



HAL
open science

Peer status in school and adult disease risk: A 30-year follow-up study of disease-specific morbidity in a Stockholm cohort

Ylva Almquist

► **To cite this version:**

Ylva Almquist. Peer status in school and adult disease risk: A 30-year follow-up study of disease-specific morbidity in a Stockholm cohort. *Journal of Epidemiology and Community Health*, 2009, 63 (12), pp.1028-n/a. 10.1136/jech.2009.088377 . hal-00484149

HAL Id: hal-00484149

<https://hal.science/hal-00484149>

Submitted on 18 May 2010

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Word count (excl. tables and references): 3,144

**Peer status in school and adult disease risk:
A 30-year follow-up study of disease-specific morbidity
in a Stockholm cohort**

Ylva Almquist¹

¹ Centre for Health Equity Studies (CHESS)
Stockholm University/Karolinska Institutet
SE-106 91 Stockholm, Sweden

Corresponding author: Ylva Almquist
Phone: +46 (0)8 6747969
Fax: +46 (0)8 162600
E-mail: ylva.almquist@chess.su.se

ABSTRACT

Background: Children have a social status position of their own, apart from that of the family, that may have an impact on short-term and long-term health. The aim of the present study was to analyse the associations between childhood social status in school, i.e. peer status, and disease-specific morbidity in adulthood.

Methods: Data was derived from a longitudinal study using a 1953 cohort born in Stockholm, Sweden: The Stockholm Birth Cohort Study (1953-2003). Peer status was sociometrically assessed in 6th grade (1966). Hazard ratios for adult disease-specific morbidity based on information on in-patient care (1973-2003) were calculated by peer status category for men and women separately, using Cox regression.

Results: The results indicate that the lower the childhood peer status, the higher the overall adult disease risk. There were however differences in the degree and magnitude to which disease-specific in-patient care varied with peer status. Some of the steepest gradients were found for mental and behavioural disorders (e.g. alcohol abuse and drug dependence), external causes (e.g. suicide) and various lifestyle-related diseases (e.g. ischaemic heart disease and diabetes). The results were not explained by childhood social class.

Conclusion: The present study underscores the importance of recognizing children's social position, apart from that of their family, for later health. Not only psychologically related diseases but also those related to behavioural risk factors demonstrate some of the largest relative differences by peer status, suggesting that health-related behaviour may be one important mechanism in the association between peer status and morbidity.

Key words: Peer status, birth cohort, longitudinal, disease-specific, in-patient care

INTRODUCTION

The relationship between social position and health is well-established; it indicates that people in higher positions have better health and live longer than those in lower positions.^[1] While most studies tend to focus on one phase in life, some researchers have emphasised the contribution of socially-patterned exposures across the life course to health inequalities, thus stressing the need to adopt a life-course perspective on inequalities in health.^[2-7] This approach has commonly been used in studies which examine the relevance of social position in childhood for children's current and future health.^[8-12] Childhood social position is in most cases indicated by parents' occupational class, income or education. It has, nevertheless, been argued that children may have a social position of their own, **apart from that of the family**, that may have an impact on short-term and long-term health.^[13] Here, school is an important context, where children spend most of their waking hours, interacting with peers on a daily basis. In the school class, a hierarchical structure of social relations emerges, in which different positions represent varying degrees of 'peer status'. The notion of peer status **refers to the degree of which the individual is an accepted, integrated and respected member of the group.**^[13, 14] It also includes the recognition among peers of achieved prestige, visibility and reputation.^[15] Peer status is thus not only viewed as the degree of liking by peers, but also as a construct based on power and status in the group.^[16, 17] While associations between childhood peer status and a number of health outcomes in childhood have been found,^[14, 18, 19] less is known about the influence of peer status on adult health.^[13] It is, however, reasonable to suppose that peer status may have an impact on long-term health, possibly mediated through resources (e.g. emotional, material, and social), self-image, aspirations and expectations, as well as subsequent life choices (e.g. healthy versus non-healthy lifestyles). Thus, while the relationship between peer status and health may be interpreted as process of mutual influence that evolves over time,^[20] there are good reasons to focus the influence of peer status on health. The health outcomes studied in relation to peer status hitherto have primarily concerned psychological health **or self-reported health outcomes**. The present study seeks to investigate the associations between childhood peer status and disease-specific types of morbidity in adulthood, **using hospital discharge data**. It will also examine whether these associations remain when **parental social class** is taken into account.

METHODS

The data material used is the Stockholm Birth Cohort Study, created in 2004/2005 by a probability matching of two longitudinal studies: The Stockholm Metropolitan Study (SMS)

and The Swedish Work and Mortality Data Base (WMD).^[21] The Metropolitan cohort comprised all children born in 1953 and living in the greater Stockholm metropolitan area in 1963 (n=15,117). The SMS-data covers the period 1953-1986, while the follow-up data from the WMD covers the period 1981-2003. Approximately 96 % (n=14,294) of the SMS cohort was matched successfully. Ethical permission was obtained from the Stockholm Regional Ethics Committee.

