

Parental alcohol-related disorders and school performance in 16-year-olds—a Swedish national cohort study

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ABSTRACT

Aims To study the links between parental alcohol-related disorders and offspring school performance and, specifically, whether associations vary by gender of parent or child and whether associations are mediated by other adverse psychosocial circumstances commonly appearing together with parental alcohol problems, such as parental mental health problems or criminal behaviour. **Design** Register study in a national cohort. **Setting** Sweden. **Participants** A total of 740 618 individuals born in Sweden in 1990–96. **Measurements** Parental hospital admissions for alcohol-related disorders and school performance in their offspring, in the final year of compulsory school at age 15–16 years was analysed in relation to socio-demographic confounders and psychosocial covariates, using linear and logistic regressions. **Findings** Both mothers' and fathers' alcohol-related hospital admissions were associated with lower Z-scores of grades and national mathematics tests scores. After adjustment for parental education and socio-demographic confounders, beta-coefficients of Z-scores of grades were -0.42 [95% confidence interval (CI) = $-0.45, -0.39$] and -0.42 (95% CI = $-0.43, -0.40$), and beta-coefficients of mathematics tests scores were -0.36 (95% CI = $-0.39, -0.33$) and -0.31 (95% CI = $-0.33, -0.29$), for mothers' and fathers' alcohol-related disorders, respectively. Adjusted odds ratios (ORs) for not being eligible for secondary school were 1.99 (95% CI = 1.84–2.15) and 2.04 (95% CI = 1.95–2.15) for mothers' and fathers' alcohol-related disorders, respectively. Adjusting the analyses for psychosocial factors in the family almost eradicated the statistical effects of parental alcohol-related disorders on offspring school performance to beta-coefficients of 0.03 to -0.10 and ORs of 0.89–1.15. The effect of a mother's alcohol-related hospital admission on school performance was stronger in girls than in boys, whereas no gender differences were seen for a father's alcohol-related hospital admission. **Conclusions** In Sweden, alcohol-related disorders in both mothers and fathers are associated with lower school performance in their children at age 15–16 years, with most of the statistical effects being attributed to psychosocial circumstances of the family, such as parental psychiatric disorders, drug use and criminality and receipt of social or child welfare interventions.

Keywords Parental alcohol-related disorders, psychosocial factors, registry data, school performance, socio-economic factors, Sweden.

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INTRODUCTION

Recent Swedish studies demonstrate that approximately 3–4% of all children under the age of 18 years have experienced a parent's alcohol-related disorder, using information on hospital discharge diagnoses [1] and survey data with questions covering the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders to identify alcohol-

related disorders [2]. British national surveys indicate that 6% of children aged under 16 years live with an adult who is a dependent drinker, using the Severity of Alcohol Dependence Questionnaire to identify alcohol dependence [3]. There is ample evidence of the negative influence of parental alcohol abuse/alcohol dependence on offspring development, health and wellbeing, e.g. with increased risks of adolescent behavioural problems, delinquency, mental

health problems, substance abuse and social maladjustment [4–7]. Parental alcohol abuse and alcohol dependence have also been associated with attention and conduct problems at school and inconsistent attendance and higher school dropout rates [8,9]. Previous studies have shown that, compared to other children, children of parents who abuse alcohol perform less well in school and display worse academic achievements [8–10]. However, previous studies are limited by cross-sectional designs and small sample sizes, and prospective evidence from large national cohorts is lacking.

Previous evidence regarding potential different effects of mother's versus father's alcohol abuse/dependence on offspring school performance is conflicting [8,9]. Heavy alcohol intake during pregnancy may have consequences for offspring school performance through effects on the neurodevelopment of the fetus, with consequences ranging from fetal alcohol syndrome to more subtle intellectual deficiencies and attention and learning problems [11–13]. A previous Danish study [6] also points to the potentially more harmful social effects of maternal alcohol abuse, e.g. with a higher likelihood of abuse and neglect and a higher risk of being placed in residential care. Accordingly, previous findings have indicated that maternal drinking in particular is associated with problems in school [8]. Conversely, in an American context, McGrath *et al.* [9] found no differences in school performance with regard to the gender of the alcohol-abusing parent.

