



UMEÅ UNIVERSITY

Growing up with poor health and managing school

Studies on ill health and young people's
educational achievements

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Umeå 2022

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Dissertation for PhD
ISBN: 978-91-7855-732-5 (print)
ISBN: 978-91-7855-733-2 (pdf)
ISSN: 0283-300X
Cover design and composition: Sonja Nordström
Electronic version available at: <http://umu.diva-portal.org/>
Printed by: Citypring i Norr AB
Umeå, Sweden, 2022

Tack till alla före mig.

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Abstract

Aim and objectives

The overall aim of this thesis was to empirically investigate consequences of poor health for children's educational outcomes in Sweden. A central tenet is that health problems impact not only the afflicted individual but also people in their social and emotional proximity, in particular immediate family members. More specific objectives were to study:

1. The relationship between multiple clinically diagnosed mental disorders and children's educational achievements in Sweden.
2. The bidirectional relationship between mental health problems and academic performance among Swedish adolescents, as well as heterogeneous patterns associated with gender and socioeconomic groups.
3. The effects of parental somatic and psychiatric health problems on the probability of youths leaving upper secondary education before completion in Sweden and potential gender differences in these effects.
4. The relationship between having a sibling with health problems and a healthy sibling's school grades in the final year of compulsory education in Sweden and how socioeconomic background modifies this relationship.

Theoretical framework

Key concepts applied in the thesis are health and illness. The ability to perform things in life, the ability to act, determines whether a person is healthy or ill. Illness (or poor health, treated as a synonymous term) entails a reduced ability to act in relation to one's life situation and its demands. Family is viewed from a systems theory perspective. Poor health of a parent reduces his or her ability to maintain regular roles, which may require reorganisation of the family system. Siblings' health problems can affect other children in the family by inducing concerns and occupying and diverting parents' time and attention. All of this could be psychosocially stressful in many ways, not least for children in the family and their ability in relation to schooling.

Data and methods

The research objectives were addressed by utilising social and medical microdata from Swedish administrative registers covering the entire population in Sweden. Data pertaining to different populations, collectively covering the period from 1987 to 2017, were used in four studies designated Studies I–IV. Educational

achievement was measured in terms of teacher-assigned school grades awarded by the end of compulsory school and in upper secondary school, as well as completion (or non-completion) of an upper secondary education. Poor health was measured through data on outpatient visits to specialist healthcare facilities, psychotropic drug prescriptions and admissions/discharges from Swedish hospitals. Socioeconomic background was measured by parental level of education. The data were analysed by fitting linear and logistic regression models as well as cross-lagged path models.

Results and conclusions

Empirical results of Study I showed that specific diagnosed mental disorders have varying, largely disadvantageous, associations with educational achievements of students that differ between boys and girls. Documentation of this in Sweden adds to evidence that mental disorders have a negative overall association with educational achievement, despite substantial variation in support and educational systems across countries. The results of Study II provided no support for a bidirectional relationship between mental health and academic performance of students aged 15-16 to 18-19 years. However, they support a unidirectional relationship, as a negative relationship was found between school grades at graduation from compulsory school and rates of subsequent psychotropic medication use in upper secondary school. The relationship was equal in size for both boys and girls but mainly among adolescents with the highest educated parents.

Study III showed that having a mother or a father with psychiatric, but not somatic, illness that necessitated hospitalisation after completing compulsory schooling was associated with an increased probability of leaving upper secondary school before completion. No significant gender-based differences in this were found. Results presented in Study IV showed that having one or more siblings with health problems that necessitated recurrent hospitalisations was associated with lower grades. Children with ill siblings were also less likely to be eligible for an upper secondary education compared to children whose siblings did not have poor health. Socioeconomic background did not affect this educational disadvantage.

Results presented in this thesis clearly corroborate the importance of health for children's education. Children's educational achievements at the end of compulsory school are inversely related to mental health problems in their adolescence. Thus, academic competence may have positive effects on certain aspects of young people's mental health, which underscores the importance of promoting opportunities for youth to do as well as they can in school. The reciprocal aspect of the relationship between mental health and academic

performance among school-aged children remains an important issue that requires further investigation. However, health is not just an individual issue; parents' and siblings' health problems can affect children and have negative 'spillover' effects on their schooling and educational achievements. This underlines the importance of a psychosocial perspective when identifying children's difficulties in school. Taken together, health, and thus the school's student health task, is highly associated with academic achievement and schools' pedagogical responsibilities.

Sammanfattning på svenska

Syfte

Det övergripande syftet med denna avhandling var att undersöka konsekvenser av ohälsa för barn och ungas utbildningsresultat i Sverige. En grundsats är att ohälsa inte bara påverkar den drabbade individen utan även människor i den sociala och känslomässiga närheten, i synnerhet de närmaste familjemedlemmarna. Mer specifikt ämnade avhandlingen:

1. Att undersöka relationen mellan ett antal kliniskt diagnostiserade psykiska sjukdomar (inkl. neuropsykiatriska funktionsnedsättningar) och barn och ungas utbildningsresultat i slutet av grundskolan.
2. Att undersöka den dubbelriktade relationen mellan psykiska hälsoproblem och skolprestation bland svenska ungdomar samt utforska heterogena mönster i denna relation utifrån kön och socioekonomisk bakgrund.
3. Att undersöka effekter av föräldrars somatiska och psykiatriska hälsoproblem för sannolikheten att ungdomar hoppar av gymnasiet, samt potentiella könsskillnader i dessa effekter.
4. Att undersöka relationen mellan ett syskons återkommande hälsoproblem under uppväxten och ett friskt syskons skolbetyg i slutet av grundskolan, samt hur socioekonomisk bakgrund påverkar detta förhållande.

Teoretiskt ramverk

Centrala begrepp i avhandlingen är hälsa och ohälsa. Dessa begrepp definieras utifrån en handlingsorienterad syn på hälsa och sjukdom i termer av förmåga och nedsatt förmåga. Förmågan att utföra saker i livet är vad som avgör om hälsa eller ohälsa föreligger. Ohälsa innebär en nedsatt handlingsförmåga i relation till sin livssituation och dess krav. Familj betraktas utifrån ett systemteoretiskt perspektiv. Ohälsa hos en förälder påverkar hans eller hennes förmåga att upprätthålla ordinarie roller, vilket kan kräva omorganisering av familjesystemet. Syskons ohälsa kan påverka andra barn i familjen genom att väcka oro/omsorg men också genom att uppta och avleda föräldrars tid och uppmärksamhet. Allt detta kan på många sätt vara psykosocialt påfrestande, inte minst för barn i familjen och deras förmåga i relation till sin skolgång.

Data och metod

Avhandlingen använder sociala och medicinska mikrodata från svenska administrativa register som täcker hela befolkningen i Sverige. Olika studiepopulationer ingår i de empiriska delstudierna (benämnda Delstudie I-IV) och sammantaget täcker de perioden från 1987 till 2017. Utbildningsprestation mäts genom lärartilldelade skolbetyg i slutet av grundskolan och gymnasiet samt genom fullgjord gymnasieutbildning. Ohälsa mäts genom data om erhållna diagnoser vid besök hos specialiserad öppenvårdsmottagning inom området psykiatri, recept på psykofarmaka, samt in-/utskrivningar från svenska sjukhus. Socioekonomisk bakgrund mäts genom föräldrarnas utbildningsnivå. Data analyseras med linjära och logistiska regressionsmodeller samt (en variant av) strukturell ekvationsmodellering.