Peer status was measured in 6th grade, when the children were 12-13 years of age (1966). It was established by the question: “Whom in this class do you best like to work with at school?” This question includes dimensions of school performance as well as of friendship, likeability and social inclusion. For example, Stütz finds a high positive correlation between children’s nominations of work partners and their nominations of best friends.^[22] All pupils were instructed to nominate three classmates in no particular order. School classes with less than 10 pupils were excluded from the analyses. The nominations were categorised into five status groups: marginalized (0 nominations), peripheral (1 nomination), accepted (2-3 nominations), popular (4-6 nominations), and favourite (7 or more nominations).^[14] This categorisation follows the recommendations that have been made for sociometric information based on three positive nominations, with the mean value as guideline.^[22] (For a further description, see ^[13, 14]) Because the status distribution does not vary systematically between school classes of different size, it is assumed that the categorisation of peer status reflects a child’s relative standing in the school class irrespective of class size.^[14]

Parental social class was included as a control variable. This information was derived from the 1963 Population Register and, in most cases, refers to the male head of the family.^[23] The categories were: upper and upper middle class; entrepreneurs; officials and non-agricultural employees; skilled workers; unskilled workers and others (e.g. homemakers, pensioners and students).

Information on overall morbidity (i.e. any event leading to in-patient care) was derived from the Swedish Hospital Discharge Register, covering the years 1973-2003. This register contains data about in-patient care, based on all discharges from Swedish hospitals (overnight patients). The diagnoses contained in these records are primarily based on the judgement of the doctor^[24] and classified using the 8th Revision (1973-1986), the 9th Revision (1987-1996) and the 10th Revision (1997-2003) of the International Classification of Diseases (ICD). In

the present study, underlying diagnoses were grouped according to the European Shortlist for Causes of Death as established by Eurostat (see Spijker^[25] for a further description). The shortlist was chosen not only to facilitate a meaningful grouping of diseases, but also to enable comparisons with similar previous studies (e.g. Erikson and Torssander's work on social class and cause-specific mortality^[26]). Since it focuses on causes of death, however, some important morbidity outcomes with low mortality (such as depression) are not identified. The shortlist is largely based on the ICD-chapters (although somewhat more compressed) and includes 65 hierarchically arranged groups, of which 17 constitute first-level groups and the rest second-level groups.^[27] **In-patient care** due to complications of pregnancy, childbirth and puerperium were not included in the present study. Furthermore, **in-patient care** due to certain conditions originating in the perinatal period, and for congenital malformations and chromosomal abnormalities, were excluded since they precede the establishment of peer status. For the analysis, individuals were first categorised into a dichotomous variable indicating overall **in-patient care** (i.e. the presence or the absence of a hospital discharge between 1973 and 2003, regardless of diagnosis). They were **then** categorised as discharged or not for all disease-specific groups respectively. Consequently, any given individual may appear in multiple groups. Although this must be kept in mind when interpreting the results, if only **the very first event** had been included (in line with previous studies **analysing** multiple years of hospital data^[24, 28]), this would firstly have disqualified diseases with a later onset and, secondly, resulted in several disease-groups not being large enough to **analyse**.

The study population was defined as those with full data for all included variables who attended a school class with at least 10 children, leaving 12,504 individuals eligible for analysis. The procedure of **analysing** the associations between peer status and cause-specific **in-patient care** was the following: first, associations between peer status and **in-patient care** were **analysed** using Cox's proportional hazards regression models, producing hazard ratios with the highest peer status group ('favourite') as the reference category. Subjects entered the study on 1973-01-01 and were censored **when dying due to any disease, on the date of first discharge (for each disease-specific group separately) or at the end of follow-up (2003-12-31)**. In both cases, only information on year is available; month of discharge or death is therefore set at the last day of June in the appropriate year. **The issue of tied failures times has been handled by controlling the results through the exactm command in Stata; an exact marginal-likelihood method that is appropriate when tied failures are numerous**. In a second step, a summary measure of the size of the peer status differences was constructed, using a procedure

adopted from Erikson and Torssander.^[26] Slopes were calculated by means of OLS regressions of the logged parameter values of the five categories of peer status. These slopes were produced for each first-level, as well as for those second-level disease-specific groups which contained at least 30 discharges. The significance of the slopes (5 % level) is based on Kendall's rank order tests of the assumption of a monotonous increase in the hazard ratios from the highest peer status category to the lowest, as opposed to an assumption of no association. Finally, for comparative purposes, additional analyses of peer status and morbidity were conducted. Here, beta coefficients from Cox regressions, with peer status included as a continuous measure (i.e. number of nominations, ranging from 0-22), were calculated.

RESULTS

The hazard ratios for peer status and overall **in-patient care** (Table 1) demonstrate a clear gradient for men and women alike. This suggests that the lower the peer status, the higher the **risk of overall in-patient care** in adulthood. These associations remain when childhood social class is adjusted for. The slope is estimated at 0.0935 for men and 0.0928 for women, with a marginal decrease when **parental** social class is added to the analyses.

Table 1. The distribution of men (n=6,195) and women (n=6,309) in different peer status positions. Hazard ratios (HR) from Cox regression for overall **in-patient care** (1973-2003) by peer status (1966). **Statistically significant hazard ratios (95 % CI) in boldface. Slopes in boldface are significant (95 % CI) according to rank correlation tests.**

Peer status	Men			Women		
	Frequency (%)	Crude HR (95 % CI)	Adjusted* HR (95 % CI)	Frequency (%)	Crude HR (95 % CI)	Adjusted* HR (95 % CI)
Marginalized	813 (13.1)	1.47 (1.25-1.74)	1.41 (1.19-1.66)	607 (9.7)	1.41 (1.19-1.67)	1.37 (1.16-1.62)
Peripheral	1205 (19.5)	1.33 (1.13-1.56)	1.28 (1.09-1.50)	1346 (21.3)	1.34 (1.15-1.56)	1.31 (1.13-1.53)
Accepted	2198 (35.5)	1.28 (1.10-1.49)	1.24 (1.07-1.44)	2470 (39.2)	1.14 (0.99-1.32)	1.12 (0.97-1.30)
Popular	1547 (25.0)	1.13 (0.97-1.32)	1.11 (0.95-1.29)	1542 (24.4)	1.05 (0.90-1.23)	1.05 (0.90-1.23)
Favourite (ref.)	432 (7.0)	1.00	1.00	344 (5.5)	1.00	1.00
Total	6195 (100.0)			6309 (100.0)		
Slope		0.0935	0.0830		0.0928	0.0851

* Adjusted for **parental** social class.

