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**Preterm birth or foetal growth impairment and psychiatric hospitalization
in adolescence and early adulthood in a Swedish population-based birth
cohort**

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Abstract

Context: Preterm birth and restricted foetal growth are related to symptoms of psychiatric disorder in childhood and early adulthood. However, psychiatric hospitalization has only been studied to a limited extent.

Objective: To investigate possible relations between being born preterm and/or small for gestational age (SGA) and later psychiatric hospitalization.

Design: A population-based registry study of psychiatric hospitalization. Registries allowed for inclusion of parental socioeconomic characteristics, pregnancy and delivery complications in the analyses. Preterm birth was defined as <37 weeks of gestation and SGA as a birth weight \leq -2.01 SD of the Swedish standard. Logistic regression was used to calculate adjusted odds ratios (OR) and 95% confidence intervals (CI_{95%}).

Settings: Public hospitals in Sweden.

Participants: 155,994 males and 148,281 females born in Sweden 1973-1975, registered in the Swedish Medical Birth Register.

Main outcome measures: Incidence and duration of all psychiatric hospitalization during the years 1987-1996.

Results: The risk of hospitalization for all mental disorders was increased for: preterm SGA males (OR 2.19, CI_{95%} 1.49-3.21); at term SGA males (OR 1.55, CI_{95%} 1.34-1.79); at term SGA females (OR 1.31, CI_{95%} 1.15-1.50). Similarly, child psychiatric disorders and mental retardation were overrepresented among preterm males, preterm SGA males, at term SGA males, and at term SGA females. At term SGA males and females also suffered increased risk for anxiety and adjustment disorders (OR 1.70, CI_{95%} 1.18-2.45 and OR 1.49, CI_{95%} 1.14-1.94). For the males substance-related disorders were more common as well (OR 1.37, CI_{95%} 1.11-1.71). Preterm, SGA males were also at risk for personality disorders (OR 3.30, CI_{95%}

1.16-9.41) and psychotic disorders (OR 4.36, CI_{95%} 1.85-10.30). SGA males were overrepresented in all hospitalization durations.

Conclusions: The results show a relationship between being born SGA and later psychiatric hospitalization, where preterm birth and male gender seem to increase the risk.

Introduction

Preterm birth and/or fetal growth impairment have recently been subjects for research concerning mental illness. Low birth weight has been related to both psychiatric symptoms and psychiatric disorders (1-4), and in those born preterm there is some evidence of an increased mental burden (5,6). It has also recently been shown amongst a sample of individuals born preterm and small for gestational age (SGA) that symptoms of anxiety and depression were more frequent (7). By linking medical birth registries to those of hospitalization further relations have been shown. Examples of these are between low birth weight (8) or SGA (9) and hospitalization because of schizophrenia in late adolescence and adulthood; very preterm birth and SGA and hospitalization because of anorexia nervosa (10); SGA and suicide (11). Linking such registries, results have also shown relations between low birth weight children of 14 years or younger and mental retardation, Asperger's Syndrome, learning disorders, and eating disorders among others (12). In general SGA works as the ideal marker of foetal growth impairment, however, it is still lesser studied than low birth weight.

The primary aim of this study was to explore the extent of relations between being born preterm and/or SGA and later psychiatric hospitalization for a wide range of mental disorders. As most studies until now have focused on a small selection of mental disorders, this investigation would provide a comprehensive knowledge of the possible relations within the whole spectrum of psychiatric hospitalization, and indirectly the extent of more severe psychiatric sequelae related to preterm birth and/or fetal growth impairment. Moreover, as most studies on the subject have used low birth weight as a proxy of foetal growth impairment, this study defined SGA by an external standard providing strength to its definition of SGA. Presuming that there were relations, would they differ by gender, and/or

remain after adjustments made for medical events of pregnancy and delivery or parental socioeconomic characteristics?