School performance may be influenced negatively by parental drinking through different socio-economic and psychosocial factors. In a Swedish context, alcohol disorders are associated with a lower educational achievement [14], and parental education is a strong determinant of school performance [15,16]. Alcohol abuse also confers increased risks of divorce [17], and there is previous evidence of poorer educational performance in children living with single parents which, to a large extent, seems to be explained by socio-economic differences [18]. Parental alcohol abuse/dependence may affect the quality of the parent–child relationship [19], and the psychosocial home environment may be influenced negatively, e.g. through effects on parenting and a lack of structure and predictability of family routines [20]. Alcohol abuse/dependency is often related to other psychiatric disorders and antisocial behaviour, e.g. criminality and violence [21–23]. Children of parents who abuse alcohol are also at increased risk of abuse and neglect and other adverse childhood experiences, such as witnessing domestic violence [24,25]. Previous studies have shown that adverse childhood experiences are usually co-occurring and that clustering of such experiences is associated with particularly high risks of negative outcomes [7,26,27]. In Scandinavia, parental alcohol abuse is a common reason for a child to be placed in foster or residential care [28]. Placement in out-of-home care may

have a negative impact on school performance and educational achievement [29].

Grades from the final year of primary school are the main selection criteria for further studies at the secondary school level. Thus, school performance is an important predictor of future educational achievement and the individual's own adult socio-economic position [30,31]. Poor school performance has been linked to negative outcomes in adolescence and young adulthood, such as alcohol-related disorders [14] and suicidal behaviour [32,33], and may be an important mechanism in the trajectory between childhood adversity and negative outcomes later in life.

The overall aim was to study the links between parental alcohol-related disorders and offspring school performance in the last year of the Swedish compulsory school at age 15–16 years, using register data from a national cohort. We aimed at answering the following research questions: (a) do associations between parental alcohol-related disorder and offspring school performance vary by gender of parent or child and (b) are the associations mediated by other adverse psychosocial circumstances commonly appearing together with parental alcohol abuse, such as parental mental health problems or criminal behaviour?

METHODS

This study was based on data from Swedish national registers. Record-linkage of different registers is made possible by use of the unique personal identity number assigned to all Swedish residents at birth or time of immigration. Random reference numbers replace the personal identity numbers and all data are analysed anonymously. This study was approved by the Stockholm Region Ethics Committee.

The study population included all children born in Sweden in 1990–96, who were alive and resident in Sweden at age 15 ($n = 740\,618$). These individuals were identified using information from the Medical Birth Register and the Total Population Register, and linked to their biological parents through the Multi-Generation Register.

Parental alcohol-related disorders

The Hospital Discharge Register was used to retrieve information on mothers' and fathers' hospitalizations for alcohol-related disorders. Alcohol-related disorders were defined by at least one hospital admission with an International Classification of Diseases (ICD) diagnosis indicating an alcohol-related disorder, from the date of birth to the 15th birthday of the child. The following diagnoses were used: 'mental and behavioural disorders attributed to the use of alcohol (F10)', 'degeneration of nervous system attributed to alcohol (G31.2)', 'alcoholic polyneuropathy (G62.1)', 'alcoholic myopathy (G72.1)',

'alcoholic cardiomyopathy (I42.6)', 'alcoholic gastritis (K29.2)', 'alcohol liver disease (K70)' and 'alcohol-induced acute and chronic pancreatitis (K85.2 and K86.0)' in ICD-10, and equivalent diagnoses in ICD-9. Alcohol-related medical diagnoses that not necessarily imply long-term alcohol misuse, such as alcohol intoxication leading to medical care, were excluded from the measure.

School performance

Information of school performance in the ninth grade (final compulsory school year in Sweden) at age 15–16 was obtained from the National School Register. School performance was analysed as grade points, scores on national mathematics tests and eligibility for secondary education. Grade points summarize performance during the final compulsory school years (maximum rating 320 points). The mathematics tests score was based on the sum of four national tests in mathematics performed in the ninth grade (maximum test score 75). Having completed primary school with passing grades in core subjects (Swedish, English and mathematics) is required for continued studies in secondary level education programmes.