Table 2 (men) and Table 3 (women) present hazard ratios from Cox regressions for the disease-specific groups, sorted according to slope size. First-level and second-level disease groups are shown separately. Based on the results of the rank order tests, it is shown that linearity can be assumed, with only a few exceptions, for the relationship between peer status and the various disease-specific groups.

Table 2. Hazard ratios (HR) from Cox regression of **overall** and disease-specific **in-patient care** (1973-2003) by peer status (1966) for men born in 1953 (n=6,195). Both first-level and second-level groups (with at least 30 discharges) are shown. Hazard ratios significantly different from those for the favourite group (reference group, HR=1.00) in boldface. Slopes in boldface are significant at the 5 % level according to rank correlation tests.

Disease-specific group (Eurostat number)	No. of cases (i.e. discharges)	Popular	Accepted	Peripheral	Marginalized	Slope	B. Coeff.
<i>First-level groups</i>							
Diseases of the blood(-forming organs) immunological disorders (25)	36	0.35 (0.09-1.29)	0.44 (0.13-1.43)	1.25 (0.41-3.81)	0.53 (0.13-2.11)	-0.04	0.12
Diseases of the circulatory system (33)	249	0.79 (0.46-1.33)	0.86 (0.52-1.41)	0.92 (0.54-1.56)	1.20 (0.69-2.06)	0.04	0.05
Diseases of the digestive system (42)	820	1.13 (0.82-1.55)	1.28 (0.94-1.73)	1.21 (0.87-1.67)	1.26 (0.90-1.77)	0.06	0.04
Diseases of the skin and subcutaneous tissue (45)	174	0.86 (0.43-1.69)	1.20 (0.63-2.26)	1.07 (0.54-2.12)	1.40 (0.69-2.79)	0.09	0.07
External causes of injury and poisoning (58)	1075	1.08 (0.81-1.42)	1.19 (0.91-1.55)	1.33 (1.01-1.76)	1.53 (1.14-2.04)	0.10	0.06
Diseases of the genitourinary system (48)	212	1.17 (0.62-2.18)	1.15 (0.62-2.11)	1.29 (0.67-2.43)	1.65 (0.85-3.16)	0.11	0.07
Diseases of the respiratory system (37)	520	1.15 (0.75-1.74)	1.41 (0.94-2.10)	1.40 (0.91-2.13)	1.77 (1.15-2.72)	0.14	0.08
Symptoms, signs, abnormal findings, ill-def. causes (55)	821	1.24 (0.88-1.74)	1.39 (1.01-1.93)	1.63 (1.16-2.29)	1.83 (1.29-2.60)	0.15	0.08
Infectious and parasitic diseases (1)	372	1.51 (0.88-2.58)	1.53 (0.90-2.57)	1.96 (1.15-3.34)	2.06 (1.18-3.56)	0.17	0.09
Diseases of the musculoskeletal system/connective tissue (46)	523	1.46 (0.92-2.30)	1.70 (1.09-2.63)	1.98 (1.25-3.11)	1.98 (1.23-3.17)	0.17	0.08
Neoplasms (6)	178	1.52 (0.67-3.39)	1.64 (0.74-3.58)	2.43 (1.09-5.36)	2.14 (0.93-4.90)	0.20	0.12
Diseases of the nervous system and the sense organs (31)	270	1.57 (0.80-3.08)	1.99 (1.03-3.80)	2.25 (1.15-4.38)	2.26 (1.13-4.50)	0.20	0.11
Mental and behavioural disorders (28)	559	1.28 (0.82-1.99)	1.58 (1.02-2.40)	2.23 (1.44-3.43)	2.17 (1.38-3.39)	0.20	0.12
Endocrine, nutritional and metabolic diseases (26)	131	2.39 (1.04-10.9)	2.37 (0.72-7.68)	3.86 (1.18-12.6)	4.30 (1.19-14.2)	0.31	0.12
<i>Second-level groups</i>							
Transport accidents (60)	521	0.74 (0.52-1.04)	0.53 (0.54-1.04)	0.79 (0.55-1.12)	1.00 (0.69-1.43)	0.00	0.02
Other heart diseases (35)	124	0.94 (0.42-2.06)	1.20 (0.56-2.53)	1.07 (0.48-2.38)	1.06 (0.45-2.47)	0.03	0.03
Diseases of kidney and ureter (49)	106	0.66 (0.28-1.51)	0.88 (0.41-1.90)	1.16 (0.52-2.56)	1.13 (0.48-2.61)	0.07	0.09
Accidents (59)	993	1.01 (0.75-1.33)	1.14 (0.86-1.49)	1.29 (0.96-1.71)	1.42 (1.05-1.90)	0.09	0.06
Cerebrovascular diseases (36)	74	0.98 (0.32-2.96)	1.38 (0.48-3.92)	1.35 (0.44-4.06)	1.73 (0.56-5.30)	0.14	0.09
Events of undetermined intent (65)	185	0.78 (0.37-1.60)	1.56 (0.80-3.01)	1.29 (0.64-2.60)	1.71 (0.84-3.48)	0.16	0.09
Alcohol abuse (including alcoholic psychosis) (29)	222	1.18 (0.59-2.34)	1.50 (0.77-2.90)	1.92 (0.97-3.77)	2.21 (1.10-4.41)	0.20	0.14
Pneumonia (39)	109	0.70 (0.27-1.79)	1.45 (0.61-3.39)	1.14 (0.45-2.85)	2.24 (0.91-5.45)	0.21	0.14
Malignant neoplasms (7)	105	1.40 (0.47-4.09)	1.58 (0.55-4.45)	2.88 (1.01-8.15)	2.27 (0.76-6.74)	0.23	0.14
Drug dependence, toxicomania (30)	185	1.17 (0.47-2.84)	2.01 (0.87-4.65)	3.47 (1.49-8.04)	3.24 (1.36-7.70)	0.24	0.23
Diabetes mellitus (27)	76	2.67 (0.62-11.4)	2.46 (0.58-10.3)	3.24 (0.75-13.9)	3.20 (0.71-14.3)	0.26	0.11
Suicide and intentional self-harm (63)	99	3.51 (0.83-14.8)	3.56 (0.85-14.7)	3.79 (0.88-16.1)	4.01 (0.91-17.5)	0.30	0.20
Accidental poisoning (62)	132	2.94 (0.68-12.5)	4.96 (1.20-20.3)	7.09 (1.71-29.3)	5.36 (1.25-22.9)	0.44	0.23
Ischaemic heart diseases (34)	84	5.90 (0.79-43.8)	7.73 (0.78-42.8)	5.76 (0.76-43.4)	9.10 (1.21-68.4)	0.46	0.15
Overall in-patient care	3311	1.13 (0.97-1.32)	1.28 (1.10-1.49)	1.33 (1.13-1.56)	1.47 (1.25-1.74)	0.0935	0.0487

