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## **Social inequality in parent-infant relations: Epidemiological study of community nurse records**

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**Abstract**

**Background:** Some studies suggest that favorable socioeconomic circumstances are associated with better parent-child relations but the documentation of such an association is limited and inconsistent. Few studies focused on infancy, few studies relied on objective measurement of parent-infant relations, and few studies included more than one measurement of parent-infant relations in the first year of life.

**Aims:** To report the prevalence of objectively measured problems in parent-infant relations during the first year of life and to examine the association between socioeconomic circumstances and parent-infant relations in an unselected community sample of infants.

**Methods:** Cross-sectional study of a community sample of children from birth to ten months in 15 municipalities in Denmark, N= 11,765. The exposure variables were population register data about socioeconomic circumstances, 1) parents' education, 2) family composition, 3) parents' origin, and 4) parents' occupational status. The outcome variable was the health visitor's concerns about the parent-infant relation assessed at four home visits from birth to ten months after delivery.

**Results:** The proportion of children with concerns about the parent-infant relation was 10.5%, 7.8% at one home visit and 2.8% at two or more home visits. Logistic regression analyses showed that all four indicators of socioeconomic circumstances were associated with concerns about the parent-infant relation in the first year of life.

**Conclusions:** The risk of problematic parent-infant relations was significantly elevated among , children of immigrant parents, and children of parents with short education and not in education or occupation.

**Key words:** Children; community-sample; Denmark; health visitor; infants; parent-child relation; social inequality; socioeconomic status

### Background

The risk of problematic development and mental health problems in childhood and adolescence is higher when parents have low as compared to high socioeconomic status<sup>1-6</sup>. One of the mechanisms behind this association may be early problematic parent-infant attachment or parent-infant relations<sup>2,3</sup>. Parenting characteristics which are important for positive development and mental health include warmth, support, positive control, and low levels of hostility, negativity and conflict<sup>1</sup>. According to Killén et al. (2008) it is likely that socioeconomic factors influence the quality of early mother-child interaction<sup>7</sup>. There are few studies about this hypothesized mechanism and according to Bryanton et al. (2009), even the documentation of an association between socioeconomic status and parent-infant relations is limited and inconsistent<sup>8</sup>. Further, such an association may be modified by other factors such as ethnic origin<sup>9</sup>, family composition<sup>10</sup> and stressful life events<sup>6</sup>.

Only few studies have addressed the association between socioeconomic status and characteristics of early parenting. Hagan et al. (2016) found higher prevalence of parent-reported parent-child relationship negativity among parents from lower socioeconomic status in a study of kindergarten children<sup>11</sup>. Thomson et al. (2014) used systematic observations of parent-child relations among 0-5-year-olds and found higher levels of positive parenting with increasing parental education<sup>12</sup>. Belsky et al. (2007) used systematic analysis of videotaped interactions at 6, 15, 24, 36 and 54 months and found that mother's education was associated with mother-child interaction characterized by covered warmth, low negativity and high positive control<sup>1</sup>. Bryanton et al. (2009) found that better educated mothers of five-year-old children had higher levels of positive parenting behaviours than mothers with shorter education<sup>8</sup>. Friedson (2016) found an association between socioeconomic disadvantages and parenting attitudes favorable to spanking and obedience<sup>13</sup>. Brocklebank et al. (2013) found that better educated mothers were more likely to read to their pre-school children<sup>14</sup>. Finally, Killén et al. (2006) used systematic scoring of videotaped interactions to assess the mother's sensitivity to their 3-7-months-old infants and found high correlations between education and sensitivity to their children's needs<sup>7</sup>.

The above-mentioned studies are difficult to compare due to differences in study population and measurements. It is for instance difficult to report the prevalence of problematic parent-infant relations because the studies applied different measures, e.g. self-reported parenting behaviour and attitudes and a variety of observations of parent-infant relations. Few studies focused on infancy; few studies relied on objective measurement of parent-infant relations; few studies included more than one measurement of parent-infant relations in the first year of living and few studies were conducted in unselected community

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samples of children. Therefore, the aims of this study were to report the prevalence of objectively measured problems in parent-infant relations during the first year of living and to examine the association between socioeconomic circumstances and parent-infant relations in an unselected community sample of infants.

### Methods

**Setting:** The study was conducted in Denmark where each of the 98 municipalities offer a series of free home visits to all families with newborn children. The home visitors are nurses with a one-year further education in child health and development. The coverage rate is high as approximately 97% of all families accept this service provision. Most municipalities comply with the recommendations from the national health authority and offer five home visits during the first year: a) a few days after delivery, b) one to two weeks after delivery, c) two to three months after delivery, d) four to six months after delivery and e) eight to ten months after delivery. Families with special needs are offered more home visits according to their needs. Approximately 25% of all children receive these need-based visits, defined as more than seven home visits during the first year of life.