Covariates

A number of socio-demographic variables, retrieved from the Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA), were included in the analyses: year of birth, gender, parents' country of birth, geographic residency and parents' highest educational level. Geographic residency and parental education was retrieved for the year the child had his/her 16th birthday. Information on whether the child lived with both parents at age 16 was also retrieved from the LISA database.

The importance of socio-economic background was addressed in the analyses through inclusion of parental educational level and a dichotomous indicator of whether or not the childhood household had received social welfare (i.e. if the household had obtained economic assistance of any amount) retrieved from LISA for the year the child had his/her 16th birthday.

As indicators of psychosocial problems in the family that often co-occur with alcohol problems, information on parental mental health problems, illicit drug abuse and criminal behaviour were retrieved separately for mothers and fathers and included in the analyses. Parental psychiatric disorders were defined as at least one recorded case of hospitalization with a main diagnosis indicating a psychiatric disorder not related to substance abuse before the child's 15th birthday, using information from the Hospital Discharge Register. Information from this register was also used to identify parental illicit drug abuse as a hospitalization with illicit drug abuse as a main or contributory

diagnosis at least once before the child's 15th birthday. Information on parental severe criminality (defined as having at least once before the child's 15th birthday been convicted of a severe crime or repeated offending, resulting in a sentence of probation, prison or forensic psychiatric care), was retrieved from the Register of Court Convictions.

A dichotomous indicator of whether the child had ever been placed in societal care (foster family or residential care) by child welfare authorities before his/her 15th birthday using information from the Register of Children and Young Persons Subjected to Child Welfare Measures was also included, regardless of length of time spent in care. These children probably represent serious cases of parental alcohol abuse, often coupled with child neglect or abuse.

Statistical analyses

To calibrate the two measures of school performance, grade points and scores on national mathematics tests, Z-scores were calculated and analysed in linear regression models. Logistic regression models were used to analyse the effect of parental alcohol-related disorders on eligibility for secondary school. Alcohol-related disorders in mothers and fathers, respectively, were included as two independent variables in the models to test for their independent effects (adjusted for the other).

Data were analysed in three different models. Model 1 included year of birth and sex. Model 2 adjusted further for geographic residency, parental country of birth and parental highest educational level; socio-demographic covariates considered to precede the alcohol-related disorder, and thus considered as potential confounders. In model 3 we added dichotomous indicators of psychosocial problems in the family; parental psychiatric disorders, drug use and criminality, whether the child lived with both parents at age 16, placement in societal care before age 15 and social welfare reciprocity, covariates that tended to cluster strongly with alcohol-related disorders in parents (see Table 1) and that may be regarded as potential mediators of the associations.

We calculated Cohen's *d* [34], to estimate the strength of the effect (0.2 is considered small, 0.5 medium and 0.8 large). Finally, we examined moderation effects by gender of the child and parental educational level, where educational level was categorized as high (post-secondary education) and low (primary or secondary education). All analyses were conducted using SAS version 9.4 (SAS Institute, Inc., Cary, NC, USA).

RESULTS

A total of 15 105 children (2.0%) experienced a parent's alcohol-related hospital admission at least once before their

Table 1 Characteristics of the study population according to parents' alcohol-related disorders, birth years 1990–96, $n = 740\ 618$, n (%).

