Soc Psychiatry Psychiatr Epidemiol (2000) 35: 104–108

ORIGINAL PAPER

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Is grand multiparity associated with offsprings' hospital-treated mental disorders? A 28-year follow-up of the North Finland 1966 birth cohort*

Accepted: 20 December 1999

Abstract *Background*: A child born to a grand multiparous (GMP) mother (i.e. a mother who has undergone six or more deliveries) is at increased risk of perinatal complications, but it is not known whether or not GMP status is associated with child's adulthood mental disorders. *Methods*: The data were obtained from the unselected, general population Northern Finland 1966 Birth Cohort (n = 11,017). The cohort members (children) were followed up prospectively to the age of 28 years. Using the National Hospital Discharge Register, a total of 89 DSM-III-R schizophrenia cases were identified, as well as 55 other psychoses, 87 personality disorders, 36 cases of alcoholism, 53 depressive disorders, and 67 anxiety and other non-psychotic disorders. The association between the mother's grand multiparity and the offspring's adult hospital-treated psychiatric morbidity was analysed using a continuation ratio model, which is a modification of logistic regression. Odds ratios were adjusted for social class, maternal antenatal depression, and wantedness of pregnancy. *Results*: A total of 1320 mothers (12%) were GMPs. Maternal GMP status was not associated with offspring's schizophrenia, anxiety or other non-psychotic disorders. The risk of other psychoses (OR 2.3; 95% CI 1.2–4.7), alcoholism (OR 2.0; 95% CI 0.8–4.7) and depressive disorder (OR 2.2; 95% CI 1.0–4.5) was elevated among offspring of GMP mothers. *Conclusions*: It is possible that the mother's GMP status and the large family size associated with this are causal factors in the development of other psychoses than schizophrenia, alcoholism and depression among adult offspring.

* This work was supported by grants from the Finnish Academy, the Sigrid Juselius Foundation, and the Theodore & Vada Stanley Foundation.

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Introduction

The term "grand multiparity" (GMP) describes a woman who has undergone six or more deliveries [1, 2]; women who have undergone at least ten deliveries are called grand grand multiparous (GGMP) [3]. GMPs are regarded as being at risk as regards complications of pregnancy, labour and puerperium. Such mothers show an increased incidence of somatic complications, rhesus incompatibility, rupture of uterus, abnormal presentation and operative delivery [4, 5], as well as an increased perinatal morbidity and mortality [6, 7]. Juntunen [2], however, concluded in her recent study that even grand grand multiparity is not a major risk factor, provided that the health care system is well organized at every level.

During recent decades the proportion of GMPs has decreased in Western developed countries as well as in other parts of the world due to dramatic changes in the practice of contraception [8]. Large families have become less popular. For example, the incidence of GMP mothers decreased from 7.7% to 4.0% of all births between 1966 and 1986 in northern Finland [1]. One important exception in northern Finland are large families due to religious reasons. The religious minority within the Lutheran church called the Laestadian movement refuses all forms of contraception. This is the main reason why the proportion especially of GGMPs has remained relatively high and stable in northern Finland: 1.4% in 1964 and 1.3% in 1985–1986 [2].

GMP status is associated with somatic complications. As far as we know, there are no empirical data available

on the association between maternal parity and offspring's adult mental disorders. Using a large database (n = 11,017), we examined whether GMP is associated with hospital-treated mental disorders among the adult offspring. The data were obtained from the Northern Finland 1966 Birth Cohort, with the cohort members being followed prospectively up to the age of 28.

Subjects and methods

Study population

The 1966 North Finland Birth Cohort, described in detail by Rantakallio [9], is an unselected, general population sample ascertained during mid-pregnancy. It is based on 12,068 pregnant women and their 12,058 live-born children in the provinces of Oulu and Lapland with an expected delivery date during 1966, representing 96% of all births in the region [10, 11]. Data for biological, socio-economic and health conditions, living habits and family characteristics of cohort members were collected prospectively from pregnancy up to the age of 28 years. Of the total cohort, 284 had died and 757 emigrated, leaving 11,017 individuals alive and living in Finland at the age of 16 years for the present study.