Resultat och slutsatser

De empiriska resultaten i Delstudie I visade att specifika diagnosticerade psykiska sjukdomar har olika, till stor del ofördelaktiga, samband med elevers utbildningsprestationer som skiljer sig åt mellan pojkar och flickor. Genom att dokumentera detta i Sverige visar studien att psykisk ohälsa hos barn och unga har ett övergripande negativt samband med deras utbildningsprestationer, trots betydande variation i hur utbildnings- och tillhörande stödsystem organiseras mellan länder. Resultaten i Delstudie II gav inget stöd för ett dubbelriktat (dvs. ömsesidigt) samband mellan psykisk ohälsa och skolprestation (i åldrarna 15-16 till 18-19). Däremot fanns ett enkelriktat samband; högre skolbetyg i slutet av grundskolan var relaterat till lägre användning av psykofarmaka i gymnasiet. Sambandet var lika starkt för både pojkar och flickor men främst bland ungdomar med högst utbildade föräldrar.

Resultaten i Delstudie III visade att närvaron av en mamma eller pappa med psykiatrisk, men inte somatisk, ohälsa som krävde sjukhusvistelse var förknippat med en ökad sannolikhet att hoppa av gymnasiet. Inga könsspecifika effekter observerades i detta. Resultaten i Delstudie IV visade att ha haft ett eller flera syskon med hälsoproblem som krävt återkommande sjukhusinläggningar var förknippat med lägre betyg i slutet av grundskolan och högre sannolikhet för obehörighet till ett nationellt program på gymnasiet jämfört med barn vars syskon inte haft hälsoproblem. Denna utbildningsmässiga nackdel var lika oavsett socioekonomisk bakgrund.

Slutsatserna baserat på avhandlingens resultat är att hälsa på många sätt är viktigt för barn och ungas utbildning. Ju högre skolprestationer vid slutet av grundskolan desto färre psykiska problem under gymnasiet. Skolkompetens kan således vara positivt för vissa aspekter av barn och ungas psykiska hälsa, vilket

understryker vikten av insatser för att främja barn och ungas skolkompetens. Den ömsesidiga aspekten av detta förhållande förblir dock en fråga som kräver fortsatt undersökning. Hälsa är emellertid inte enbart en individfråga; föräldrars och syskons ohälsa kan i flera avseenden påverka barn, detta kan ”spilla över” på deras skolgång och är negativt förknippat med deras utbildningsresultat. Detta understryker vikten av ett psykosocialt perspektiv när en ska identifiera barns svårigheter i skolan. Sammantaget är hälsofrågan, och därmed skolans elevhälsoupdrag, i hög grad förknippad med kunskapsfrågan och skolans kunskapsuppdrag.

Thesis at a glance

Study	Reference	Aim
I	Bortes, C., Nilsson, K., & Strandh, M. (2022). Associations between children's diagnosed mental disorders and educational achievements in Sweden. (Manuscript)	To examine associations between multiple clinically diagnosed mental disorders among children in Sweden and their educational achievements.
II	Bortes, C., Landstedt, E., & Strandh, M. (2021). Psychotropic medication use and academic performance in adolescence: A cross-lagged path analysis. <i>Journal of Adolescence</i> , 91, 25–34.	To investigate the directionality of associations between academic performance and mental health problems during mid to late adolescence, and to explore heterogeneous patterns in associations by gender and socioeconomic status.
III	Bortes, C., Strandh, M., & Nilsson, K. (2020). Parental illness and young people's education. <i>Child Indicators Research</i> , 13(6), 2069–2091.	To investigate effects of parental somatic and psychiatric illness on the probability of youths leaving upper secondary education before completion and potential gender differences in these effects.
IV	Bortes, C., Strandh, M., & Nilsson, K. (2020). Sibling ill health and children's educational outcomes. <i>Journal of School Health</i> , 90(5), 407–414.	To investigate the relationship between having a sibling with health problems and a healthy siblings' academic achievement and how socioeconomic background modifies this relationship.

Material and method

Results

The study sample comprised 266 662 individuals born between 2000 and 2002. Exposure variables were defined as receipt of a diagnosis of mood disorder, including unipolar depression, anxiety disorder, including obsessive compulsive disorder, eating disorder and ADHD. Educational achievements was measured by grade sums obtained by the end of compulsory school (15–16-years). Data were analysed by fitting linear and logistic regression models.

The results showed negative associations between all the examined mental disorders and educational achievements, except for positive associations between eating disorder and grade sums among girls. The results showed clear differences in associations between specific diagnoses and the outcomes as well as notable gender-based differences.

The study sample comprised 85 186 individuals (50.7% girls) born in 1991 who received a complete diploma with grades *both* when graduating compulsory school (15–16-years), *and* three years later, when graduating upper secondary school (18-19-years). Psychotropic medication use served as a proxy for mental health problems. Academic performance was measured by school grades. Directions of associations were analysed by estimating a series of cross-lagged path models.

Support for a unidirectional but not a bidirectional association between the constructs was found. Higher school grades when graduating compulsory school were associated with relatively lower rates of mental health problems by the end of upper secondary school. The association was equal in size for both boys and girls, but mainly among adolescents in socioeconomic groups with the highest educated parents.

The study sample comprised 398 748 individuals (48.8 % girls) born between 1987 and 1990. Maternal and paternal somatic and psychiatric illness were measured by indicators based on hospitalisations. Early school leaving was operationalised as a binary variable indicating whether a student had or had not completed a full upper secondary school qualification within four to seven years of completing compulsory schooling. Data were analysed by fitting logistic regression models.

Having had a mother or father with psychiatric, but not somatic, illness that necessitated hospitalisation after competing compulsory schooling was independently associated with an increased probability of leaving upper secondary education. No significant gender-specific interaction effects were observed.

The study sample comprised 115 106 individuals (51.3% boys) born in 1990. An indicator for whether a child had one or more siblings who had recurring hospitalisations during the child's life was used as a measure for having a sibling with health problems. Academic achievement was measured by grade sums (end of compulsory school), including ineligibility for an upper secondary education. Data were analysed by fitting linear and logistic regression models.

Having had one or more siblings with health problems that necessitated recurrent hospitalisations was associated with lower grades. Children with ill siblings were also less likely to be eligible for an upper secondary education compared to children whose siblings did not have poor health. Socioeconomic background did not modify the association.

1. Introduction

The topic of this thesis is how the health problems of children and youth, and their family members (siblings and parents), relate to their educational achievements. This situates the thesis in the field of research on the welfare of children – a classical core thematic area within social work as a scientific discipline (Martínez et al. 2015) – and school social work. Educational achievements are studied at the end of comprehensive school, which is compulsory, and in upper secondary school. Children start compulsory school in the year they turn six (pre-school class) and finish after ten at the age of 15-16 (school year 9). Nearly all 16-year olds in Sweden transition directly to an upper secondary education, which is elective but with a 99% enrolment rate (OECD 2022), and finish at the age of 18-19.¹

Swedish schools have a responsibility to foster both children's learning and, together with other institutions, their health.² Since a new Education Act (SFS 2010:800) came into force in 2010, medical, psychological, psychosocial, and special education services, which were previously separated, were gathered into a single service – the student health service [elevhälsan]. Prior to this reform, efforts to optimize students' health and learning were conducted in what was described as “parallel tracks” (SOU 2000:19). The purpose of gathering all these competencies was to integrate student health activities and the schools' other pedagogical processes within a single framework (Prop. 2001/02:14). All Swedish school children must now, by law, have access to student health services, provided by a doctor, nurse, psychologist, special education teacher and school counsellor. These professionals work together in interprofessional teams called student health teams. The student health teams' primary task is to promote students' health, prevent ill health, and help them to meet learning objectives in collaboration with teachers and, if necessary, external parties, such as staff of healthcare and social services.