	<i>No parental alcohol-related disorder</i>	<i>Father alcohol-related disorder</i>	<i>Mother alcohol-related disorder</i>	<i>Both parents alcohol-related disorders</i>
Total	725 513 (98.0)	11 254 (1.5)	4264 (0.6)	413 (0.1)
Sex				
Girls	352 819 (48.6)	5480 (48.7)	2051 (48.1)	193 (46.7)
Boys	372 694 (51.4)	5774 (51.3)	2213 (51.9)	220 (53.3)
Geographic residency				
City	300 804 (41.5)	4577 (40.7)	1859 (43.6)	161 (39.0)
Town	305 218 (42.1)	4679 (41.6)	1677 (39.3)	168 (40.7)
Rural	119 491 (16.5)	1998 (17.8)	728 (17.1)	84 (20.3)
Mother's highest education				
Compulsory school	78 323 (10.8)	2331 (20.7)	1476 (34.6)	175 (42.4)
Upper secondary school	373 060 (51.4)	6343 (56.4)	2189 (51.3)	202 (48.9)
University	274 130 (37.8)	2580 (22.9)	599 (11.1)	36 (8.7)
Father's highest education				
Compulsory school	135 111 (18.6)	4597 (40.9)	1387 (32.5)	205 (49.6)
Upper secondary school	380 053 (52.4)	5602 (49.8)	2262 (53.1)	190 (46.0)
University	210 349 (29.0)	1055 (9.4)	615 (14.4)	18 (4.4)
Parental country of birth				
Sweden	601 780 (83.3)	9500 (84.9)	3429 (81.1)	332 (81.2)
Nordic	20 359 (2.8)	591 (5.3)	359 (8.5)	47 (11.5)
European	13 405 (1.9)	72 (0.6)	22 (0.5)	1 (0.2)
Non-European	44 308 (6.1)	281 (2.5)	60 (1.4)	4 (1.0)
Mix	42 984 (6.0)	747 (6.7)	359 (8.5)	25 (6.1)
Psychosocial problems in the family (dichotomous indicators)				
Mother drug abuse	2708 (0.4)	338 (3.0)	978 (22.9)	117 (28.3)
Mother mental health problems	25 710 (3.5)	1050 (9.3)	2276 (53.4)	212 (51.3)
Mother severe criminality	2186 (0.3)	231 (2.1)	455 (10.7)	66 (16.0)
Father drug abuse	3916 (0.5)	2197 (19.5)	243 (5.7)	118 (28.6)
Father mental health problems	18 892 (2.6)	4130 (36.7)	379 (8.9)	133 (32.2)
Father severe criminality	22 118 (3.1)	3199 (28.4)	643 (15.1)	164 (39.7)
Social welfare	31 413 (4.3)	2748 (24.4)	1431 (33.6)	183 (44.3)
Living with single parent at age 16	277 693 (38.3)	9849 (87.5)	3727 (87.4)	395 (95.6)
Societal care before age 16	13 566 (1.9)	1742 (15.5)	1442 (33.8)	290 (70.2)

15th birthday. Alcohol-related hospital admissions were almost three times more common among fathers than among mothers. Alcohol-related hospital admissions were associated with lower parental educational attainment and tended to appear strongly in clusters with psychosocial problems in the family. Families in which one or both parents had been admitted to hospital with an alcohol related-disorder were also far more likely to receive social welfare, and child welfare interventions were much more common in these families (Table 1).

A parent's alcohol-related disorder was associated with lower grades and lower scores on mathematics tests, with larger differences between boys and girls in Z-scores of grade points compared with mathematics test scores (Table 2). There was a clear gradient in school performance related to parent's educational level. The lowest grades, the lowest scores on mathematics tests and the highest proportion of individuals not being eligible

for secondary education were seen in children who had been placed in societal care at some point before age 15. Having received schooling in a special educational facility or having dropped out of school before ninth grade was observed in 18 444 children, 2.5% of the study population. This was the case for 6.9% of children of mothers and 5.3% of children to fathers with an alcohol-related disorder ($P < 0.001$ in comparison with other children).

In the model adjusted for sex and year of birth, maternal as well as paternal alcohol-related hospital admission were associated with lower grades and mathematical test scores, with beta-coefficients of Z-scores of -0.43 to -0.59 (Table 3). Adjusting for parental education and socio-demographic confounders reduced these estimates slightly. Adjusting further for psychosocial factors, clustered with parental alcohol problems, greatly attenuated the effects of having a parent with an alcohol-related

Table 2 School performance in 2006–12, related to parents' alcohol-related disorders and background variables, birth years 1990–96.