Mother's parity

The predictor variable was parity as reported in 1966: six children or more (GMP) versus five children or less. This cutpoint was based on the definition of GMP [2]. Mother's parity is, in practice, the same as family size (number of children) in 1966. Families with GMP mothers seemed to be stable, e.g. only 1% of GMP mothers divorced between 1966 and 1980.

Adult psychiatric morbidity

The nation wide Finnish Hospital Discharge Register (FHDR) covers all mental and general hospitals. Diagnoses are coded according to DSM-III-R. All cohort members over 16 years appearing on the FHDR up to the end of 1994 for any disorder (i.e. DSM-III-R diagnoses 290–316) were identified, as well as all psychosis cases under the age of 16. All diagnoses were validated for the DSM-III-R criteria until the end of 1994, resulting in 387 psychiatric cases [11]. Interrater reliability was ensured in many phases, with good kappa values, from 0.6 to 0.9. The six diagnostic categories used in this study were: (1) DSM-III-R Schizophrenia, (2) All other psychoses, (3) Personality disorders, (4) Alcoholism, (5) Depressive disorder, and (6) Anxiety and other non-psychotic disorders. Diagnostic data have been described earlier in detail [11, 12].

Confounding variables

The following variables were controlled as possible confounders: paternal socio-economic status determined by occupation and prestige (social classes I–V) [12, 13]; mother's attitude to the pregnancy (wanted the pregnancy at the time or would have wanted it later vs did not want the pregnancy at all) [14]; and mother's self-reported antenatal depression (no depression vs depression) [15].

Table 1 Cumulative incidence of offspring's mental disorder up to the age of 28 years and mother's sociodemographic and health factor contributions by mother's multiparity in 1966 in the Northern Finland Birth Cohort 1966. Percentages are calculated by columns (*GMP* grand multiparous)

	Mothers parity					
	Non GMP		GMP		Total[a]	
	n = 9680	%	n = 1320	%	n = 11017	%
Hospital diagnosis*						
Schizophrenia	74	0.8	14	1.1	89	0.8
Other psychoses	44	0.5	11	0.8	55	0.5
Personality disorder	79	0.8	8	0.6	87	0.8
Alcoholism	28	0.3	8	0.6	36	0.3
Depressive disorder	40	0.4	13	1.0	53	0.5
Anxiety disorders and other non-psychotic disorders	60	0.6	6	0.5	67	0.6
No hospital treatment	9355	96.6	1260	95.5	10630	96.5
Parental social class[b] **						
I	759	7.9	35	2.7	794	7.2
II	1730	17.9	127	9.7	1857	16.9
III	3481	36.1	199	15.2	3680	33.6
IV	2189	22.7	336	25.6	2525	23.0
V	1496	15.5	616	46.9	2112	19.3
Wantedness of pregnancy**						
Yes	8736	92.1	741	58.3	9477	88.1
No	753	7.9	529	41.7	1282	11.9
Maternal depression during pregnancy**						
No	8328	87.7	937	73.3	9265	86.0
Yes	1166	12.3	342	26.7	1508	14.0

