during the study period, and the general practitioners practising at the start of the study have now been replaced. An analysis has been made of the effect of practice changing trends on the recorded morbidity (16). A substantial fluctuation was demonstrated. The influence of this factor on the results of the present study seems only limited.

Special attention has to be paid to the fact that the findings in this study are based on presented morbidity and not on experienced morbidity. It is obvious that the differences in help-seeking behaviour of parents can have a considerable influence on the presented morbidity.

Interpretation of the results of birth order studies is difficult. Many theories have tried to explain the findings of differences in this respect. Prenatal maternal conditions, sibling influence, and family economics have been suggested. Adams (17) mentioned two main factors after analysis of a number of studies. There is a greater educational attainment among first-born, and first-born are more affiliated to their parents and dependent than later-born.

Besides this there is a difference between first and later-born children in intra-uterine and perinatal conditions. The first labour is more frequently disturbed by problems and more often ends in interferences such as Caesarian section. In our study no significant differences between first, second, and later-born children were found in presented serious diseases nor in presented congenital, or neonatal morbidity. It has to be taken into account that the incidence of serious, congenital, and neonatal morbidity is low.

In this study, being the first child was an independent risk factor for non-serious diseases. The distribution of this risk factor over the various diagnoses suggests that family culture in seeking professional help could be of more importance than structural or perinatal factors. We did not find much difference between second and later-born children.

Social class is a major factor explaining inequality in morbidity and use of health services by children. There is no evidence that social inequality is decreasing (4). Social class can be related to the development of chronic diseases, stillbirth rate, perinatal morbidity, or even infant death (18). It has been noticed in the past that disturbances of health in childhood can influence the socio-economic position of an individual in later life (19).

Social class can be related to presented morbidity in various ways. A different financial threshold in seeking medical care may be present. Dutton (8) assumes a higher prevalence of health problems in families in the United States with lower incomes and an easier access to health resources in families with higher incomes. In The Netherlands this situation is different. More than half of the people with lower incomes are insured with a Sick Fund which pays all the doctor's costs. In the past, people with higher incomes were only insured for hospital care and had to pay for primary care. In recent years most private insurance companies cover primary care expenses. This could be one of the explanations why people in higher social classes used to consult their doctors less frequently.

In this study, social class was a major and independent factor related to the number of diagnoses made by the doctor. Even serious disease was less often recorded in the highest social class, suggesting that not only presentation but the true prevalence in the highest social class is different. These general relations do not rule out a different pattern in more specific diagnoses. Further study is needed to give an indication whether susceptibility to infections, personal hygiene, or even doctors' behaviour can be brought into relation to these findings.

There are several other factors that influence childhood morbidity and the presentation of morbidity episodes in general practice, but which were not included in this analysis. Breast-feeding and parental smoking should be particularly mentioned. A study of breast-feeding and morbidity in the study population showed a decline followed by an upsurge in the number of breastfed children (20). No relevant difference between different social classes was found. The relation of breast-feeding to presented morbidity was rather weak and this factor will not have much influence on our results. Smoking, on the other hand, must have been an important factor, because throughout this study period 80% of the households involved in the breast-feeding study reported one or more smokers (44% a smoking mother), particularly in the lowest social class. In our study it was not possible to control or correct for smoking status.

Social class, gender, and birth order appear to be independent risk factors in determining presented early childhood morbidity. Non-serious morbidity is by and large the most important within this category. The general practitioner should be aware of this. The relation to birth order position is particularly interesting because this seems to refer to a change in parental experience. This experience will grow with the number of children, irrespective of their sex or their parent social class. Demographic changes leading to a smaller or larger family size will directly influence the morbidity presented for professional care. The general practitioner can use his position in the health care system to support the growth of parental experience through counselling and individual health education. This should focus in particular on parents with their first child (boy) and on lower social class.

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