The home visitors keep records from these home visits. Home visitors in a range of municipalities have organized a clinical database – the Child Health Database - where they store standardized data from their records from visits (b) to (e) in order to stimulate quality assurance and research. The home visitors apply a manual of definitions in order to secure comparability and stimulate validity of data in their records. The records include the child's unique person identification number which enable that data can be linked with national health and sociodemographic registers with complete data from the entire population.

**Study design and study population:** Cross-sectional study of children from birth to ten months. The eligible study population was all newborn from 1<sup>st</sup> January to 31<sup>st</sup> December 2016 from the 15 municipalities that have data on parent-child relation. The municipalities represent a mixture of metropolitan, urban and rural areas, with data in the Child Health Database (N=12,020 of which 11,765 had data about the parent-infant relation). Missing analyses show no difference in socioeconomic factors except for ethnic background where there is a higher proportion of children with Danish parents in the study population than in missing data (data not shown).

**Measures:** The exposure variables were population register data about socioeconomic circumstances, 1) parents' educational attainment at the child's birth, categorized into five hierarchical levels from higher education (five or more completed years at university) to primary school only (nine years at school); each

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child was categorized by the parent in the household with the highest education. 2) Family composition (child lives with both parents, yes vs. no), 3) parents' origin (2, 1 or 0 parents of Danish origin), and 4) parents' occupational status (2, 1 or 0 parents in job or education, for mothers prior to maternity leave).

The outcome variable was the health visitor's concerns about this relation assessed at four home visits from visit (b) one to two weeks after delivery to visit (e) eight to ten months after delivery. A concern is the health visitor's way to indicate that the parent-infant-relation is problematic, or that follow-up is needed. The exact definition of a concern regarding the parent-child-relation was any deviation from the following description: "The child is attended to; has appropriate clothing; the parents offer the child stimulating activities, are calm and confident in their behaviour resulting in a positive interaction; the parents can detect and meet the child's needs; the parents are aware of the child's weeping and can comfort the child; the parents understand and respond properly to older siblings' reactions." The database includes the health visitors' summary assessment of the parent-infant-relation but not systematic information about each of the criteria for concerns. Each child was categorized according to number of visits where the health visitor expressed concerns, range 0-4.

**Statistical procedures:** The first step was inspection of contingency tables tested for homogeneity by the chi<sup>2</sup>-test with a significance level of 0.01. The second step was multivariate logistic regression analyses with at least one record of concern about the parent-infant relation as outcome measure and the socioeconomic variables as exposure. These analyses were mutually adjusted where the criteria for confounding were met (control variable significantly associated with both exposure and outcome; control variable not considered to be a mediator). Further, the multivariate analyses were adjusted for mother's and father's age at childbirth (<20, 20-29, 30-39, >39) where the criteria for confounding were met. Since there was some inter-municipality variation in the level of health visitor concerns, we also adjusted for municipality. The multivariate logistic regression analyses excluded participants with missing data; the applied study population was approximately 8,500 with small variations across analyses.

**Data protection and ethical issues:** The study was approved by Research & Innovation Organization at University of Southern Denmark (registration number 10.366, University of Southern Denmark) and complied with national regulations of data protection and consent. Data from the health visitors' records are stored at the National Institute of Public Health in accordance with the Data Protection Legislation where data are exclusively used for research and statistical analyses. The database does not include information on health visitors. Linkage with register data was administered by Statistics Denmark and the involved researchers did not have access to personal identification. According to the Danish legislation, informed consent is not required for register-based studies.

## Results

The proportion of children with concerns about the parent-infant relation was 10.5%. The proportion with concerns at one home visit was 7.8% and 2.8% had records of concerns at two or more home visits. The proportion with concerns at the individual home visits was 3.4% at the b-visit one to two weeks after delivery, 5.6% at the c-visit two to three months after delivery, 4.9% at the d-visit four to six months after delivery and 4.2% at the e-visit eight to ten months after delivery. Concerns at the early b-visit was predictive of concerns at the subsequent visits, c-visit, unadjusted OR (99% CI) 11.22 (8.04-15.65), d-visit, OR 9.37 (6.03-14.55) and e-visit, OR 8.17 (5.43-12.27) (not shown in table).

Table 1 shows characteristics of the study population and prevalence of at least one record of concern about the parent-infant relation. Most of the study population of infants lived with both their parents, had parents in the age interval 20-39, had two parents of Danish origin, had two parents in job or education and parents with higher education. The prevalence of at least one record of concern about the parent-infant relation was significantly higher among infants living with only one of the parents, parent < 20 years of age, without parents of Danish origin, without higher education and with less than two parents in job or education.