Table 3. Hazard ratios (HR) from Cox regression of **overall** and disease-specific **in-patient care** (1973-2003) by peer status (1966) for women born in 1953 (n=6,309). Both first-level and second-level groups (with at least 30 discharges) are shown. Hazard ratios significantly different from those for the favourite group (reference group, HR=1.00) in boldface. Slopes in boldface are significant at the 5 % level according to rank correlation tests.

Disease-specific group (Eurostat number)	No. of cases (i.e. discharges)	Popular	Accepted	Peripheral	Marginalized	Slope	B. Coeff.
<i>First-level groups</i>							
Diseases of the blood(-forming organs) immunological disorders (25)	64	0.50 (0.15-1.63)	1.05 (0.36-2.97)	0.96 (0.31-2.89)	0.85 (0.24-3.02)	0.04	0.06
Infectious and parasitic diseases (1)	449	0.76 (0.48-1.17)	0.97 (0.64-1.46)	0.99 (0.64-1.53)	1.12 (0.69-1.79)	0.05	0.05
Neoplasms (6)	876	0.77 (0.56-1.04)	0.89 (0.66-1.19)	1.00 (0.73-1.35)	1.04 (0.74-1.45)	0.05	0.04
Diseases of the genitourinary system (48)	1472	0.88 (0.68-1.13)	1.09 (0.85-1.38)	1.16 (0.90-1.49)	1.25 (0.95-1.63)	0.07	0.05
Diseases of the circulatory system (33)	225	0.93 (0.47-1.78)	1.17 (0.62-2.19)	1.09 (0.56-2.10)	1.45 (0.71-2.90)	0.08	0.08
External causes of injury and poisoning (58)	702	0.91 (0.62-1.33)	1.00 (0.69-1.43)	1.15 (0.78-1.67)	1.42 (0.95-2.13)	0.09	0.06
Diseases of the nervous system and the sense organs (31)	285	0.84 (0.46-1.51)	1.21 (0.69-2.10)	1.13 (0.63-2.02)	1.43 (0.76-2.65)	0.09	0.09
Diseases of the respiratory system (37)	519	1.09 (0.68-1.71)	1.25 (0.80-1.94)	1.68 (1.07-2.63)	1.35 (0.82-2.22)	0.10	0.07
Diseases of the digestive system (42)	861	1.56 (1.05-2.30)	1.65 (1.12-2.40)	1.87 (1.26-2.75)	1.96 (1.29-2.97)	0.13	0.08
Endocrine, nutritional and metabolic diseases (26)	200	1.07 (0.54-2.13)	0.94 (0.42-1.63)	1.32 (0.66-2.59)	1.79 (0.87-3.65)	0.13	0.09
Symptoms, signs, abnormal findings, ill-def. causes (55)	1070	1.03 (0.74-1.40)	1.21 (0.89-1.63)	1.47 (1.07-2.00)	1.87 (1.34-2.60)	0.15	0.10
Diseases of the musculoskeletal system/connective tissue (46)	163	0.94 (0.58-1.53)	1.22 (0.76-1.94)	1.54 (0.95-2.47)	1.83 (1.10-3.02)	0.15	0.11
Mental and behavioural disorders (28)	483	1.14 (0.76-2.08)	1.36 (0.83-2.20)	1.84 (1.12-3.00)	2.05 (1.21-3.45)	0.16	0.11
Diseases of the skin and subcutaneous tissue (45)	163	1.34 (0.51-3.45)	1.79 (0.71-4.43)	2.31 (0.91-5.82)	2.16 (0.80-5.78)	0.18	0.11
<i>Second-level groups</i>							
Transport accidents (60)	268	0.66 (0.39-1.11)	0.75 (0.45-1.22)	0.76 (0.45-1.27)	0.95 (0.53-1.67)	0.01	0.03
Malignant neoplasms (7)	283	0.66 (0.39-1.08)	0.77 (0.47-1.23)	0.77 (0.46-1.27)	0.97 (0.55-1.68)	0.02	0.03
Pneumonia (39)	117	0.70 (0.29-1.63)	0.85 (0.38-1.89)	1.31 (0.58-2.95)	0.72 (0.26-1.94)	0.02	0.03
Accidents (59)	542	0.79 (0.52-1.17)	0.92 (0.63-1.34)	1.03 (0.69-1.53)	1.25 (0.81-1.91)	0.07	0.06
Diseases of kidney and ureter (49)	153	0.93 (0.40-2.12)	1.32 (0.60-2.88)	1.14 (0.50-2.58)	1.64 (0.69-3.86)	0.10	0.07
Alcohol abuse (including alcoholic psychosis) (29)	117	0.78 (0.31-1.93)	0.95 (0.40-2.24)	1.63 (0.68-3.85)	1.04 (0.38-2.82)	0.12	0.10
Drug dependence, toxicomania (30)	117	0.63 (0.24-1.59)	1.07 (0.45-2.50)	1.23 (0.51-2.97)	1.81 (0.72-4.52)	0.17	0.14
Cerebrovascular diseases (36)	44	2.01 (0.25-15.8)	2.65 (0.35-19.7)	2.56 (0.32-19.9)	2.84 (0.33-24.2)	0.18	0.08
Diabetes mellitus (27)	57	1.68 (0.38-7.33)	1.19 (0.27-5.13)	1.54 (0.34-6.86)	3.15 (0.69-14.1)	0.18	0.09
Suicide and intentional self-harm (63)	68	0.44 (0.11-1.77)	1.53 (0.47-5.00)	1.53 (0.45-5.20)	1.51 (0.40-5.70)	0.19	0.15
Other heart diseases (35)	57	0.89 (1.18-4.19)	1.81 (0.43-7.64)	1.15 (0.24-5.32)	3.43 (0.76-15.3)	0.22	0.17
Accidental poisoning (62)	117	1.28 (0.44-3.70)	1.25 (0.44-3.51)	2.31 (0.82-6.49)	2.56 (0.86-7.56)	0.23	0.15
Events of undetermined intent (65)	68	3.12 (0.41-23.7)	3.91 (0.53-28.7)	3.84 (0.50-29.1)	5.70 (0.72-44.5)	0.29	0.10
Ischaemic heart diseases (34)	35	1.11 (0.13-9.55)	1.95 (0.25-14.8)	2.04 (0.25-16.3)	3.99 (0.49-32.4)	0.29	0.25
Overall in-patient care	3944	1.05 (0.90-1.23)	1.14 (0.99-1.32)	1.34 (1.15-1.56)	1.41 (1.19-1.67)	0.0928	0.0496