Materials and Methods

Since 1973 the Swedish Medical Birth Register (MBR) has gathered information on maternal, antenatal and perinatal data (13). The register continuously receives information on births including identity, social factors, pregnancy, delivery and infant variables including birth weight and gestational length. Today the register covers approximately 99 percent of all births. During the period of pregnancy and delivery of the cohort (1973-1975) studied, diagnoses in the MBR were made according to the eighth revision of the World Health Organization (WHO) International Classification of Disease (ICD-8) (14). The Swedish Hospital Discharge Register (HDR) has been in use since 1964. From 1987 on it covers all public hospitalization in Sweden (15). The register continuously receives information on patient-, hospital-, and administration data, including a main diagnosis. During the studied period - 1987 until 1996 - diagnoses of mental disorder in the register were made according to the Swedish version of the ninth revision of the WHO International Classification of Disease (ICD-9) (16).

Identifying the subjects within the cohort and their parents involved multiple registries: the Total Population Register (TPR) made it possible to retrieve information on marital status, births, deaths and migration including country of origin for parents and cohort (17); the Causes of Death Register revealed data on deceased individuals (18); the Multi-generation Register allowed for identification of the parents (19); and the Population and Housing Census 1970 was used to retrieve the educational level of the parents (20). The unique personal identification number assigned all Swedish citizens allowed for cross-reference of all registries.

The cohort consisted of males and females born in Sweden during the years 1973, 1974 and 1975 registered in the MBR and the TPR. Of all registered births only those alive and living in Sweden by age thirteen were included. Because of missing values on birth weight and/or gestational length 1,161 males and 1,029 females were excluded, as were 167 males and 126 females with extremely high birth weights compared to their length of gestation. The mother and/or the father of 1,161 males and 1,003 females could not be identified, thus these males and females were also excluded. The final number consisted of 148,281 females and 155,994 males. The exclusion-process has been described more thoroughly previously (21). During the study period, 0.9 percent of the males emigrated and 0.5 percent were deceased. The corresponding percentages among the females were 1.7 and 0.2.

The relation with the following categories of preterm birth, or markers of foetal growth impairment on psychiatric hospitalization care were investigated: preterm birth defined as less than 37 completed weeks of gestation, and SGA defined as a birth weight less than two standard deviations (SD) below the mean birth weight according to Swedish external standards from 1996 (22). SGA births were also stratified into those born at term SGA, preterm SGA, moderately SGA (MSGGA - being within 3.00 to 2.01 SD below mean birth weight), and very SGA (VSGA - those below 3.00 SD).

Adjustments were made for various background variables. Medical diagnoses related to pregnancy or delivery of the cohort were grouped together on a three-digit basis according to the ICD-8, allowing for adjustment of these events (Table 1). Also a number of background variables served as estimations of the early socioeconomic environment for the infants: maternal age classified as 13-19, 20-26, 27-33 and ≥ 34 years of age; parity of mother as previous or no previous children; parental educational level, classified according to the

Swedish educational system as 9-10, 11-13 and ≥ 14 years; marital status of mothers at time of birth as married, divorced/widow or unmarried; and parental country of origin.

Table 1. Complications of pregnancy- and delivery for males and females born 1973-75.

Complication Category	ICD-8#	Males n=155994	Females n=148281
Hypertensive disease during pregnancy	401, 637	13101	12118
Diabetes	250	459	454
Anaemia gravidarum	633	1722	1785
Pregnancy bleeding	651	3487	3073
Inertia uteri	657.1	7495	5998
Preterm rupture of the membranes	645.95, 661.0	1806	1553
Fetopelvic disproportion	655	3978	3514
Vaginal instrumental delivery	-	8281	5829
Cesarean section	-	10103	9071
Birth trauma	772.00-10, 772.24-99	13062	10103
Asphyxia	661.8, 776	15361	11568
Apgar score at 1 minute			
7-10 scores	-	149130	142885
0-6 scores	-	6864	5396
Neonatal jaundice	775	1069	975