Recurring reports, however, indicate that many schools have difficulties in working and coordinating with the student health services. Access to student health services is limited in most Swedish schools, as the working hours of doctors, nurses, and counsellors do not cover the students' needs (Skolinspektionen 2015). There is also a lack of clear guidelines and instructions for student health staff on what they are obliged to do, for example in meeting

¹ Students who are ineligible for a three year upper secondary programme can enrol in introductory programmes aiming at eligibility for a standard upper secondary programme, but can also prepare for entering the labour market or other forms of education.

² Other sectors of society, not only schools, also have responsibility for the health of children. See Wettergren et al. (2016) for an overview of child health systems in Sweden.

needs of students with mental illness or from psychosocial risk environments (OECD 2013). Above all, the link between the student health staff and pedagogical staff is generally weak, and their cooperation, which is imperative, is insufficient in many schools (SOU 2021:11). Thus, in many schools, a decade after the reform, there is still a gap between schools' pedagogical and student health-related obligations.

This gap is also reflected in previous Swedish research on the topic. For example, a systematic review of studies examining various aspects of health and its relationship to students' learning and educational outcomes found that Swedish researchers remarkably rarely addressed links between them (Eriksson 2012). The cited author concluded that this was a field still under development. Previous Swedish research on both health and education, directly related to schools' student health services, has predominantly focused on school nurses' promotion of students' health (Wigert et al. 2019; Golsäter et al. 2019; Fors et al. 2019), students' experiences of contacting student health staff (Rosvall and Nilsson 2016; Rosvall 2020), and school counsellors' experiences of organisational aspects of collaboration with teachers (Isaksson and Sjöström 2017; Isaksson and Larsson 2017). There has been very little empirical research on how children growing up with poor health manage in terms of actual performance outcomes, thereby addressing schools' obligations to promote learning *and* students' health (see Ragnarsson 2019 for a rare exception). Thus, the aim of this thesis was to address parts of this research gap by empirically investigating consequences of poor health for young people's educational outcomes in Sweden.

However, the paucity of research does not mean that we know nothing about the relationship between poor health and children's educational outcomes. For example, in Health Behaviour in School-aged Children surveys,³ children aged 11, 13 and 15 years are asked if they have a long-term illness, a disability, or other long-term health problems. Between 21 and 27 percent of the Swedish girls and boys answered yes, and of these between 30 and 46 percent answered that this health condition affected their participation in school (Folkhälsomyndigheten 2018). Moreover, increases in incidence of mental health problems among young people (Collishaw 2014; Bor et al. 2014; Hagquist 2011) are currently a strong area of concern regarding students' health and their opportunities for learning. A common conception in various discourses, and one on which many policy documents are based, is that there is a reciprocal relationship between mental health and learning. Expressions of this idea are often based on a frequently cited systematic review of international research that deals with issues of school, learning and the mental health of children and youths (Gustafsson et al. 2010). A

³ Health Behaviour in School-aged Children is a survey that has been conducted in almost 50 countries and in Sweden every four years since 1985/86. Its purpose is to monitor and track changes in young people's living conditions, lifestyle and health.

major conclusion in that review was that school performance and mental health reciprocally influence each other. Another is that this relationship is complex, as both mental (ill) health and academic performance are multifaceted, so it depends on the aspects considered.

One of three limitations of the review by Gustafsson et al. (2010) that the authors themselves point out is that psychiatric symptoms were not well represented among the included studies. A second limitation is that none of the longitudinal studies included in the review applied analytical data models allowing empirical investigation of bidirectional effects. The conclusion that the relationship is reciprocal is based on a number of observations that mental health affects school performance and other observations that performance at school affects mental health. Thus, previous studies have generally adopted a so-called unidirectional focus on the relationship, but the review synthesizes the findings and concludes that the relationship is (probably) bidirectional, i.e., reciprocal. A third limitation of the review, in my view, is that most of the 471 studies included were from the USA (63%), the remaining 37% were from other countries, and only 12 were from Sweden (2.5%). The transferability of findings from one cultural context to another is problematic as institutional characteristics vary across countries: typical class sizes, average numbers of educational transitions and access to support services (e.g. student health services) are far from uniform. The review by Gustafsson et al. (2010) provides many insights on various aspects of the relationship between mental health and performance at school, but research-based knowledge on the relationship and its potential reciprocity in Sweden is limited. Therefore, the relationship between school-aged children's mental health problems and their educational performance is a topic that this thesis will investigate further.

In addition to individual mental health, the thesis also addresses relations between family members' health problems (not only *mental* health) and young people's educational outcomes. To understand the implications of poor health for children's schooling, it is important to recognize that children grow up in a family and a family member suffering from health problems may affect them. For example, about 7 percent of 15-year-olds in Sweden perform extensive care work due to an ill parent (Nordenfors and Melander 2016). However, according to a cross-national comparative classification, Sweden is only at an intermediate (not advanced or sustainable) level in terms of awareness of and policy responses to 'young carers' (Leu and Becker 2017). This means that we know relatively little about how children of a parent with poor health are affected, especially in terms of educational outcomes. Furthermore, the vast majority of children also grow up with at least one sibling (Statistics Sweden 2017), and relationships with siblings (as well as parents) are major elements of their life context. Thus, in addition to parents, the effects of siblings' health should also be considered, but they have

received little attention in international and (especially) Swedish research. Thus, two of the four empirical studies in this thesis examine how health problems within the family, such as having a parent or a sibling in poor health, are related to children's educational outcomes.

Investigating these issues is primarily a matter of basic research. As shown in the literature review presented below, there are research gaps that warrant attention. In addition, these issues are relevant to school social work. An important goal for school social work in Sweden, for which student health service staff are responsible (in particular the counsellor), is to strengthen all children's right to receive equal education, regardless of background or requirements, and to identify children who need special support in school (Backlund et al. 2017). Although schools must systematically strive to identify students in need of special support, many students leave compulsory school without eligibility for a three-year standard (national) programme in upper secondary school (SOU 2021:11), indicating that not all needs are met. School social workers have an important task to contribute specific knowledge of preventive work and early intervention to help students who have difficulties in school and to pay special attention to risk groups. However, to provide them with robust research-based foundations for this task, empirical analysis of relations between mental health, children's kinship and performance at school is clearly required.

1.2 Aim and objectives

The overall aim of this thesis was to empirically investigate consequences of poor health for young people's educational outcomes in Sweden. Poor health refers here to mental health problems of young people and includes also other family members' (somatic *and* mental) health. A central tenet is the notion that health problems impact not only the afflicted individual but also people in their social and emotional proximity, in particular immediate family members. The educational outcomes considered are all core indicators of educational achievement in the Swedish education system: the final school grades in compulsory school determine a student's eligibility for admission to an upper secondary education; an incomplete upper secondary education is associated with significant difficulties in gaining a foothold in the labour market and risks of social marginalisation. Thus, the educational outcomes in focus are essential for young people's educational trajectories and future opportunities. The associations between poor health and educational outcomes is throughout studied in relation to gender and socioeconomic background, both of which are central aspects of young people's living conditions. Specifically, the objectives were as follows:

1. To study the relationship between multiple clinically diagnosed mental disorders and the educational achievements among children in Sweden.
2. To study the bidirectional relationship between mental health problems and academic performance among Swedish adolescents, as well as heterogeneous patterns associated with gender and socioeconomic groups.
3. To study the effects of parental somatic and psychiatric health problems on the probability of youths leaving upper secondary education before completion in Sweden and potential gender differences in these effects.
4. To study the relationship between having a sibling with health problems and a healthy sibling's school grades in the final year of compulsory education in Sweden and how socioeconomic background modifies this relationship.