*P = 0.008, **P < 0.001

[a] The total number of subjects varies because of missing data

[b] I = highest, V = lowest social class

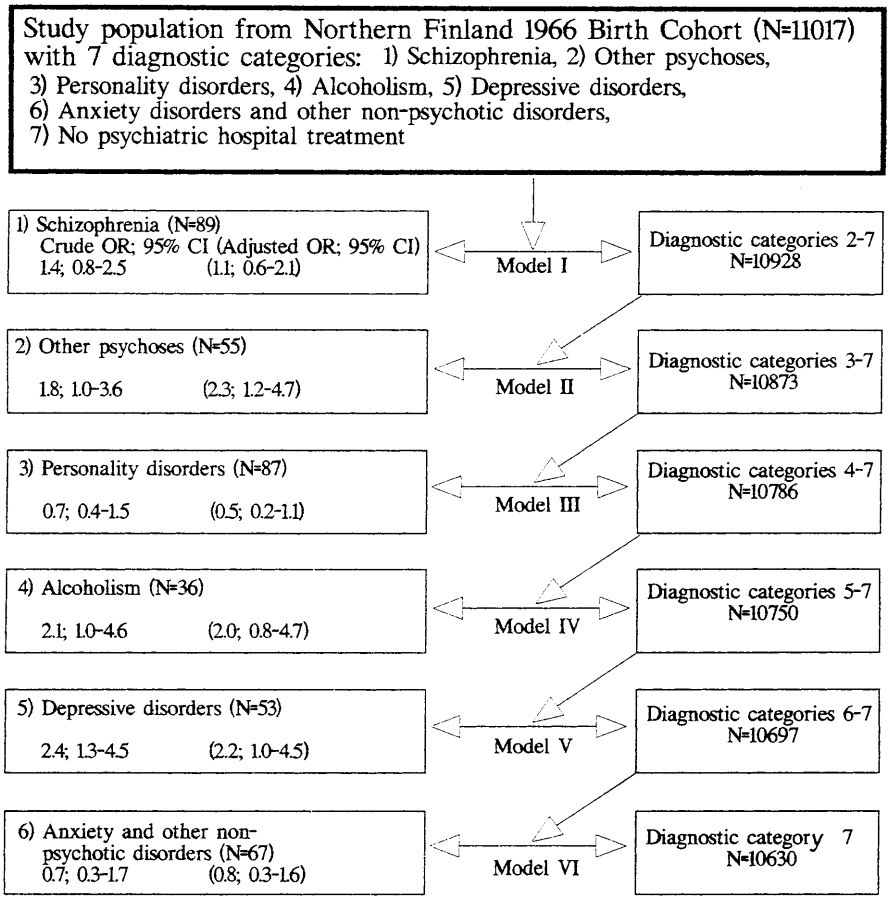

Fig. 1 The "tree structure" of six logistic regression models presenting the odds ratios (OR) and confidence intervals (95% CI) of grand multiparity for seven diagnostic categories. In the "grand multiparity" variable, non-grand multiparity was used as a reference group for calculating the odds ratios for grand multiparity families. The odds ratios have been adjusted for social class, self-reported maternal antenatal depression, and wantedness of pregnancy

Statistical methods

Cross-tabulation was first used to present the distribution of the offspring's mental disorders in adulthood as well as maternal sociodemographic and health factors by parity. The statistical significance of differences in the frequency tables was tested using the chi-square test. The continuation ratio model [16, 17] provides a means to estimate the associations between psychiatric disorders and parity. This model partitions the analysis of the original response variable (psychiatric disorder) into six different logit models (logistic regression models for dichotomous response) (Fig. 1). The final models were reported using adjusted odds ratios (OR) and their 95% confidence intervals (95% CI). Odds ratios indicate the liability of a child born to a GMP mother to belong to a diagnostic category as adjusted by social class, maternal antenatal depression, and wantedness of the pregnancy. Crude odds ratios are also reported. Statistical analyses were performed using SPSS for Windows [18].

Results

Of 12,068 mothers, 1320 (12%) were GMPs at the child's birth in 1966. Table 1 shows the association between maternal parity and the offspring's mental disorder, parental social class, wantedness of pregnancy and maternal self-reported depression. Other psychoses than schizophrenia ($P = 0.066$), alcoholism ($P = 0.057$) and depressive disorders ($P = 0.004$) were more common in the GMP category, as well as low paternal social class ($P < 0.001$), unwantedness of the pregnancy ($P < 0.001$) and maternal antenatal depression ($P < 0.001$).