Outcome variables for the cohort were hospital discharge with a main diagnosis of mental disorder according to ICD-9. For the study period of 1987 until 1996 the overall cumulative incidence of hospital discharge with a main diagnosis of mental disorder was investigated; that is, hospitalization one or more times versus no hospitalization. For further analysis the diagnosis codes of the Swedish version of ICD-9, chapter V mental disorders were divided into nine diagnostic subcategories: *substance-related disorders; mood disorders; personality disorders; psychotic disorders; anxiety and adjustment disorders; somatoform and*

dissociative disorders; eating disorders; child psychiatric disorders and mental retardation; and other disorders (Table 2). For each subcategory the cumulative incidence of the study period was investigated. Duration of hospitalization with a main diagnosis of mental disorder was also investigated. The total number of days of psychiatric hospitalization during 1987-1996 was classified into six subgroups: 1-7 days; 8-14 days; 15-30 days; 31-60 days; 61-120 days; and >120 days. For the study period the cumulative incidence of total number of days of psychiatric hospitalization for each of these subgroups was investigated.

Table 2. Diagnostic subcategories and number of hospitalizations of males and females born 1973-1975 during the period of 1987-1996.

Diagnostic subcategories	ICD-9#	Hospitalizations	
		Males n=155994	Females n=148281
All mental disorders		3103	3588
Substance-related disorders	291, 292, 303-305	1475	882
Mood disorders	296, 300E, 301B, 311	257	474
Personality disorders	301A, 301C, 301E, 301F, 301G, 301H, 301J, 301W, 301X	211	342
Psychotic disorders	295, 297, 298	335	254
Anxiety and adjustment disorders	300A, 300C, 300D, 300W, 300X, 308, 309	419	832
Somatoform and dissociative disorders	300B, 300F, 300G, 300H, 306, 307	98	277
Eating disorders	307B, 307F	37	533
Child psychiatric disorders and mental retardation	299, 312-315, 317-319	581	661
Other disorders	290, 293, 294, 302, 307A, 307C-E, 307G, 307H, 307X, 310	158	196

Statistical Analyses

Analyses were performed separately for the studied males and females and all variables in the analyses were treated as categorical. Multiple logistic regression analysis was used to estimate the effects of socioeconomic variables, delivery and pregnancy on subsequent overall risk (cumulative incidence) of psychiatric hospitalization. Year of birth of the males and females studied as well as 'twin birth' were also included in the analyses. The relations between preterm birth, SGA and SGA-subgroups to subsequent risk for psychiatric hospitalization were also estimated through logistic regression analysis. Both the crude odds ratios (OR) and the ORs adjusted for the background variables were calculated; however, only adjusted ORs are presented. The dependent variables were the overall cumulative incidence of psychiatric hospitalization according to mental disorders of ICD-9 during the study period, as well as the cumulative incidence of being hospitalized according to each diagnostic subcategory. In order to find any differences on the character of hospitalization, each length-of-stay subgroup was also used as a dependent variable, although restricted to the overall cumulative incidence of psychiatric hospitalization.

This study was approved by the Human Research Ethics Committee; Faculty of Health Sciences, Linköping University.

Results

During the years 1973 to 1975, 7467 males and 6071 females were born preterm. In total 7461 males and 7942 females were born SGA. The total number of hospitalizations for mental disorders for males and females born 1973-1975 are presented in Table 2.

For *all mental disorders* males born at term SGA, and in particular males born SGA and preterm, were at an increased risk of hospitalization (Table 3). This was also true for females born at term SGA. The only statistically significant increased risk for males born preterm was within the subcategory of *child psychiatric disorders and mental retardation*.

Correspondingly, there was a weak tendency, although not statistically significant, in the same subcategory for preterm females. Both males and females born at term SGA were at increased risk of hospitalization within the subcategories of *anxiety and adjustment disorders* and also *child psychiatric disorders and mental retardation*. Males born at term SGA; however, differed from their female peers by also being at an increased risk for hospitalization within the subcategory of *substance-related disorders*. Preterm SGA males were also at increased risks for hospitalizations within the subcategories of: *personality disorders; psychotic disorders; child psychiatric disorders and mental retardation; and other disorders*. Data also implied an increased risk for *mood disorders*. In general the risks of hospitalization within these subcategories were at a higher level for preterm SGA males, as compared to those born at term SGA.