2. Previous research

This section begins by reviewing previous research on the relationship between mental health problems and performance at school. An issue of particular interest is the reciprocity, or bidirectionality, of this relationship, i.e., how much young people's academic achievements and mental health problems affect each other. The second part covers research on effects of parents' physical and mental health problems on children, specifically their schooling. The third part addresses the degree (if any) that siblings' health affects other children in a family and, again, specifically their school-related outcomes. Having provided a brief overview of the existing body of research on these three topics (and highlighting research gaps) the fourth and final subsection outlines the specific contributions of the thesis to the literature.

2.1 Mental health among school-aged children and their academic performance

The research literature dealing with child and adolescent mental health in relation to schooling is extensive and spans numerous disciplines. It would therefore be challenging to thoroughly cover every aspect of it. Moreover, there is high heterogeneity in what is included in the concept of mental health, ranging from self-esteem and subjective well-being (positive aspects) to internalising symptoms such as anxiety and depression, as well as externalising symptoms such as conduct disorders and hyperactivity (negative aspects). There is also heterogeneity in the indicators of academic performance used in previous studies – grades, test scores and school dropout rates, to name just a few. In addition, individual studies tend to focus on different aspects of the relationship.

The main conclusions of the frequently cited systematic review on the topic (Gustafsson et al. 2010) discussed in the Introduction (section 1) were that the relationship between mental health and academic performance varies depending on the aspect of the relationship considered. Aspects of mental health that the review did not include were psychiatric symptoms, but mental health problems among children and youths that include psychiatric symptoms have increased in recent decades in Sweden and internationally (Hagquist 2011; Collishaw 2015). Increasing numbers of adolescents are consuming psychotropic drugs and receive care for mental disorders (Petersen et al. 2010; Socialstyrelsen 2013). It is therefore important to investigate how these particular types of mental health problems are related to schooling outcomes.

The most common mental disorders among children and young people are behavioural and mood disorders and anxiety (Merinkangas et al. 2009). Briefly,

all of these are negatively associated with academic performance. For reviews and meta-analyses see Wickersham et al. (2021), Tosto et al. (2015) and Riglin et al. (2014) for associations with depression, attention deficit hyperactivity disorder (ADHD) and emotional problems, respectively. Children with mental disorders tend to have higher degrees of school absenteeism than other children (Lawrence et al. 2019) and this has a direct negative impact on educational outcomes. Most mental disorders have associated symptoms (e.g., attention impairment, social withdrawal and disruptive behaviour) that tend to impair school functioning and the required abilities for learning and studying in a traditional teaching environment. In addition, there are social challenges associated with mental disorders, such as stigma, peer discrimination and lack of understanding from teachers, all of which could affect educational outcomes (DeSocio and Hootman 2004; McLeod et al. 2012). Thus, the negative association is a result of both individual functional impairments and negative social responses.

Regarding bidirectional associations, another systematic review – aiming to summarise knowledge of the reciprocal association between mental disorders and early school leaving (ESL: dropout from secondary school) – that included 51 studies found that mood and anxiety disorders (internalising disorders) had weaker effects on ESL than substance use and disruptive disorders (externalising disorders) (Esch et al. 2014). Internalising disorders, on the other hand, reportedly develop as a consequence of school dropout. These results confirm that mental health problems are negatively associated with successful schooling and that successfully completing a secondary school education is important for future mental health.

While providing many insights, the studies included in the review by Esch et al. (2014) only addressed unidirectional associations. They included studies that assessed the predictability of school dropout from mental disorders and others that assessed the reverse predictability. None of the studies, however, investigated the *interplay* between mental health and academic performance within a time period of youth development. An issue of particular interest is what matters most or, rather, what comes first; is it, so to speak, the chicken (health) or egg (performance)? The same individuals must be followed across time to investigate this empirically, with measures of both mental health and academic performance at multiple timepoints. This study design, with appropriate statistical techniques, enables investigation of reciprocal effects. In sum, concurrent and longitudinal associations between mental health and academic performance are well researched but reciprocal effects are much less well understood.

2.2 Educational consequences of parental illness

For a long time the influence of “disease on families of patients [was] often unrecognised and underestimated” (Golics et al. 2013: 405), and received little research attention. In recent years, however, increasing numbers of studies on the topic have been published. Those on effects of parental illness on children mainly deal with its impact on their psychosocial adjustment. A review of this literature states that “the areas and the extent of children’s psychosocial functioning affected by parental physical illness vary substantially across studies” (Chen 2017: 169). While some support the notion that children of chronically ill parents have psychosocial, emotional and behavioural problems (e.g. Pakenham and Cox 2014), others suggest that children of chronically ill parents function similarly to or better than children of healthy parents (e.g. Jantzer et al. 2013; Razaz et al. 2015). A meta-analysis that included 19 studies examined whether children of parents with a chronic illness differed from norm groups in terms of internalising and externalising problem behaviours.⁴ It found that children of chronically ill parents displayed more internalising and slightly more externalising problem behaviour than children of healthy parents. Overall, there seems now to be a consensus among researchers that “parents’ chronic physical illness places an increased risk for internalising and externalising behaviour problems for a proportion of school-aged children who have difficulties adapting to their parents’ illness and managing associated demands imposed on the family as a result of an illness” (Chen 2017: 173).

Reviews of qualitative studies by Yamamoto and Keogh (2018) and Gladstone et al. (2011) provide indications of children’s experiences of parental *mental* illness on their lives. These reviews included 8 and 10 studies, respectively, 1 and 3 of which were conducted in Sweden.⁵ Children have reported quite varied experiences, expressing a range of emotions about living with a parent with mental illness, including both positive and negative feelings such as fear, confusion, exhaustion, distress, powerlessness, love, hope, and a sense of responsibility. Some children find it difficult to talk to others about a parent’s mental illness, and it is sometimes described as a family secret, as they may fear stigmatisation. Even within a family, in some cases, it can be perceived as taboo to talk about parental mental illness. A parent’s capacity to parent may also be impaired by mental illness, and parental role reversal commonly occurs, with the child doing household chores and taking care of siblings. Taken together, the psychosocial consequences of parental mental illness for children can be quite

⁴ The studies included in the meta-analysis used scales that measured depressive symptoms, anxiety, somatic complaints and withdrawal behaviours (internalising problem behaviours), as well as aggressive and delinquent behaviour (externalising problem behaviours).

⁵ Ages of the children addressed in the reviewed studies ranged from 5 to 18 years. The mental illness diagnoses reported in the studies were mood, stress, borderline personality, bipolar, and affective disorders, major depression and schizophrenia.

extensive although varied (Yamamoto and Keogh 2018; Gladstone et al. 2011). The cited qualitative studies have mostly focused on nursing-related aspects, and thus primarily highlight care needs of the children to these parents, with little if any exploration of how these children fare in terms of educational outcomes.