Figure 1 presents the "tree structure" of the six logistic regression models, analysing the seven diagnostic categories. In the GMP variable, the non-GMP category was used as a reference group to calculate the odds ratios for GMPs. The association between GMP and different psychiatric disorders is expressed as both crude and adjusted odds ratios (adjusted for social class, maternal antenatal depression, and wantedness of pregnancy). Maternal GMP status was associated with other psychoses and depression, and statistically marginally, with alcoholism. Data on parity were missing in 17 cases and different predictor and outcome variables were used in 0.2–5.9% of cases.

Discussion

Our main finding was that GMP was not an independent predictor of an offspring's schizophrenia, but did predict other psychoses and hospital-treated non-psychotic depressions in adulthood. Alcoholism was also more common among the offspring of GMP mothers, but confidence limits included unity. As far as we know, there are no previous empirical data available on the association between GMP and offspring's severe, hospital-treated mental disorders.

Are there any theoretical explanations for our findings? Several adverse factors may be associated with GMP families. Parents of large families may be stressed and therefore unable to provide psychological support for their children. It is also obvious that GMP families may have more financial problems than non-GMP families, even in the Nordic welfare state, where large families receive economic support. The children of GMP families may also lack maternal support, as there are so many children to take care of. GMP mothers were more often depressed during pregnancy. In this study 26.7% of GMP mothers were depressed during pregnancy and 41.7% did not want the pregnancy at all. It is possible that the mother's depression may have contributed in turn to that of the child. Brown and Harris [19] found that one vulnerability factor of depression in women was having several children under the age of 14 living at home. In GMP families some children may be more vulnerable to some mental disorders. These stressors may contribute to the development of the disorder. The level of stress that may become unbearable to a vulnerable person may appear normal to others. Even exposure to the infectious agents more common in big families may be a risk factor for psychotic disorders [20].

There are many large families in northern Finland due to religious reasons. Might this religious background be reflected in our results? Our rough estimate is that one-third of our GMPs (those who had eight children or more by 1980) belonged to the local religious sect, which does not accept any form of contraception. Health risks in large religious families have been discussed from time to time in Finland, mainly due to somatic birth complications in GMP and GGMP deliveries [2], as well as due to some individual and family crises probably associated with this minority. Some adverse features may also exist: resigning from the sect may be followed by a lack of psychological support and even condemnation or ostracism by other devotees. We do not have any exact data about the religious background, so we can only speculate about the effect of it.

The study population consisted of hospital-treated cases. Only a small proportion, i.e. 3% [11], of schizophrenics in this study were treated solely as out-patients, thereby escaping the FHDR. In Finland the vast majority of cases of schizophrenia and other psychoses were treated in some phase of life in a mental hospital, and are thereby included in the FHDR. Thus, schizophrenia and other psychotic cases in the study sample were representative. Most non-psychotic disorders, however, are never treated as in-patients and our non-psychotic cases were highly selected. The study sample represents the most severe 20% of all non-psychotic cases in the population, based on estimates from the Mini-Finland Study, where one-tenth of the population (9.0% of males and 10.2% of females) had a non-psychotic disorder at the age of 30 [21]. Generalizability of our results to the non-psychotic majority treated outside hospital remains uncertain. If, however, our results are repeatable among a large group of non-psychotic cases not treated in a psychiatric hospital, we have encountered a considerable public health problem.

The follow-up period to age 28 years may be biased towards the inclusion of more severe forms of disorder. We also acknowledge that, strictly, our results are relevant only to disorders with a fairly young age at onset. The strength of this study was that we had a population-based, prospective birth cohort study with a long follow-up of 28 years from mid-pregnancy until adulthood. This makes analysis of intervening and confounding factors possible. Boosted by a large study sample, the study gives reasonable statistical power for our primary analyses, although some confidence limits come close to unity.

In conclusion, we found some associations between GMP and the offspring's adult psychiatric morbidity, but not many, and the odds were not very high. Social security is extensive in Finland. Families with children are supported economically and day care services for children are good. Our results may be generalizable to other Western societies with high levels of economic and social security. We believe, without research-based evidence, that social and economic support may prevent some problems connected with GMP families.

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