As primary analysis deemed SGA to be the one marker most strongly related to psychiatric hospitalization, further analysis was initiated to reveal any possible differences among those born SGA. Males and females born SGA were subdivided into MSGA, and VSGA, of which 1103 males, and 1155 females had a birth weight below 3.00 SD's. Risks were equal to or

Table 3. Adjusted odds ratios for the cumulative incidence of psychiatric hospitalization according to subcategories of disorders amongst males and females born as either preterm, SGA or both.

Subcategories of disorders	Preterm			At term and SGA			Preterm and SGA		
	OR*,†,‡	95% CI	p-value	OR*,†	95% CI	p-value	OR*,†	95% CI	p-value
Males									
Substance-related disorders	1.11	0.89-1.40	0.36	1.37	1.11-1.71	0.004	1.76	0.95-3.27	0.07
Mood disorders	1.26	0.76-2.10	0.37	1.28	0.75-2.17	0.37	2.90	1.02-8.23	0.05
Personality disorders	1.43	0.84-2.42	0.19	1.22	0.69-2.15	0.50	3.30	1.16-9.41	0.03
Psychotic disorders	1.15	0.71-1.87	0.56	1.35	0.85-2.14	0.20	4.36	1.85-10.30	0.001
Anxiety and adjustment disorders	1.05	0.67-1.64	0.83	1.70	1.18-2.45	0.004	2.27	0.82-6.30	0.11
Somatoform and dissociative disorders	0.88	0.34-2.30	0.79	1.72	0.79-3.74	0.17	2.12	0.28-16.20	0.47
Eating disorders	0.57	0.07-4.37	0.59	0.00	0.00-	0.98	0.00	0.00-	0.99
Child psychiatric disorders and mental retardation	1.50	1.10-2.06	0.01	2.03	1.53-2.70	<.001	3.15	1.57-6.30	0.001
Other disorders	1.17	0.59-2.30	0.66	1.67	0.92-3.04	0.10	3.84	1.15-12.84	0.03
All mental disorders	1.14	0.97-1.33	0.11	1.55	1.34-1.79	<.001	2.19	1.49-3.21	<.001
Females									
Substance-related disorders	1.19	0.87-1.64	0.28	1.19	0.90-1.57	0.22	0.67	0.21-2.11	0.49
Mood disorders	1.33	0.88-2.02	0.18	0.97	0.63-1.48	0.88	1.55	0.56-4.29	0.40
Personality disorders	1.28	0.78-2.09	0.33	1.18	0.75-1.84	0.48	0.00	0.00-	0.99
Psychotic disorders	1.12	0.62-2.03	0.72	0.91	0.51-1.64	0.75	0.00	0.00-	0.99
Anxiety and adjustment disorders	1.12	0.80-1.56	0.51	1.49	1.14-1.94	0.003	0.94	0.34-2.56	0.90
Somatoform and dissociative disorders	1.42	0.84-2.41	0.19	1.42	0.89-2.28	0.14	1.44	0.34-5.99	0.62
Eating disorders	1.23	0.82-1.83	0.32	0.84	0.55-1.28	0.41	1.34	0.48-3.73	0.57
Child psychiatric disorders and mental retardation	1.30	0.92-1.83	0.14	1.79	1.36-2.35	<.001	1.34	0.54-3.33	0.53
Other disorders	1.01	0.52-1.95	0.97	1.02	0.55-1.90	0.94	0.65	0.09-4.80	0.67
All mental disorders	1.13	0.96-1.33	0.13	1.31	1.15-1.50	<.001	0.90	0.55-1.47	0.67

Abbreviations: OR=odds ratio, CI= confidence intervals, SGA=small for gestational age

Logistic regression analysis. † Adjusted for socioeconomic and pregnancy- or delivery related variables. ‡ Not adjusted for birth weight.