	Grade mean points (Z-score)	Mathematics tests score (Z-score)	Ineligible for further secondary education (%)	Dropout or special education (%)
All individuals	211.6 (0)	36.3 (0)	9.7	2.5
Sex				
Girls	223.2 (0.19)	36.4 (0.00)	8.7	2.1
Boys	200.6 (−0.18)	36.2 (−0.01)	10.7	2.8
Parental alcohol-related disorders				
No alcohol-related disorder	212.3 (0.01)	36.5 (0.01)	9.5	2.4
Father alcohol-related disorder	177.8 (−0.56)	29.4 (−0.44)	21.3	5.3
Mother alcohol-related disorder	173.3 (−0.64)	27.8 (−0.53)	23.1	6.9
Both parents	160.9 (−0.84)	24.9 (−0.72)	30.9	9.9
Girls				
No alcohol-related disorder	223.9 (0.20)	36.6 (0.02)	8.4	2.1
Father alcohol-related disorder	188.7 (−0.38)	29.5 (−0.43)	19.8	4.6
Mother alcohol-related disorder	181.5 (−0.50)	27.2 (−0.57)	22.7	6.1
Both parents	169.1 (−0.70)	24.5 (−0.75)	33.1	9.3
Boys				
No alcohol-related disorder	201.3 (−0.17)	36.4 (0.00)	10.5	2.8
Father alcohol-related disorder	167.2 (−0.74)	29.3 (−0.44)	22.8	5.9
Mother alcohol-related disorder	165.6 (−0.77)	29.3 (−0.44)	23.5	7.6
Both parents	153.9 (−0.96)	25.3 (−0.70)	28.9	10.5
Parent's highest education				
Compulsory school	169.6 (−0.69)	26.8 (−0.61)	27.0	7.4
Upper secondary school	194.4 (−0.29)	32.0 (−0.28)	13.5	3.1
University	232.1 (0.34)	41.3 (0.31)	4.5	1.5
Social welfare	159.4 (−0.87)	25.8 (−0.66)	32.0	7.7
Living with single parent at age 16	195.1 (−0.28)	33.0 (−0.21)	14.5	3.5
Societal care before age 16	149.6 (−1.03)	25.5 (−0.68)	35.8	14.9

Table 3 Beta-coefficients of Z-scores of grade points and mathematics tests scores by parental alcohol-related disorders.

	Model 1	Model 2	Model 3
Beta-coefficients of Z-scores of grades			
Mother no alcohol-related disorder	0	0	0
Mother alcohol-related disorder	−0.59 (−0.63, −0.56)	−0.42 (−0.45, −0.39)	0.03 (−0.00, 0.05)
Father no alcohol-related disorder	0	0	0
Father alcohol-related disorder	−0.56 (−0.58, −0.54)	−0.42 (−0.43, −0.40)	−0.10 (−0.12, −0.08)
r ²	0.0418	0.1570	0.2053
Beta-coefficients of Z-scores of mathematics tests			
Mother no alcohol-related disorder	0	0	0
Mother alcohol-related disorder	−0.50 (−0.54, −0.47)	−0.36 (−0.39, −0.33)	−0.08 (−0.11, −0.05)
Father no alcohol-related disorder	0	0	0
Father alcohol-related disorder	−0.43 (−0.45, −0.41)	−0.31 (−0.33, −0.29)	−0.10 (−0.12, −0.08)
r ²	0.0040	0.1078	0.1292

Estimates are presented as beta coefficients (with upper and lower 95% confidence intervals in parenthesis). Model 1 is adjusted for birth year and gender. Model 2 is adjusted also for geographic residency, parental country of birth, and parental highest education. Model 3 is adjusted also for social welfare benefits, parental separation, placement in societal care, parental psychiatric disorder, drug abuse and criminality.

hospital admission, on both grades and mathematical test scores, to effects of 0.03 to −0.10. Interaction analyses indicated that in relation to a father's hospital admission for an alcohol-related disorder there was no significant effect modification of gender on the beta-coefficients in model 2

($P > 0.05$). However, the effect of a mother's hospital admission was stronger in girls compared with boys, for both grades (Z-score −0.48 in girls and −0.37 in boys, $P < 0.001$) and mathematics test scores (Z-score −0.41 in girls and −0.31 in boys, $P = 0.003$).