Turning to studies of the relationship between parental illness and young people's educational outcomes specifically, the results are rather inconclusive (see Chen 2016 for a systematic review and Chen 2017 for a literature review⁶). This is partly because there have been relatively few previous studies on the topic, with great variation in methods used to measure parental illness and types of educational outcomes considered, yielding somewhat mixed results. It is also partly because previous studies were conducted in various single national contexts, and comparisons between countries are hindered by variations in their health, education and welfare systems. For example, analyses of the relationship based on data from non-Western countries undergoing economic transitions often find that loss of household income is the main cause of negative effects of parental illness on children's schooling (Alam 2015; Sun and Yao 2010; Woode 2017; Dhanaraj 2016; Mendolia et al. 2019). This is because it may increase the children's likelihood of being in employment instead of education. In almost all of these cases, the importance of public health insurance is highlighted, but the Swedish context and features of the Swedish welfare system differ in many ways from national settings of previous studies. For instance, there are no fees in Swedish compulsory and higher education, and the social insurance system provides financial security in the event of illness by granting monetary benefits. Parents are entitled to income compensation when they are sick and unable to work (although this does not cover the entire income loss). Thus, the educational consequences of parental illness in Sweden is an issue that must be empirically resolved in its own right, rather than inferred from results of studies elsewhere.

There has been rather limited interest in this issue among Swedish researchers. During my review of the literature, I only found three Swedish studies on the topic, all based on linkages of entries in multiple Swedish population-based registers. The first compared school performance of children with and without schizophrenic parents (Jundong et al. 2012). Parents were classified as suffering from schizophrenia if they had had two or more hospitalisation episodes with a discharge diagnosis of schizophrenia. The study included 1 439 215 and 3 654 children who were and were not exposed to a parent with schizophrenia, respectively. The results showed that school performance (final school grades at the end of compulsory school, at approximately age 16 years) was poorer for children of schizophrenic parents. The second study (Shen et al. 2016) examined associations between parental depression during different periods (before birth,

⁶ None of these reviews included studies from Sweden.

after birth, and when their children were 1-5, 6-10, and 11-16 years old) and children's school performance (final school grades) at the end of compulsory education. Parental depression was classified by collecting information from inpatient and outpatient contacts. The study included 1 124 162 children born in the period from 1984 to 1994 in Sweden. Maternal and paternal depression at any time before the final compulsory school year was negatively associated with school performance. An interesting finding of this study is that child sex modified the associations of maternal depression with school performance as maternal depression had a stronger negative influence on school performance for girls than for boys.

These two studies' findings are somewhat expected, as parental conditions such as schizophrenia and depression are often associated with relatively unstable circumstances, accompanied by both social and emotional difficulties for children (Yamamoto and Keogh 2018; Gladstone et al. 2011). These are cases of very severe mental illnesses. Furthermore, being grounded in a medical paradigm, explanations given for the associations in these studies are almost unilaterally medical, based on hereditary and genetic effects, and the effects of phenotypes on the intelligence and cognitive abilities that are required for good school performance. There are, of course, strong genetic determinants, but despite being empirically robust these studies lack a broader social explanation that provides theoretical understanding of the relationship between parental mental illness and children's educational outcomes. In addition, while Shen et al. (2016) found that child sex significantly influenced effects of maternal depression on children's school performance, they only use 'sex' as a variable and not as an analytical category. Beyond biological sex, greater understanding could be gained by employing 'gender' as an analytical category and considering the social attributes associated with the social role of being a mother or father (or son/daughter) and the meaning they carry in different social contexts.

The third Swedish study that I found on the topic highlights the effects of kinship, particularly impacts of children's roles as next of kin (Hjern et al. 2013). In contrast to the other two studies, it focuses not only on the heredity-based mechanisms but also on the psychosocial implications of being a 'young carer'. Young carers are individuals under 18 years old who care for a relative with an illness, disability, mental health issue, or addiction (see e.g. Aldridge and Becker 1999). They may be involved in diverse daily activities, such as helping their relative with cleaning, cooking, mobilising, taking medicines, showering, dressing, or supervising them to make sure they are safe. The report takes a broader stance and analyses the final school grades at the end of compulsory school of 655 000 children with parents who had been cared for in hospital due to substance abuse, mental or physical illness or who had died, any time before the final compulsory school year (when the children were aged 0-15 years). In

short, children who had a parent cared for in hospital had lower school grades, on average, than the general population. Children of parents with a history of substance abuse and/or mental illness accounted for 7 percent of the study population and had the least satisfactory school grades. Taken together, these three studies clearly indicate that parental illness has unfavourable consequences for children's schooling in Sweden.

However, major uncertainties remain, regarding issues such as: effects of parental illness beyond final compulsory school, e.g. after the transition to upper secondary school; their strength relative to other factors that influence young people's educational achievements; and the role of gender. As indicated by research from other countries, including analyses of associations in the USA (Johnsson and Reynolds 2013), Bosnia and Herzegovina (Bratti and Mendola 2014), and Tanzania (Alam 2015), maternal and paternal health might have different effects on children's schooling. It is often argued that this is related to societal gender roles and the arrangement or lack of state family policies on gender equality. Since Sweden has long striven for gender equality and research on the focal issues is limited, the role of gender in relation to them in Sweden clearly warrants attention.

2.3 Sibling's health and children's education

Let us now turn to the issue of how a *sibling's* health relates to children's education. Research on siblings more generally has been grounded in varying disciplinary perspectives, from Galton's work in the late 1800s, the psychoanalytic foundations of developmental perspectives, to social learning theories and sociological interest in sibship size. In addition to publications promoting social Darwinism and eugenics, which are highly questioned today, a study by Galton (1874) was one of the earliest focusing on the significance of siblings. He was interested, although only implicitly, in birth order and its impact on achievement. He analysed British scientists' birth order and found an overrepresentation of firstborns in science leadership, which he attributed to the rights and responsibilities conferred on them by laws and customs around primogenitures. From this perspective, siblings' positions in the family give rise to social psychological processes with lifelong implications for individual development and adjustment. The psychoanalytical perspective emphasises the significance of early experience, and regards social comparisons and power dynamics in families (e.g. sibling rivalry) as major influences on personality development. Learning theories received support from empirical research showing how siblings can function as role models (Brim 1956) and toddlers imitate their older siblings (Abramovitch et al. 1979). In addition, an early sociological perspective that remains influential holds that siblings dilute resources available to individual children and thereby limit their achievement

(Blake 1981). Based on all this work we know that siblings can “have direct effects on one another’s development when they serve as social partners, role models [...] and that siblings can influence one another indirectly by virtue of their impact on larger family dynamics – such as by serving as building blocks of the family structure, holding a favoured family niche, or diluting family resources” (McHale et al. 2012: 913). It would not be surprising, then, to learn that siblings’ *health* also influences children in various ways.

Many studies have examined effects of childhood illness or disability on the well-being and psychosocial functioning of ill children’s siblings. In the two last decades alone, numerous published literature reviews have synthesised and provided an overview of existing research on the topic (Sharpe and Rossiter 2002; Barlow and Ellard 2006; Schuntermann 2007; Dew et al. 2008; O’Brien et al. 2009; Incledon et al. 2013; Knecht et al. 2015). For example, a meta-analysis by Vermaes et al. (2012) included 52 studies (of which only two were conducted in Sweden) published between 1970 and 2008 to address effects of chronic health conditions on siblings’ psychological functioning. The included studies covered a range of chronic health conditions categorised as requiring little treatment or intrusive treatment, and association with low or high mortality rates.⁷ Psychological functioning was defined in terms of both mental health problems (internalising and externalising) and positive self-attributes (age-appropriate, normative, healthy affective, and social functioning in response to stresses engendered by a paediatric chronic health condition). The meta-analysis found an overall negative but small effect of chronic health conditions on siblings. Siblings of children with chronic health conditions had slightly poorer psychological functioning (i.e. psychological health) than siblings of healthy children.⁸ Of all the published reviews, however, only one explicitly focused on studies that examined effects of siblings with an illness on children in terms of school-related outcomes.