higher for males born MSGA or VSGA for all diagnostic subcategories as compared to the females, with the exception of *eating disorders* (Table 4). Both SGA subgroups of males and females were at a statistically significant increased risk of hospitalization for *all mental disorders*, but risks were stronger for males and those born VSGA. For males born MSGA increased risks were also observed for: *substance-related disorders; anxiety and adjustment disorders; and child psychiatric disorders and mental retardation*. In comparison, VSGA males also suffered an increased risk for: *substance-related disorders; mood disorders; psychotic disorders; anxiety and adjustment disorders; child psychiatric disorders and mental retardation; and other disorders*. All risks were at a higher level for these diagnostic subcategories among the VSGA males as compared to those born MSGA. The only increased risk within the diagnostic subcategories for MSGA females were for *anxiety and adjustment disorders* and *child psychiatric disorders and mental retardation*. The VSGA females did not follow the pattern observed among the VSGA males, and the only indication of a possibly increased risk among the diagnostic subcategories was for *anxiety and adjustment disorders*.

Preterm males and females differed very little from those born at term with regards to total duration of hospitalization for the studied period (Figure 1). For preterm females a positive trend was observed with increased risks for hospitalizations of longer durations. However, increased risks were only found statistically significant for hospitalizations of ≥ 60 days OR 1.45 (CI_{95%} 1.07-1.98, p=0.02). In males born preterm the risk for a total hospitalization duration of 31-60 days was somewhat increased, OR 1.87 (CI_{95%} 1.21- 2.89, p=0.005). In contrast, SGA males suffered statistically significant increased risks for hospitalization durations of all lengths as compared to those born appropriate for gestational age, with increasing risk for hospitalizations of longer duration (Figure 2). In females born SGA a negative trend was observed with increasing risks for hospitalizations of shorter duration,

although the only significant increased risk was for a hospitalization of 1-7 days, OR 1.41 (CI_{95%} 1.16-1.70, p<0.001).

Table 4. Adjusted odds ratios for cumulative incidence of psychiatric hospitalization according to subcategories of disorders amongst males and females born as MSGA or VSGA.