Odds ratios (ORs) for not being eligible for further secondary education, in relation to parental hospital admissions for alcohol-related disorders, are given in Table 4. Adjustment for confounding from parental education and socio-demographic variables reduced the associations slightly, and further adjustment for psychosocial factors eradicated all the statistical effects of maternal alcohol-related disorders and greatly attenuated the effect of paternal alcohol-related disorders. OR in relation to maternal alcohol-related hospital admissions, after adjustment for parental education and sociodemographic confounders, was higher in girls [OR = 2.24, 95% confidence interval (CI) = 2.00–2.50] than in boys (OR = 1.80, 95% CI = 1.61–2.00, $P = 0.006$), whereas no gender differences were seen in relation to paternal alcohol-related hospital admissions ($P > 0.05$).

Having experienced alcohol-related hospital admissions in two parents, compared with one parent, was associated with a significantly higher risk of lower grades and mathematics test scores ($P < 0.001$). Z-scores of grade points and mathematics test scores were -0.53 (-0.63 , -0.43) and -0.48 (-0.58 , -0.37), respectively, and OR for not being eligible for further secondary education was 2.70 (2.14–3.41) in analyses adjusted for parental education and socio-demographic confounders, and the effect was eradicated in further adjusted models.

Interaction analyses indicated no effect modification of parental educational level on the beta-coefficients of overall grades ($P > 0.05$). However, the impact of parental alcohol-related disorders on mathematical tests scores and eligibility for secondary education was stronger among children with highly educated parents.

DISCUSSION

In this national cohort study of 740 000 Swedish 15–16-year-olds, we used register data to investigate links between parental alcohol-related hospital admissions and school performance in the last year of compulsory school (ninth grade). Approximately 20% of children who had a

parent who had been admitted to hospital with an alcohol-related disorder failed to obtain eligibility to secondary education, a two- to threefold increase in relation to other children, and one in five of those were either in special education or had dropped out of school before ninth grade.

Two main pathways for the effect of parental alcohol problems on school performance can be hypothesized. The first is a biological pathway through fetal exposure to alcohol before birth and genetic factors associated with alcohol problems, such as a lower than average cognitive competence [14], while the second pathway is through other adverse psychosocial factors commonly appearing together with parental alcohol problems. Some are probably psychosocial consequences of the parental alcohol problems, and even though our study was not designed to entangle the causality among these clustered psychosocial factors, the analyses underline the importance of the psychosocial pathway. A high percentage of the families with parental alcohol-related morbidity received social welfare, most parents had separated before the child's 16th birthday and a large proportion of the fathers in these families had committed a major crime. Adjusting for psychosocial factors clustered with alcohol problems in the regression analyses more or less obliterated the effects of parental alcohol-related morbidity. In a similar vein, McGrath [9] found that life stress events mediated the relation between parental alcohol dependence and school performance in American adolescents.

Overall, only minor differences were seen with regard to the impact of fathers' and mother's alcohol-related disorders on the child's school performance. However, a mother's hospital admissions for alcohol-related disorders was associated with lower grades and a higher risk of not being eligible for secondary education in girls compared to boys, whereas no gender differences was seen with regard to fathers' alcohol-related hospital admissions. There are few previous studies on parental gender effects and potential interactions, and previous findings are inconclusive. There are, however, some previous reports of a greater risk for adult psychopathology in female children of alcohol-dependent women [35].

Table 4 Parental alcohol-related disorders and odds ratios (OR) of ineligibility for secondary education.

	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Mother no alcohol-related disorder	1	1	1
Mother alcohol-related disorder	2.59 (2.40–2.79)	1.99 (1.84–2.15)	0.89 (0.81–0.96)
Father no alcohol-related disorder	1	1	1
Father alcohol-related disorder	2.50 (2.38–2.62)	2.04 (1.95–2.15)	1.15 (1.09–1.22)
r^2	0.0078	0.0801	0.1212

Model 1 is adjusted for birth year and gender. Model 2 is adjusted also for geographic residency, parental country of birth, and parental highest education. Model 3 is adjusted also for social welfare benefits, parental separation, placement in societal care, parental psychiatric disorders, drug abuse and criminality. CI = confidence interval.