Gan et al. (2017) reviewed 28 studies on the school experiences of approximately 1470 siblings of children with chronic illness. Most of the studies were qualitative and examined outcomes including academic functioning, peer relations, and school attendance. The cited authors concluded that “many siblings are socially

⁷ Categories requiring little intrusive treatment: brain injury, cardiac anomaly, cerebral palsy, craniofacial anomaly, epilepsy, functional abdominal pain, hearing impairment, hydrocephalus, and rheumatism. Categories requiring highly intrusive treatment: asthma, beta-thalassemia, cancer, Crohn’s disease, cystic fibrosis, diabetes, HIV, kidney disease, sickle cell disease, and spina bifida. Low mortality categories: asthma, beta-thalassemia, brain injury, cardiac anomaly, cerebral palsy, craniofacial anomaly, Crohn’s disease, diabetes, epilepsy, functional abdominal pain, hearing impairments, hydrocephalus, rheumatism, and spina bifida. High mortality categories: cancer, cystic fibrosis, HIV/AIDS, renal failure, and sickle cell disease.

⁸ Siblings of children with life-threatening conditions and/or those requiring intrusive day-to-day treatment had more internalising problems and less positive self-attributes than comparisons.

resilient, yet overlooked, members of the family who may present with psychological, academic, and peer-related difficulties at school following a diagnosis of a brother or sister with chronic illness” (Gan et al. 2017: 23). They also noted that conclusions of these studies “may not generalise well beyond the experiences of siblings of children diagnosed with cancer” (Gan et al. 2017: 30) because of limitations of their samples. The reviewed studies mainly examined the *experiences* of children of siblings with cancer. Academic achievement *per se* was not examined as an outcome in any of the reviewed studies.

It would, of course, be reasonable to assume that the reported negative psychosocial experiences of children with seriously ill siblings will also create problems in the school context and potentially reduce achievement. The few studies that have included specific achievement measures as outcomes have detected (e.g., in the USA) negative associations between having a sibling with developmental disability or externalising behaviour and scores for mathematics and language tests (Fletcher et al. 2012). In a study based on Danish registry data, Breining (2014) found that presence of a sibling with attention deficit hyperactivity disorder (ADHD) negatively effects educational outcomes of a healthy firstborn child, in terms of overall grades in 9th grade. However, Gottfried and McGene (2013) found (in a sample of siblings in the Philadelphia School District, in the USA) that in cases where a child has special education needs, which do not necessarily imply a health problem such as cancer, there can be positive spillover effects on siblings’ achievement outcomes. The increased efforts or dedicated resources of parents and other caregivers might take the form of strategies that can academically benefit all children in the family. However, whether achievement outcomes that are relevant in the Swedish school system are affected by sibling effects such as those discussed here has not been explored at all, to the best of my knowledge.

2.4 Contribution of the thesis

As stated, the aim of this thesis was to investigate various aspects of the relationship between health and education. There has been a strong geographical bias in research in this field, as most published studies are from the USA (Suhrcke and de Paz Nieves 2011). Since differences between countries in medical, social and education systems limit the comparability of results, the existing body of research in this field is unbalanced. Thus, the thesis adds to previous knowledge by providing information on specific aspects of the relationship between health and education in Sweden. This is important as Sweden has a sharply different context (e.g., in welfare system and organisation of both school and student health services) from those of previous studies. Thus, the findings may help efforts to identify patterns that are general, regardless of welfare and educational systems, and which tend to differ.

More specifically, analyses of multiple mental disorders in a population of children and their associations with educational outcomes are rare, especially in Sweden (see Dalsgaard et al. 2019 for a rare example from Denmark). Hence, the significance of specific mental disorders for educational achievement remains unclear. Previous studies have also rarely considered the common comorbidity of mental disorders (Plana-Ripoll et al. 2019). Study I addressed these research gaps by examining associations between multiple clinically diagnosed mental disorders (unipolar depression or a mood, anxiety, obsessive compulsive, eating or attention deficit hyperactivity disorder) among children in Sweden and their teacher-assigned school grades. Study I also considers effects of potential comorbidity and provides evidence regarding the varying educational disadvantages associated with specific mental disorders.

In addition, bidirectional associations between mental health problems and academic performance have received much less attention than unidirectional associations, and the few existing studies have presented inconsistent findings (McArdle et al. 2014; cf. Obradovic et al. 2010). This indicates a need for further research to improve understanding of the differential effects of health and education on adolescents' development. By investigating interrelations of mental health problems and academic performance across two timepoints in mid to late adolescence, Study II adds to the scant empirical research on the topic. Furthermore, most previous investigations of bidirectional relations relied on small samples with various degrees of attrition and calls have been made for research based on larger and more diverse samples (Weidman et al. 2015). Study II responded to these calls by drawing on a sample of more than 85 000 adolescents from all over Sweden with various ethnic and socioeconomic backgrounds. In addition, by employing a measure of mental health problems based on the prescription of psychotropic drugs it moved beyond self-reporting survey methods, investigating the directionality of the relationships in a novel way.

Children's roles as next of kin, and their effects, have received increasing recognition and attention in Sweden from professionals, in empirical research, and policies. Previous work has shown that children with a parent who had received hospital care had lower compulsory school grades at graduation than the general population (Hjern et al. 2013). Study III added to this knowledge by examining how parental illness is related to educational outcomes post-compulsory school, and more specifically the probability of not completing an upper secondary education. It also thoroughly examined gender effects, i.e., whether the gender of an ill parent or ill child affects the probability of leaving upper secondary school early. This seems particularly relevant to examine in Sweden due to the Swedish state's strong efforts to increase gender equality. In addition, Study IV addresses a gap in knowledge of effects of siblings' health on

children's educational outcomes. Limitations of prior studies on this topic include lack of generalisability, as the vast majority examined the school *experiences* of children of siblings with cancer rather than actual achievement outcomes (Gan et al. 2017). Study IV adds to this literature by providing indications of effects of growing up with a sibling with a wide array of diseases on healthy siblings' grades at the end of compulsory school.

3. Conceptual and theoretical framework

The three central phenomena addressed in this thesis are academic achievement [skolframgång], health and family dynamics. This section discusses these concepts and how they relate to each other. First the concept of academic achievement is described, followed by a discussion on health and illness, presenting the perspective of poor health adopted in this thesis. Thereafter the relationship between poor health in a family and children's education is examined, by first defining family then considering features of the Swedish welfare context that affect families' living conditions. The section concludes by discussing within-family processes explaining how poor health in a family could affect children's educational outcomes.

3.1 Academic achievement

The concept of academic achievement refers to performance outcomes that indicate the extent to which students, teachers, or institutions have achieved their educational goals (Spinath 2012; Steinmayr et al. 2014). This thesis focuses on students' academic achievements. That is, the extent to which students have accomplished specific curricular objectives for activities within the instructional environment of the Swedish school system. These objectives usually, and most explicitly, concern knowledge in specific intellectual domains such as numeracy, literacy, history and science, or cognitive skills that apply across multiple subject areas, such as critical thinking. The Swedish school curriculum also stipulates goals regarding norms, attitudes and values (non-cognitive skills⁹). For example, the education should impart and establish respect for human rights and the fundamental democratic values on which Swedish society is based. Fostering cognitive skills is included in the schools' pedagogical learning tasks while promoting non-cognitive skills is part of the schools' social function (see e.g. Skolverket 2018).¹⁰ Considering these different goals, academic achievement is a multifaceted concept. This thesis focuses on the knowledge-related goals defined and measured by curricular-based criteria (such as grades) or cumulative indicators (such as educational diplomas). 'Educational outcomes' and 'academic (or educational) achievement' are used throughout the thesis interchangeably and both refer to students' school grades or reaching/not reaching educational milestones such as formally recognised completion of upper secondary school.