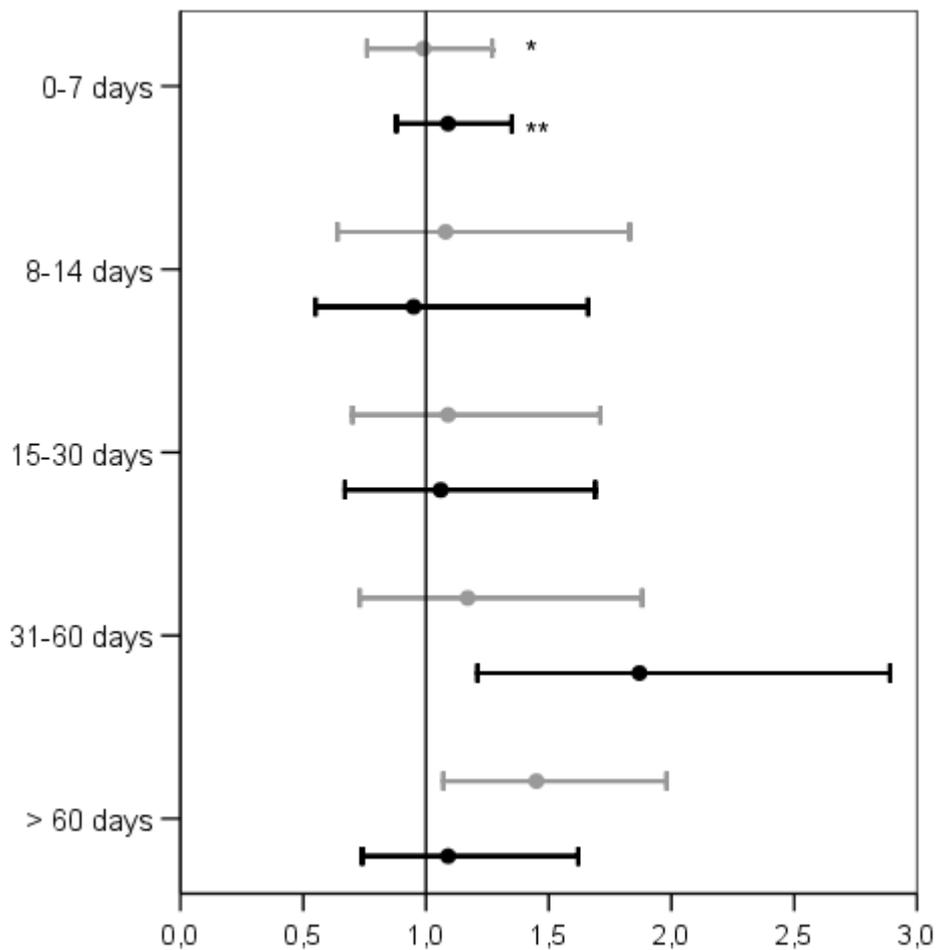
Subcategories of disorders	MSGA			VSGA		
	OR*, †	95% CI	p-value	OR*, †	95% CI	p-value
Males						
Substance-related disorders	1.34	1.07-1.68	0.01	1.83	1.15-2.91	0.01
Mood disorders	1.17	0.67-2.07	0.58	2.88	1.25-6.65	0.01
Personality disorders	1.31	0.74-2.31	0.36	1.93	0.70-5.35	0.20
Psychotic disorders	1.30	0.81-2.11	0.28	3.23	1.56-6.68	0.002
Anxiety and adjustment disorders	1.66	1.13-2.44	0.009	2.24	1.04-4.80	0.04
Somatoform and dissociative disorders	1.82	0.83-3.96	0.13	1.40	0.19-10.27	0.74
Eating disorders	0.00	0.00-	0.98	0.00	0.00-	0.99
Child psychiatric disorders and mental retardation	1.94	1.43-2.62	<.001	3.21	1.88-5.46	<.001
Other disorders	1.51	0.79-2.89	0.22	3.76	1.48-9.53	0.005
All mental disorders	1.51	1.30-1.75	<.001	2.15	1.60-2.89	<.001
Females						
Substance-related disorders	1.11	0.83-1.50	0.48	1.35	0.71-2.55	0.36
Mood disorders	0.90	0.57-1.41	0.64	1.73	0.80-3.72	0.16
Personality disorders	1.15	0.72-1.84	0.56	0.65	0.16-2.66	0.55
Psychotic disorders	0.97	0.54-1.74	0.92	0.00	0.00-	0.99
Anxiety and adjustment disorders	1.39	1.05-1.85	0.02	1.72	0.96-3.08	0.07
Somatoform and dissociative disorders	1.44	0.89-2.33	0.14	1.36	0.43-4.30	0.61
Eating disorders	0.85	0.55-1.30	0.45	1.09	0.45-2.68	0.85
Child psychiatric disorders and mental retardation	1.77	1.34-2.35	<.001	1.62	0.83-3.17	0.16
Other disorders	1.08	0.58-2.00	0.81	0.48	0.07-3.44	0.46
All mental disorders	1.25	1.09-1.45	0.002	1.42	1.03-1.94	0.03

Abbreviations: OR=odds ratio, CI=confidence interval, MSGA= moderately small for gestational age, VSGA=very small for gestational age

* Logistic regression analysis.

† Adjusted for socioeconomic- and, pregnancy- or, delivery related variables.