Having experienced societal care before age 15 was much more common among children of parents that had been admitted to hospital with an alcohol-related disorder, particularly if the parent was a mother. These children had by far the lowest grades and test scores (cp. [29]).

The impact of parental alcohol problems on school performance in boys was more pronounced on grades than on mathematics test scores when the scales had been equalized as Z-scores. This seems to indicate that the school problems of these children are not purely learning problems, as their mathematical skills are better than the grades they obtained. One factor that could be relevant here is the elevated risk for attention and conduct disorder found in children of parents with alcohol problems in previous studies [8,36]. However, the register design of this study did not allow for identification of these disorders.

The effect sizes of the adjusted estimates of Z-scores of grade points were moderate, according to the suggested interpretation by Cohen [34]. None the less, the effect on the life trajectory in the individual child of not obtaining eligibility for secondary education can be substantial. In Sweden, grades from the final year of primary school are the main selection criteria for further studies at the upper secondary school level, thus determining future chances for university education and employment. For the individual teenager even small differences in merit score can be a decisive factor when applying for further studies. Thus, school performance in the ninth grade can be seen as a strong indication of the individual's own future socio-economic position in the Scandinavian society. For very low school achievers this also includes substantial risks of being excluded from the labour market [30,31].

Methodological considerations

The strengths of this study include the use of information from Swedish national registers, with high-quality data on exposure, outcome and multiple potentially confounding factors in the family environment, with a very low or non-existent attrition rate. Record-linkage of these register provides an excellent opportunity to perform research using a longitudinal design and large sample sizes.

The Hospital Discharge Register covers all publicly provided inpatient care with complete national coverage and more than 99% of all somatic and psychiatric hospital discharges are registered. A previous validation of the register shows that 85–95% of all diagnoses are valid [37]. The use of hospital admissions as indicator of parental alcohol problems is, however, also our main limitation, as effects of parental alcohol problems that are not severe enough to cause a hospital admission could not be investigated, nor could we compare the effect of different levels of alcohol problems. Furthermore, the design and data available do not allow us to draw conclusions about the impact

of alcohol problems *per se*, but rather about the impact of alcohol problems together with clustered psychosocial circumstances.

Our study population consists of children born in Sweden during 1990–96, with follow-up during 2006–12. The Swedish school system today is very similar to that during 2006–12, so we have no reason to believe that having access to more recent data would have changed the conclusions of this study. This is emphasized further by a recent report from the Swedish National Agency for Education, which shows that family background continues to be an important factor for school performance in the Swedish primary school [15].

In a Swedish study of children diagnosed with fetal alcohol syndrome, 25% were found to have been schooled in a special needs setting [38]. In our study it was not possible to identify children with fetal alcohol syndrome. However, the much lower rate of dropout/special education found in the children exposed to parental alcohol problems in our study compared with the study by Rangmar and associates [32] suggests that fetal alcohol syndrome was rare among the children exposed to parental alcohol problems in this study.

Implications

This study demonstrates that parental alcohol-related disorders are associated with a lower than average school performance of their offspring. The finding that most of this effect is mediated by psychosocial familial factors clustered with parental alcohol problems is hopeful in a preventive perspective, and underlines the importance of support for children living under adverse psychosocial conditions appearing commonly together with parental alcohol problems. Reasonably good school performance is an important protective factor for the future of a child raised in an adverse environment [30,39]. Several interventions have substantial potential to improve school performance of children from disadvantaged family backgrounds, e.g. tutoring programmes [40]. These programmes may well be effective also for children from homes with parental addiction problems, and are worth testing in intervention trials targeting this group specifically.

CONCLUSION

This study, in a national cohort of Swedish 15–16-year-olds, demonstrates that maternal as well as paternal alcohol-related hospital admissions were associated with lower school performance. Most of the lower school performance was associated with indications of psychosocial adversity clustered with parental alcohol problems. Evidence-based educational support should be included in intervention programmes targeting offspring of parents with alcohol problems.

Declaration of interests

None.

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