Large differences by peer status are found in mental and behavioural disorders, and in the second-level groups alcohol abuse and drug dependence. For example, drug dependence demonstrates a very steep slope, both for men (0.24) and women (0.17). Second-level groups related to external causes of injury and poisoning, such as suicide and intentional self-harm, accidental poisoning and events of undetermined intent, also demonstrate steep gradients. For example, the slope for accidental poisoning is 0.44 for men and 0.23 for women.

Another finding concerns diseases of the circulatory system. Although there is no evident slope of this first-level group, the second-level groups ischaemic heart disease (IHD) and cerebrovascular diseases for men and women, as well as other heart diseases for women, show some of the steepest gradients of all the included disease-specific groups. For example, the slope for IHD is 0.46 for men and 0.29 for women. Slopes related to endocrine, nutritional and metabolic diseases are also very steep. For instance, the slope for diabetes is 0.26 for men and 0.18 for women.

Most of the remaining first-level groups demonstrate slopes in the range between 0.10 and 0.20. Some gender differences can be noted: for women, there is no observable slope for neoplasms (0.05) (which is not surprising, since breast cancer is more common among more highly-educated women^[29]), while the opposite result is found for men (0.20). This pattern can also be observed for infectious and parasitic diseases and diseases of the genitourinary system. For diseases of the digestive system, however, the slope is fairly steep for women (0.13) but not for men (0.06). The same pattern is found for diseases of the skin and subcutaneous tissue. Finally, diseases of the blood(-forming) organs and immunological disorders demonstrate little evidence of slopes for men and women alike.

Beta coefficients from Cox regressions, with peer status included as a continuous measure, are presented in the last column of Table 2 (men) and Table 3 (women). Although these coefficients are based on a different scale than the slopes, the results are very similar (with only some exceptions) to the slopes based on the categorised peer status measure.