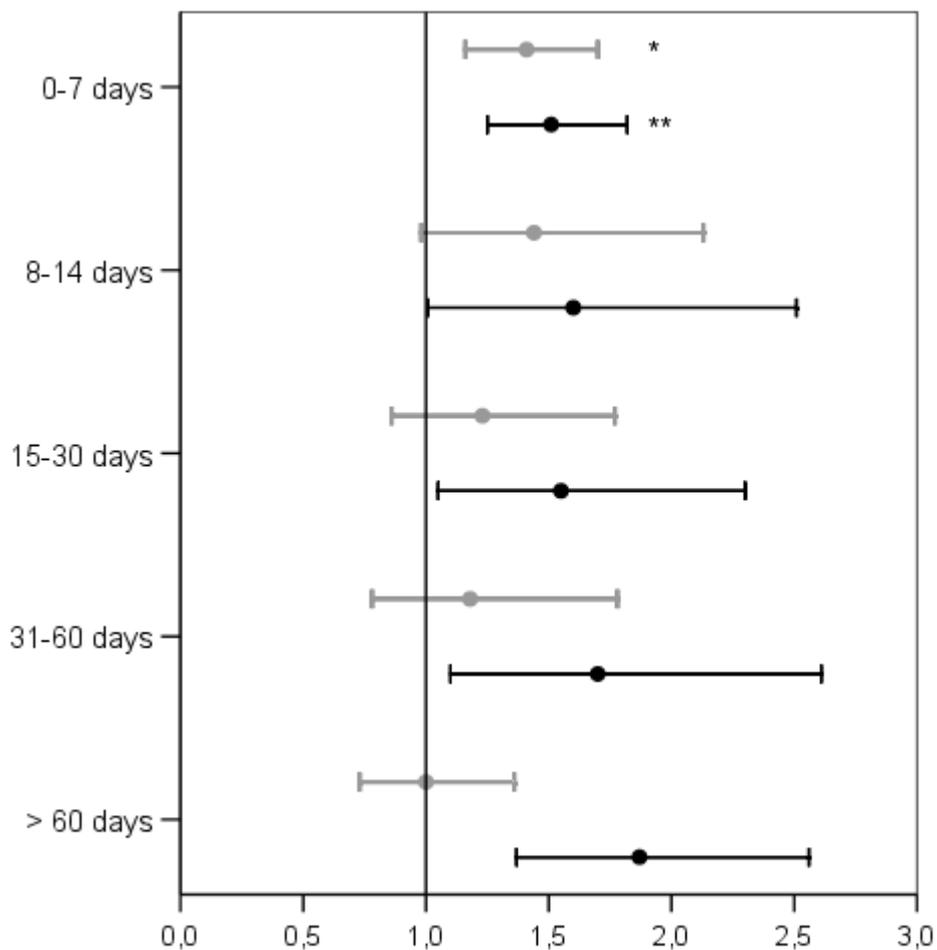
Figure 1. Adjusted odds ratios of total hospitalization duration 1987-1996 for preterm males and females, as compared to full term males and females.



* Females

** Males

Figure 2. Adjusted odds ratios of total hospitalization duration 1987-1996 for small for gestational age males and females, as compared to appropriate for gestational age males and females.



* Females

** Males

Discussion

We believe that this study provides unique evidence of a relation between being born SGA and hospitalization during late adolescence and early adulthood for the following groups of disorders: *substance-related; mood; anxiety and adjustment; personality; child psychiatric and mental retardation; and other disorders*. In this population-based register-study it was shown that males within the study cohort who were born preterm suffered a very modest increased risk of psychiatric hospitalization in late adolescence and early adulthood. In comparison, subgroups of males born SGA and, to a lesser degree also females born SGA had a higher risk of psychiatric hospitalization, especially males born SGA and preterm, or within the VSGA subgroup. This was seen both for the total cumulative incidence of mental disorder, and within several diagnostic subcategories. These increased risks were observed after adjustments made for childhood socioeconomic characteristics and complications during pregnancy and delivery. The evidence that those born SGA was at a greater risk was further supported by the fact that SGA males were over-represented within all hospitalization-duration subcategories. In conclusion, this indicates that there is a relationship between being born SGA and later psychiatric hospitalization, which seems to be stronger when SGA birth is combined with preterm birth and male gender. Preterm birth on its own, on the other hand, was to a minor degree related to psychiatric hospitalization. It should be noticed that for several of the risk increases the confidence intervals approached one, implying that the real effect could be modest.