⁹ Non-cognitive skills refer to such things as empathy, humility, tolerance of diverse opinions and the ability to engage productively in society (see e.g. Kautz and Heckman 2014). Further examples of non-cognitive skills include perseverance ("grit"), self-control, trust, conscientiousness, attentiveness, self-esteem and self-efficacy, resilience to adversity, and openness to experience.

¹⁰ Skolans kunskaps-/pedagogiska uppdrag respektive skolans sociala eller fostrande uppdrag.

3.2 Health and illness

Moving on to consider health, most people probably have a general everyday understanding of the concept, but what exactly is health? Or, in the words of Nordenfelt (2018:10), “what do we normally mean when we ascribe health or disease to a person?” Contemporary perspectives on health stem from two main lines of thought in the philosophy of health, naturalism and normativism, and can be divided into two categories: biomedical and holistic (Schramme and Edwards 2017). In biomedical, or biostatistical theories (Boorse 1977), health and disease are seen as biological concepts. These theories, particularly biostatistical, focus on the distinction between normal and pathological conditions based on the idea of a normal or natural species function. Disease is seen as a condition of an individual that interferes with or prevents the normal functioning of any organ of the carrier of the condition. From this perspective, health is defined as the absence of disease and a healthy person is one who does not have any diseases. However, health can also be characterised in more than purely biostatistical terms.

Holistic health perspectives regard the whole person with no reductionist focus on parts – it is the *person* who is healthy, not individual organs – and take the person’s environment into account (Nordenfelt 1995; 2000; Tengland 2007). From these perspectives, a person is a social agent who is involved in multiple relationships and performs a variety of daily actions. The ability to do things in life, the ability to act, is then what determines whether a person is healthy or has ill health. Things a healthy person should be able to do have been formulated in varying ways. According to Parsons (1972: 117), a healthy person can perform and undertake “the roles and tasks for which we have been socialized”. According to others, the primary criterion is the ability to reach one’s vital goals (Nordenfelt 1995; 2000), attain typical goals in one’s society (Tengland 2007), perform one’s consciously chosen actions (Seedhouse 1986), or do the “everyday things people ordinarily just get on and do” (Fulford 1989: 149). Regardless of the sets of actions one decides that a healthy person should be able to perform, holistic theories regard ability-disability as the core health dimension.

Another important dimension in holistic accounts of health is its subjective character. A person normally has positive feelings of ease and well-being associated with being healthy and negative feelings of pain or suffering associated with being unhealthy. The well-being dimension is connected in many ways to the ability-dimension of health. For instance, well-being – how one feels in terms of (un)pleasant bodily sensations, moods, and emotions – tends to influence ability, and disability can also influence well-being negatively. As emphasised by Nordenfelt (1995; 2000), it is difficult to imagine a person with great pain or great

suffering having all his or her abilities intact. Thus, the concept of health can be defined in terms of both well-being and ability.

However, a key concept in this thesis is *ill* health, or having poor health. Given the definition of health provided above, primarily as the ability to perform things in life, poor health entails a *reduced* ability (or lower ability than some reference level) to perform certain things in life. In its most basic form, the negative relationship between mental health conditions and educational achievements discussed in section 2.1 can be explained through a conceptualisation of health in terms of ability. Many abilities are required to assimilate the teaching at school and achieve curricular goals, most importantly abilities to concentrate and develop cognitive skills, take notes and complete assignments on time, as well as social abilities that involve communication and collaboration with teachers and peers. From this perspective, a reason why children with mental health problems do less well in school than their healthier peers is that the health problems reduce some of their abilities. In this thesis, I employ the health-as-ability perspective and discuss poor health mostly in terms of impaired ability.

That said, it should be noted that poor health is operationalised by utilising data on prescribed psychotropic drugs and hospital admissions (see section 4.3), which occur due to health conditions that are diagnosable in the biomedical sense.¹¹ However, holistic theories of health do acknowledge diseases as biological phenomena, as conditions of physiological and psychological nature, but more essential is that diseases tend to prevent or limit a person's ability to act. From a holistic perspective, cancer is not a disease primarily because it is an abnormal condition in the biostatistical sense, it is a disease because it tends to involve severe inability to act (Nordenfelt 1995; 2000).

The conceptual triad of *disease*, *illness*, and *sickness* – first introduced by Twaddle (1968) – is also applied, as including these concepts and the distinction between them is fruitful when discussing data and results. *Disease* refers to 'physiological malfunction' that is of organic origin, it can be observed and diagnosed and is "independent of subjective experiences or social conventions" (Twaddle 1994: 8-9). *Illness* refers to the individual's subjective experience of ill health. Illness is often associated with a disease but may be present without a disease being found, as in the case of contested diseases (Conrad and Barker 2009) or 'medically unexplained' symptoms (Rosendal et al. 2017). *Sickness* is a social role that is attributed to, or assumed by, a person with a disease or illness (cf. the sick role, Parsons 1951). Sickness is a position negotiated between the person and society that acknowledges him or her as such, for example when one

¹¹ Note the distinction: the measures themselves are not biomedical (e.g. consisting of biomarkers) but they are based on health conditions that can be *diagnosed* based on a biomedical logic.

is on sick leave and receives sickness benefits. These three concepts are used in various scientific disciplines and characterise medical, personal, and social aspects of human ailment (Wikman et al. 2005; Hofmann 2002).

3.3 Poor health in families and children's education

3.3.1. Defining family

So far, the term *family* has been used without specifying its meaning. Thus, there is a need to address what family is. To begin with, the meaning of family has varied over time and place, and even in family research literature there is little consensus regarding what and who constitutes a family (see e.g. Schadler 2016; Sharma 2013; Chibucos et al. 2005). Definitions typically follow one of four approaches: structural, household-based, role-based, or interactionist (Ciabattari 2017). Structural approaches to defining a family focus on the genetic or formal legal ties between family members: “Biologically, family refers to people related by blood and genetically bound to each other, however distantly” and families can also be “created legally by marriage, adoption, or formalised fostering” (Hutchison 2015: 341). This is probably what most people consider to be a family, but it is also a narrow definition as it limits family members to those with legal roles. Consequently, these definitions exclude, for example, long-time cohabiting couples who are not married.

Household-based definitions, in contrast, consider family members to be those living in a single household and the word ‘household’ is often used interchangeably with family. A household is a residential unit that consists of everyone living under one roof. Households can consist of cohabiting couples or friends living together as housemates, nuclear families, multigenerational families, and various other groups of people. However, families can cross households, for example, children of divorced parents may live in several separate households. Moreover, a person can live alone, as is often the case of Sweden – which has the lowest average number of persons per household in the European Union (Eurostat 2020) – but can still have family members although they do not live in the same household.

The third type of definition focuses on the social roles in a family, for example brother and sister (sibling roles), son and daughter (child roles), father and mother (paternal and maternal roles, or breadwinner and primary caregiver), and how individuals act and create families based on these roles (e.g., Teschlade and Peukert 2019). These perspectives go hand in hand with definitions aligned with the interactionist approach, highlighting ways in which families are actively created through relationships and interactions. Interaction-based definitions emphasize that families are best understood through patterns of shared activities

and that “it is in the process of [...] investing emotion, time, money, and other resources into a relationship that one becomes a family” (Ciabattari 2017: 26).