DISCUSSION

The results suggest that childhood social status in school is associated with overall adult morbidity leading to hospital care: the lower the peer status in school, the higher the risk of in-patient care in adulthood. This gradient exists for women and men alike. When in-patient

care is divided into disease-specific groups, however, there are substantial differences in the degree and magnitude to which they vary with peer status, suggesting that peer status position in childhood is associated with most – but not all – types of morbidity. Thus, these findings are to some extent in line with theories of ‘general susceptibility’ among individuals in lower social positions, suggesting that there is a common set of general risk factors underlying the association between social position and health.^[30] However, the variation in associations also emphasises the importance of interpreting the heterogeneous contributions in order to find the mechanisms and pathways through which peer status is linked to disease.^[11]

The gradient for mental and behavioural disorders (including depression, anxiety, alcohol abuse and drug use) and the large relative differences for external causes (such as suicide attempts and intentional self-harm) are consistent with results from previous studies.^[31, 32] For example, Östberg and Modin found an association between childhood peer status and self-reported health problems in adulthood.^[13] Despite the fact that the degree of severity most probably differs between diseases influencing self-reported health problems and diseases leading to in-patient care, the results from Östberg and Modin’s study are quite similar to the results found in the present study. The most interesting finding in the present study, however, are the steep gradients for ischaemic heart disease and cerebrovascular diseases for men and women, other heart diseases for women, and diabetes. These types of disease are known to be socially patterned,^[2, 33] and they have previously been linked to childhood socioeconomic status, but not to the child’s status position in school. A plausible mechanism may involve lifestyle factors, health related behaviours, and perhaps stress. To verify this, further research is needed.

The results for peer status and disease-specific morbidity correspond quite well with previous analyses of adult social class and cause-specific mortality,^[26] which may lead to the conclusion that peer status merely mediates the association between childhood socioeconomic status and morbidity. However, when parental social class is controlled for, the estimates are overall somewhat attenuated but the main findings remain unaltered. This suggests that the differences in morbidity by peer status are not accounted for by parental social class. Hence, although these types of status structure share important similarities inasmuch as they both are hierarchical structures of social position, there are also important differences due to the different structural levels on which these status positions are distributed. While the child’s peer status position is created in the classroom (micro-level) thus directly affecting the child

in everyday face-to-face interaction, childhood social status in society (macro-level) influences the child primarily via the parents. Thus, it may be assumed that psychosocial mechanisms (e.g. social support, social influence, and social engagement) are more directly linked to the former type of structure.^[34] It has been suggested that these mechanisms influence health through three pathways: the psychological, the behavioural, and the physiological.^[35] In the present study, some of the largest relative differences in disease-specific morbidity by peer status were found in disease-specific groups that were psychologically related (e.g. mental disorders, suicide attempts and intentional self-harm) or affected by behavioural risk factors (e.g. diabetes and circulatory diseases such as ischaemic heart disease).^[7] Hence, this study adds support to the notion of peer status being linked to health through behavioural and psychological pathways, and as such, influencing diseases with these particular kinds of aetiology. The results can also be seen as to support the physiological pathway, for instance, through obesity.

Peer status is here thought of as influencing morbidity, but one may argue that diseases that may have an early onset, such as mental disorders, precede the establishment of peer status. Previous studies have, however, found that peer status predicts depressive symptoms irrespective of symptoms at an earlier point in time.^[36] Nevertheless, peer status and health are perhaps best seen as parts of a process of mutual influence, evolving over time.^[20] In a similar way, peer status appears to be continuously renegotiated. Status mobility is however restrained, particularly for individuals in the lowest and highest peer status positions.^[37] Thus, one may assume that the assignment of social positions in the peer status hierarchy is a fairly stable phenomenon. To the extent that peers constitute significant others,^[38] the exposure to expectations and access to resources that accompany any given peer status position are likely to have a long-term impact on the child's identity, behaviour, and ambitions, as well as the choices they make for themselves. This may in turn affect health development across the life course.

Few data materials permit a life-course approach to peer status in school and morbidity. The Stockholm Birth Cohort study used in this paper offers the opportunity to examine how sociometrically-assessed childhood peer status in ages 12-13 relates to a wide variety of morbidity outcomes from ages 20 to 50. The present study does, however, have some important limitations. First, the use of hospital discharge register data to indicate morbidity produces a possible bias if status position in school also predicts differences in help-seeking

behaviour. Second, the cohort members are relatively young, meaning that diseases with a late onset are not well represented, which precludes the analysis of some second-level disease groups (e.g. types of cancer). A somewhat different overall picture may have emerged if it had been possible to include all second-level groups. A third issue concerns comorbidity. For instance, alcohol-related disorders co-occur with other psychiatric disorders such as anxiety and depression,^[39] as well as with external causes such as suicide attempts.^[40, 41] In addition, heart disease commonly co-occurs with diabetes.^[42] To complicate matters further, diabetes and heart diseases have been found to co-occur with depression,^[43, 44] schizophrenia,^[45] and anxiety.^[46] Thus, one may claim that a small group of comorbid individuals account for a large proportion of disease.^[26] As a consequence they contribute to the gradients in a wide range of diseases, equalizing differences in the magnitude of the effect of peer status between various diseases and leading to an overestimation of the results. **When controlling for comorbid diseases in the analysis by including dummies, however, the associations between peer status and health-related diseases, and between peer status and psychologically related diseases, were reduced but only to a limited extent. Thus, the main findings remained unaltered (data not presented).** Furthermore, if the association between peer status and morbidity was due to such circumstances, we would probably see a threshold effect for the marginalized group rather than a gradient across all peer status categories.

In conclusion, the results of this study, especially with regard to peer status being associated with such a wide range of morbidity outcomes, underscore the need to understand how and why peer status has such a seemingly strong impact on health outcomes across the life course. This is an important area of research and policy making, given that most children attend school for several years and are thus subjected to the social ordering of this micro-level social world. However, if the universality of status distributions constitutes ‘a social law’,^[47] which seems to be the case, we should maybe rather focus on how the psychosocial mechanisms between social status in school and health operate, and how they may be influenced in order to reduce the negative impact of peer status on health across the life course.

WHAT THIS PAPER ADDS

What is already known on this subject?