Lack of national registries on birth-data and mental hospitalization can limit the potential for doing studies to determine if there is increased psychopathology amongst those born preterm and/or SGA because samples may be limited in size and selection, for example if only hospital-based samples are available. We were able to access population-based registries in

our study, which also allowed for adjustment for pregnancy, delivery, and socioeconomic variables. It has been recognized that these are significant factors contributing to the multifactor etiology of mental disorder (23,24). An earlier finding by Eaton *et al.* (12) showed that children 14 years or younger who were born preterm and/or with signs of fetal growth impairment were at an increased risk of hospitalization for a range of mental disorders. This could, to some extent, be compared with our results. However, their sub-grouping of gestational age, birth weight, and diagnoses, as well as the adjustments made for possible confounders, differed very much from ours, making a comparison difficult. We were unable to find an increased risk of hospitalization with a diagnosis of *anorexia nervosa* amongst preterm females, as was done by Cnattingius *et al.* (10). These females were; however, born very preterm, and the study included all live-birth females in Sweden during the years 1973 to 1984. Today there is some evidence of an increased psychopathology amongst children born preterm. Still, this study showed only a limited increase in risk for psychiatric hospitalization among the males born preterm, and none among the females born preterm (5,6). Earlier studies have found that SGA (9) and low birth weight or low birth weight combined with preterm birth (8) is associated with an increased risk of hospitalization with a diagnosis of *schizophrenia*. Restricted to males our findings seem to be in accordance with this, however we chose to analyze the sub-diagnostic category of *psychotic disorders*, which beside *schizophrenia* also includes *reactive psychosis* and *paranoid states*.

Modern medical imaging techniques have made it possible to study in detail the morphology of the brain. In this way it has been shown that differences in cerebral white matter are present amongst samples of children and adolescents born preterm with low birth weights (≤ 1500 grams)(25,26). Inder *et al.* (27) have, in addition, shown that a sample of preterm infants (mean birth weight 1040 grams) also differed from their full term peers at term in morphology

of cerebral ventricles and cortical grey matter. The same study also showed that major predictors of altered cerebral volumes were gestational age and white matter injury. In a sample of preterm infants, Tolsa *et al.* (28) showed that those who suffered from intrauterine growth retardation - both at time of birth and at term - had significantly lower cerebral cortical grey volumes compared to those born preterm and appropriate for gestational age. Although there are limitations to the conclusions that can be made from these findings, it remains tempting to make the assumption that among them are to be found plausible explanations for an increased mental morbidity.

Earlier quality control of the MBR has implied that “hard” data like birth weight are relatively reliable. The quality of information on gestational length and birth weight has been found “acceptable” and “good” (29). This is a general conclusion, and it should be understood that the risk of incorrectly entered data increases when handling extreme values as, for example, low birth weights. It should also be understood that diagnoses in the registry are made on a basis of various diagnostic criteria in clinical practice. The same holds true for the HDR which, on the matter of mental disorders, deserves its own discussion when one considers the fact that psychiatric care had the highest number of missing main diagnoses within the HDR in a recent evaluation of the registry (16). In the year 2004 approximately nine percent were missing. During the past ten years the average number has been seven percent. The reasons for this still remain unanswered.

Keeping in mind the numerous studies on increased symptoms of psychiatric disorder amongst children born preterm and/or with sign of fetal growth restriction, one must remember that this study measured hospitalization and not morbidity. If preterm and/or SGA birth is associated with later adverse psychiatric outcome then it can be assumed that we only

measured the most extreme outcome. It could be that this group of individuals is prone to information-bias when it comes to reporting symptoms of psychiatric disorder. Even so, our study shows that the anthropometrical variables of SGA and to a minor extent preterm birth are significantly related to psychiatric hospitalization care. Thus the knowledge that these individuals are prone to psychopathology severe enough to cause increased risk of psychiatric hospitalization in late adolescence and early adulthood could necessitate early recognition and support, and add insight into the etiology of mental illness.

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Study concepts and design: Monfils Gustafsson, Ekholm Selling, Sydsjö

Acquisition of the data: Monfils Gustafsson, Ekholm Selling, Sydsjö

Analysis and interpretation of data: Monfils Gustafsson, Ekholm Selling, Josefsson, Sydsjö

Drafting the manuscript: Monfils Gustafsson, Ekholm Selling, Sydsjö

Critical revision of the manuscript for important intellectual content: Monfils Gustafsson, Ekholm Selling, Josefsson, Sydsjö

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