[Table 1]

Table 2 shows the results of the logistic regression analyses. All independent variables were significantly associated with prevalence of concerns about the parent-infant relation in the first year of life. Most of the OR-estimates remained significant in the adjusted analyses. The significant predictors of concerns about the parent-infant relation were parents with other origin than Danish, without higher education, and one or two parents not having a connection to the labour market or educational system.

[Table 2]

## Discussion

**Main findings:** The first main finding was that home visitors visiting families with newborn children four times during the infant's first year of life had concerns about the parent-infant relation in 10.5% of all families, usually only once but for 2.8% at several home visits. The definition of a concern was any deviation from the following description: "The child is attended to; has appropriate clothing; the parents offer the child stimulating activities, are calm and confident in their behaviour resulting in a positive interaction; the parents can detect and meet the child's needs; the parents are aware of the child's weeping and can

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comfort the child; the parents understand and respond properly to older siblings' reactions." This prevalence was in accordance with the findings in Skovgaard et al.'s (2007) study which also applied data from home visitors<sup>15</sup>.

The second main finding was that the risk of problematic parent-infant relations was significantly elevated for children, where one or two parents of non-Danish origin, where the parents had shorter education and no connection to the labour market or educational system. This indication of social inequality in problematic parent-infant relations corresponds with findings in other studies, although these studies apply different measures of parent-infant relations and often focus on older children<sup>1-7</sup>. It is likely that parents with fewer socioeconomic resources are more exposed to economic and other stressors in their life which may reduce their capacity for a supportive parent-infant relation<sup>8</sup>. The finding of an elevated risk for problematic parent-infant relations among non-Danish parents corresponds to the finding of differences in parenting behaviour in specific ethnic groups<sup>9</sup>, e.g. that some specific ethnic groups do not engage so much in playing with, reading for and telling stories<sup>14</sup>.

**Methodological considerations:** The study population was an almost complete population of newborn in 15 municipalities in Denmark, representing a mixture of metropolitan, urban and rural areas. The linking of health visitors' records with complete population registers resulted in a high data coverage. The data about parent-infant relations were collected systematically by health visitors at four home visits during the first year of life. There is no formal validation study of these data, and differences in registration between municipalities can exist due to different focus and priorities in the municipalities. It is also likely that the health visitors' registrations could be biased. For instance, cultural bias in relation to ethnic differences childcare and confirmation bias in relation to the health visitors' own beliefs and values. Health visitors could also be biased because of their knowledge on parents' social background before the visit. We believe it enhances the validity that the home visitors have great expertise in child health and development and their use of a manual on what to observe at the home visits and how to keep records.

The study applied a definition of parent-infant relations which focus on the parent's role in the parent-infant relation. The definition focused on attachment, the parents' interaction with the infant and whether the parents understand the child's needs. Other studies on social inequality in parent-infant relations focused on other aspects such as parental negativity in relation to their kindergarten children<sup>11</sup>; analysis of videotaped mother-infant interactions coded for anticipation of the child's needs, autonomy, cooperation, responsiveness, containment of child's distress and control at 12 months<sup>12</sup>; the degree to which the mother child interaction in the first four years of life was characterized by warmth, negativity and positive control<sup>1</sup>;



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whether the mother engaged with their five-year-old child in playing, reading and telling stories<sup>14</sup>; and coding of videotaped interactions with 3-7-months-old infants by sensitivity to their children's needs<sup>7</sup>.

**Implications:** Problematic parent-infant relations have serious negative consequences for the child's development, mental health and social relations. It is important to intervene in order to support the families suffering from this problem and to intervene early in life. The Danish home visitor service provision is one way to intervene and this study suggests that observation of parent-infant relations is an integrated part of the home visitors' observations and examinations. The widespread use of extra need-based home visits is another indicator of the efforts to deal with problematic parent-infant relations. Pedersen et al. (2018) reported that the OR (99% CI) for receiving need-based home visits is 5.24 (3.68-7.47) in families with observed problematic parent-infant relations. Our study may inform the health visitors about population groups in high risk of problematic parent-infant relations. An extended report in Danish language provides an extensive account of risk factors for problematic parent-infant relations which also helps the home visitors to identify families with elevated risk of such problems<sup>16</sup>.

Yet another indication of the priority given to parent-infant relations in the Danish health services is that many municipals have introduced systematic screening for mental health problems and relational withdrawal. Two widespread screening methods are the Alarm Baby Distress Scale (ADBB)<sup>17</sup> and the Copenhagen Infant Mental Health Screening<sup>18</sup>. Both screening methods have demonstrated high reliability and validity<sup>19-21</sup>. A study has demonstrated that the Alarm Baby Distress Scale are well received by the health visitors and support their detection of problematic parent-infant relations and stimulate their communication with the parents about ways to stimulate relations and wellbeing<sup>22</sup>. Another study demonstrated that health visitors using the Copenhagen Infant Mental Health Screening found it appropriate and supportive in their work with the families<sup>23</sup>.