In studies of childhood social status, parents’ social position has proved to be related to the children’s adult health, but only a small number of studies have considered the importance of

the child's own social position in school; peer status. These studies have found an association between childhood peer status and future psychological health outcomes, as well as between peer status and self-reported health in adulthood.

What does this study add?

This study adds new knowledge by demonstrating that there is a gradient for various types of objectively measured morbidity in adulthood by childhood peer status. The latter effects not only psychological health, but also lifestyle related diseases, and in particular circulatory diseases.

ACKNOWLEDGEMENTS

I am grateful for the permission to use the Stockholm Birth Cohort Study. The creation and maintenance of the Stockholm Birth Cohort Data Base is a collaboration between CHES and SOFI, financed by the Swedish Research Council. Sten-Åke Stenberg of SOFI prepared the original Metropolitan Data Base, Denny Vågerö of CHES prepared the follow-up data for 1980-2002, and Reidar Österman of CHES organised the probability matching of the two data sets. I would also like to thank Jenny Torssander and Michael Gähler at SOFI as well as Denny Vågerö, Kristiina Rajaleid and Viveca Östberg at CHES, for valuable comments.

CONFLICTS OF INTEREST

None

FUNDING

This study was financially supported by the Swedish Council for Working Life and Social Research and the Swedish Research Council.

EXCLUSIVE LICENSE

The Corresponding Author has the right to grant on behalf of all authors and does grant on behalf of all authors, an exclusive license (or non-exclusive for government employees) on a worldwide basis to the BMJ Publishing Group Ltd and its Licensees to permit this article (if accepted) to be published in Journal of Epidemiology and Community Health and any other BMJ PGL products to exploit all subsidiary rights, as set out in our licence (<http://jech.bmj.com/ifora/licence.pdf>).

REFERENCES

1. Marmot M. *The status syndrome. How social standing affects our health and longevity*. 2004, New York: Times Books.
2. Davey Smith G. Gunnell D. Ben-Shlomo Y. *Life-course approaches to socio-economic differentials in cause-specific adult mortality*, in *Poverty inequality and health. An international perspective*, D. Leon and G. Walt, Editors. 2001, Oxford University Press: Oxford.
3. Davey Smith G. *Socioeconomic differentials*, in *A life course approach to chronic disease epidemiology*, D. Kuh and Y. Ben-Shlomo, Editors. 1997, Oxford University Press: Oxford.
4. Davey Smith G. *Down at heart - the meaning and implications of social inequalities in cardiovascular disease*. *Journal of Royal College of Physicians* 1997;31:414-424.
5. Hallqvist J. Lynch J. Bartley M. Land T. Blane D. *Can we disentangle life course processes of accumulation, critical period and social mobility? An analysis of disadvantaged socio-economic positions and myocardial infarction in the Stockholm Heart Epidemiology Program*. *Social Science & Medicine* 2004;58:1555-1562.
6. Vågerö D. Illsley R. *Explaining health inequalities beyond Black and Barker*. *European Sociological Review* 1995;11:219-241.
7. Lawlor D.A. Sterne J.A.C. Tynelius P. Davey Smith G. Rasmussen F. *Association of childhood socioeconomic position with cause-specific mortality in a prospective record linkage study of 1,839,384 individuals*. *American Journal of Epidemiology* 2006;164:907-915.
8. Davey Smith G. Hart C. Blane D. Hole D. *Adverse socioeconomic conditions in childhood and cause specific adult mortality: prospective observational study*. *BMJ* 1998;316:1631-1635.
9. Osler M. Andersen A.-M.N. Due P. Damsgaard M.T. Holstein B.E. *Socioeconomic position in early life, birth weight, childhood cognitive function, and adult mortality. A longitudinal study of Danish men born in 1953* *Journal of Epidemiology and Community Health* 2003;57:681-686.
10. Lawlor D.A. Batty G.D. Morton S.M.B. Clark H. Macintyre S. Leon D.A. *Childhood socioeconomic position, educational attainment, and adult cardiovascular risk factors: The Aberdeen Children of the 1950s Cohort Study*. *American Journal of Public Health* 2005;95:1245-1251.
11. Galobardes B. Lynch J.W. Davey Smith G. *Childhood socioeconomic circumstances and cause-specific mortality in adulthood: Systematic review and interpretation*. *Epidemiological Reviews* 2004;26:7-21.
12. Power C. Hyppönen E. Davey Smith G. *Socioeconomic position in childhood and early adult life and risk of mortality: A prospective study of the mothers of the 1958 British Birth Cohort*. *American Journal of Public Health* 2005;95:1396-1402.
13. Östberg V. Modin B. *Status relations in school and their relevance for health in a life course perspective: Findings from the Aberdeen children of the 1950's cohort study*. *Social Science & Medicine* 2007;66:835-848.
14. Östberg V. *Children in classrooms: Peer status, status distribution and mental well-being*. *Social Science & Medicine* 2003;53:17-29.
15. Adler P.A. Kless S.J. Adler P. *Socialization to gender roles: Popularity among elementary school boys and girls*. *Sociology of Education* 1992;65:169-187.
16. Lease A.M. Kennedy C.A. Axelrod J.L. *Children's social constructions of popularity*. *Social Development* 2002;11:87-109.

17. Xie H. Cairns R.B. Cairns B.D. *Social networks and configurations in inner city schools: Aggression, popularity, and implications for student with EBD.* Journal of Emotional and Behavioral Disorders 1999;7:147-156.
18. Due P. Lynch J. Holstein B. Modvig J. *Socioeconomic health inequalities among a nationally representative sample of Danish adolescents: the role of different types of social relations.* Journal of Epidemiology and Community Health 2003;57:692-698.
19. Brolin Låftman S. Östberg V. *The pros and cons of social relations: An analysis of adolescents' health complaints.* Social Science & Medicine 2006;63:611-623.
20. Hay D.F. Payne A. Chadwick A. *Peer relations in childhood.* Journal of Child Psychology and Psychiatry 2004;45:84-108.
21. Stenberg S.-Å. Vågerö D. Österman R. Arvidsson E. von Otter C. Janson C.-G. *Stockholm Birth Cohort Study 1953-2003: A new tool for life-course studies.* Scandinavian Journal of Public Health 2006;35:104-110.
22. Stütz G., *Kamratstatus (Peer status).* 1985, Stockholm University: Stockholm.
23. Janson C.-G., *The school study - A code book,* in *Project Metropolitan. A longitudinal study of a Stockholm cohort,* C.-G. Janson, Editor. 1975, Department of Sociology: Stockholm.
24. Ringbäck Weitoft G. Rosén M. *Is perceived nervousness and anxiety a predictor of premature mortality and severe morbidity? A longitudinal follow up of the Swedish survey of living conditions.* Journal of Epidemiology and Community Health 2005;59:794-798.
25. Spijker J.J.A. *Socioeconomic determinants of regional mortality differences in Europe.* 2004, Groningen: University of Groningen.
26. Erikson R. Torssander J. *Social class and cause of death.* The European Journal of Public Health 2008;1-6 [E-pub].
27. Eurostat ed. *Causes of death: 1994-1995 statistics. Eurostat Working Papers: Population and social conditions.* Vol. 3/199/E/No 22. 1998: Luxembourg.
28. Ringbäck Weitoft G. Hjerm A. Haglund B. Rosén M. *Mortality, severe morbidity, and injury in children living with single parents in Sweden: A population-based study.* The Lancet 2003;361:289-295.
29. Strand B.H. Kunst A. Huisman M., et al. *The reversed social gradient: higher breast cancer mortality in the higher educated compared to lower educated. A comparison of 11 European populations during the 1990s.* European Journal of Cancer 2007;43:1200-1207.
30. Marmot M.G. Shipley M.J. G. R. *Inequalities in death - specific explanations of a general pattern?* Lancet 1984;1:1003-1006.
31. Cowen E.L. Pederson A. Babigian H. Izzo L.D. Trost M.A. *Long-term follow-up of early detected vulnerable children.* Journal of Consulting and Clinical Psychology 1973;41:438-446.
32. Roff J.D. Wirt R.D. *Childhood social adjustment, adolescent status, and young adult mental health.* American Journal of Orthopsychiatry 1984;54:595-602.
33. Connolly V. Unwin N. Sherriff P. Bilous R. Kelly W. *Journal of Epidemiology and Community Health.* Journal of Epidemiology and Community Health 2000;54:173-177.
34. Berkman L.F. Glass T. Brissette I. Seeman T.E. *From social integration to health: Durkheim in the new millennium.* Social Science & Medicine 2000;51:843-857.
35. Berkman L.F. Glass T. *Social integration, social networks, social support, and health,* in *Social Epidemiology,* L. Berkman and I. Kawachi, Editors. 2000, Oxford University Press: New York. p. 137-173.

36. Keisner J. *Depressive symptoms in early adolescence: Their relations with classroom problem behavior and peer status*. Journal of Research on Adolescence 2002;12:463-478.
37. Stensaasen S. Sletta O. *Grupprocesser [Group processes]*. 2000, Stockholm: Natur & Kultur.
38. Mead G.H. *Mind, self and society*. 1934, Chicago: The University of Chicago Press.
39. Burns L. Teesson M. *Alcohol use disorders comorbid with anxiety, depression and drug use disorders. Findings from the Australian National Survey of Mental Health and Well Being*. Drug and Alcohol Dependence 2002;68:299-307.
40. Beautrais A.L. Joyce P.R. Mulder R.T. Fergusson D.M. Deavoll B.J. Nightingale S.K. *Prevalence and comorbidity of mental disorders in persons making serious suicide attempts: a case-control study*. American Journal of Psychiatry 1996;153:1009-1014
41. Henriksson M.M. Aro H.M. Marttunen M.J., et al. *Mental disorders and comorbidity in suicide*. American Journal of Psychiatry 1993;150:935-940.
42. Simpson S.H. Corabian P. Jacobs P. Johnson J.A. *The cost of major comorbidity in people with diabetes mellitus*. CMAJ 2003;168:1661-1667.
43. Anderson R.J. Freedland K.E. Clouse R.E. Lustman P.J. *The prevalence of comorbid depression in adult with diabetes*. Diabetes care 2001;24:1069-1078.
44. O'Connor C. Gurbel P.A. Serebruany V.L. *Depression and ischemic heart disease. Depression as a risk factor for cardiovascular and cerebrovascular disease*. American Heart Journal 2000;140:Supplement:S63-S69.
45. Dixon L. Widen P. Delahanty J., et al. *Prevalence and correlates of diabetes in national schizophrenia samples*. Schizophrenia Bulletin 2000;26:903-912.
46. Barger S.D. Sydeman S.J. *Does generalized anxiety disorder predict coronary heart disease risk factors independently of major depressive disorder?* Journal of Affective Disorders 2005;88:87-91.
47. Moreno J.L. *Who shall survive? Foundations of sociometry, group psychotherapy and sociodrama*. 1953, New York: Beacon House.