Another widespread effort to stimulate parent-infant relations are training and psychoeducation of parents. There are many specific methods and many studies of their appropriateness and effects. Recent reviews of randomized controlled studies show mixed results regarding the effects of universally provided parent training<sup>24, 25</sup>. Other reviews draw a much more positive picture of the effects of targeted efforts to stimulate the parent-infant relation by means of training and psychoeducation of parents<sup>24, 26-30</sup>.

From a research point of view, we recommend formalized validation of the health visitors' records. We also recommend further studies which separate the many criteria for concerns about parent-child relations; it may be very different family situations which result in the indication of a concern. The concerns may differ for the first child and subsequent children because there may be a learning curve when it comes to raising

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children, especially for young parents so more detailed analyses, which is an issue for further study. We recommend studies which provide more detailed insight into the processes which result in higher prevalences of problematic parent-infant relations in families where the parents have short education and frail connection with the labour market. Qualitative studies may help answer this question. Social inequality in parent-infant relations may have further consequences like promoting social inequality in mental health<sup>2-3</sup>; and it is important to analyze to what degree this is true.

**Conclusions:** The study found that 10.5% of children born in Denmark 2016 have a problematic parent-infant relation, assessed by skilled home visitors during four home visits in the child's first year. The risk of problematic parent-infant relations was significantly elevated among children of immigrant parents, and children of parents with short education and not in education or occupation.

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**Table 1.** Descriptive information about the study population and percent with concerns about the parent-infant relation in the first year of life

Variable	Category	Proportion of study population	% with concerns about parent-infant relation
Sex (N=11.622)	Boys	51.6%	11.0
	Girls	48.4%	10.1
Family composition* (N=11.018)	Live with both parents	87.7%	9.5
	Live with one of the parents	12.3%	15.5
Mother's age at birth* (N=11.415)	<20 år	0.9%	25.7
	20-29	45.7%	10.9
	30-39	50.0%	9.4
	40'+	3.4%	12.2
Father's age at birth* (N=11.019)	<20 år	0.3%	27.6
	20-29	31,5%	11.3
	30-39	56,3%	9.0
	40+	11.9%	12.8
Origin* (N=10.683)	Two parents of Danish origin	73.3%	7.8
	One parent of Danish origin	6.3%	13.8
	No parents of Danish origin	20.5%	18.4
Highest parental education* (N=11.061)	Five+ years university education	37.5%	7.9
	Higher education	28.5%	8.6
	High school education	7.5%	11.7
	Vocational education	19.0%	11.1
	Primary school	7.6%	22.5
Parents occupational status* (N=10.055)	Two parents in job or education	86.1%	8.2
	One parent in job or education	10.9%	15.3
	No parent in job or education	2.9%	23.7

\* The difference in prevalence is statistically significant, all p-values < 0.01

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**Table 2** OR (99% CI) for at least one record of concern about the parent-infant relation in the first year of life; crude and multivariate adjusted analyses

Exposure variable	Crude OR (99% CI)	Adjusted OR (99% CI)
Family composition, living with one vs. two parents	<b>1.75 (1.42-2.17)</b>	1.17 (0.88-1.55) <sup>a</sup>
Family's origin		
Two parents of Danish origin	1 (reference)	1 (reference)
One parent of Danish origin	<b>1.89 (1.39-2.57)</b>	<b>1.89 (1.38-2.59)</b>
No parent of Danish origin	<b>2.89 (2.23-3.18)</b>	<b>2.74 (2.27-3.30)</b>
		b
Highest parental education		
Five+ years university education	1 (reference)	1 (reference)
Higher education	1.10 (0.88-1.37)	1.27 (0.99-1.62)
High school education	<b>1.54 (1.12-2.11)</b>	<b>1.44 (1.00-2.06)</b>
Vocational education	<b>1.45 (1.15-1.83)</b>	<b>1.75 (1.34-2.28)</b>
Primary school	<b>3.38 (2.61-4.38)</b>	<b>2.78 (1.98-3.91)<sup>c</sup></b>
Parents occupational status		
Two parents in job or education	1 (reference)	1 (reference)
One parent in job or education	<b>3.47 (2.41-5.01)</b>	<b>1.56 (1.19-2.04)</b>
No parent in job or education	<b>2.03 (1.60-2.57)</b>	<b>1.81 (1.12-2.93)<sup>d</sup></b>

<sup>a</sup> Adjusted for mother's age at childbirth, parents' origin, parents' education, parents' occupational status and municipality

<sup>b</sup> Only adjusted for municipality; the other control variables did not meet criteria for confounding

<sup>c</sup> Adjusted for family origin, mother's age, father's age at childbirth and municipality

<sup>d</sup> Adjusted for family origin, parents' education, mother's age, father's age at childbirth and municipality

Estimates in **bold** are statistically significant at the 1% level.