All of these approaches have qualities that are analytically useful when studying aspects of the family. Here, due to the nature of the data (section 4.1), a definition rooted in the first of these approaches is adopted. Hence, all persons that have relationships with each other in the form of parent/child, husband/wife, or registered partners (cohabiting couple) with children, are regarded as family. An implication of this is that persons other than those linked to a child through his or her personal identification number, who could be considered part of the child’s family, are disregarded. The theoretical understanding of family, on the other hand, draws on insights from the two latter approaches, as a family and its way of functioning is not conceptualised solely in terms of biological or legal relations, but also in terms of roles, interactions and processes (see section 3.3.3. below).

All in all, the definitions of what a family is, what functions it should maintain and expected roles of family members in relation to each other, vary depending on the society in which it is embedded. This brings us to the discussion about family in the Swedish context.

3.3.2. *The family in the Swedish context*

To understand how the health of a parent or a sibling relates to a young person’s educational outcomes, we need, as previously emphasised, to consider the societal context in which this relationship is examined. This is because the configuration of a country’s social and welfare systems (and potentially many other cultural and socioeconomic factors) may strongly affect it. Thus, here it must be examined in the light of the institutional context of Sweden, which includes heavily subsidised universal healthcare and an educational system oriented towards inclusion and equality. Given the objectives of the thesis, in particular elucidation of potential gender differences in effects of parental illness, two features of the Swedish context specifically related to the family should be highlighted: the universal provision of public care services and the relatively equal distribution of paid and unpaid work between men and women.

The first feature is related to the most basic parental function, across most if not all societies: to nurture and provide care for children. An important characteristic of the Swedish context is a high degree of *defamilisation*, through state family policies, of care responsibilities. Defamilisation can be defined as “the degree to which households’ welfare and caring responsibilities are relaxed either via welfare state provision or via market provision” (Esping-Andersen 1999:61). Welfare state family policies related to social care and social services can be characterised as familialistic (with strong reliance of individuals on their families)

or defamilialising to varying degrees. Defamilisation implies a transfer of the responsibility for informal care for children, old persons and/or other dependents from family members to public organisations that provide formal services.

The second major characteristic feature of families in Sweden, concerns the division of paid work and household duties/childrearing between men and women. Both mothers and fathers combine family life with working life, in a so-called dual-earner/dual-carer model (see e.g. Ferrarini and Duvander 2010). In addition to the earner-carer model, which is highly developed mainly in Nordic countries (Denmark, Norway, Finland, and Sweden), in other Western countries there are also traditional-family models and market-oriented models (Korpi 2010). Briefly, traditional-family models (e.g., in Germany, Italy, and Austria) sustain male-breadwinning and female home-making roles, while in market-oriented policy models (e.g. in the USA, UK, Canada and Australia), public support systems for both earner-carer and traditional families are less developed. Instead, families have to rely on the market for family care, which greatly increases the vulnerability of those without sufficient financial resources if, for instance, health problems occur.

Sweden's dual-earner and dual-carer policy orientation originates from the 1960s, with a growing need for workers to meet labour market gaps, and the 1970s, when the view of men and women as equals in terms of employment and responsibility for childcare was established in Swedish legislation (Nyberg 2004). Family policy arrangements, such as individual taxation, earnings-related parental leave for both parents, and full-day subsidised public day care from a child's first birthday, have led to women's integration in the labour market and fathers' increased engagement in family responsibilities. Unlike countries with traditional family arrangements, where the father is the breadwinner and the mother the children's primary caregiver, the total time spent on gainful employment and domestic work is relatively equal for Swedish men and women: according to the Swedish Time Use Survey 2010, since 1990 women have been spending less time on household tasks while men have been spending more (Statistics Sweden 2010).¹²

A key issue is the relevance of all this for understanding the relationship between the health of a parent or sibling and educational outcomes for other children in

¹² The Swedish Time Use Survey has been conducted every 10 years since 1990 by Statistics Sweden. Women in 2010 spent on average 4 hours per day on unpaid household tasks, while men had increased their share of unpaid housework, but still spent on average 45 minutes less. In addition, women are more likely to take part-time jobs and have more career breaks than men, and men and women still dominate different sectors of the labour market. Moreover, new principles of marketisation and familisation of care, introduced by the centre-right government in 2006-2014, challenge principles of the earner-carer model and could lead to a more mixed family policy model (Ferrarini and Duvander 2010).

the family. Given the definition of health in terms of ability (section 3.2), poor health of a parent implies a reduced ability to fulfil his or her parenting role, not least regarding the children's schooling activities. However, due to Sweden's welfare system with generous support for families with children, the children's welfare should not be exclusively dependent on the parents' own abilities. It is easy to imagine how the severity of consequences of a health problem in a family may depend on the societal support systems available (cf. Johnson and Reynolds 2013; Bratti and Mendola 2014; Alam 2015). Furthermore, regarding gender differences, increasing involvement of fathers, due to egalitarian gender policies, implies increases in available support in households if mothers become ill. The convergence of fathers' and mothers' roles within the family suggests that they may have increasingly equal significance for their children's welfare. The associations analysed in the empirical studies (particularly III and IV) should be understood in the light of this institutional setting. In the following section, I adopt a more theoretical understanding of the family to consider the direct and indirect effects through which poor health in a family may impact children's education.

3.3.3. Family systems, spillovers, and resource dilution

Family systems theory is "an approach to understand human functioning that focuses on interactions between people in a family and between the family and the context(s) in which that family is embedded" (Watson 2012: 184). Having discussed features of the Swedish welfare context, in which Swedish families are embedded, this section focuses on within-family-related processes. Family systems theory has foundations in a number of disciplines and was developed in the field of family therapy during the 1950s onwards (Watson 2012). It is a comprehensive framework used by therapists with various specialisations in varying forms. Here, I do not expound the entire framework, and primarily illustrate how a systems perspective can provide opportunities for understanding aspects relevant to the research questions beyond the somewhat narrow confines of available data.

From a systems perspective, the family is a social system in which the members influence each other's behaviours and emotions; each member influences and is influenced by the other members. Families are organised in manners that promote stability and continuity for both individual members and the family as a whole (Pedersen and Revenson 2005). Changes in a family's conditions, due for example to disease, illness or sickness, can affect the stability of the family system and disturb the family's functional equilibrium (Rolland 1999). Since systems are self-organising, this leads to reorganisation, as a change in one part of the system induces changes in other parts. When, for example, a parent is afflicted by a health problem, a common coping strategy is to redistribute family roles (Asen

1985). A child may then take on an adult role that consumes time and mental energy that otherwise would have been directed toward school work.¹³ The child may feel anxious, concerned about the parent and have difficulty concentrating in school. This is an example of a negative spillover effect, and *direct* effect through which a family member's health can impact children's education. Spillover is a within-person cross-domain transmission of strain from one area of life to another (Bakker et al. 2009). The poor health of a parent or sibling has a negative impact on the child in the family domain that 'spills over' onto the child's ability in the school domain.

In addition, a family member's health may have *indirect* effects on children's schooling. Explanations of these draw on ideas from sociological research on group composition, specifically family structures and their relations to children's life chances. According to the resource dilution hypothesis, the family is a unit through which children access diverse resources that have implications for various outcomes in life, including educational attainment (Blake 1981; Downey 1995). These resources include not only financial means but also amounts of time and attention paid to each child. As parents have finite levels of resources (time, energy, money, etc.), the amounts that can be allocated to each child depend on the number of children. Accordingly, the more children in a family the greater the dilution of family resources, which, according to the hypothesis, negatively impacts children's life chances.

However, studies have shown that the relationship between sibling group size and children's educational attainment varies across countries. The effect of growing up with numerous siblings is strongest in countries with a liberal economic system and very weak or non-existent in countries with welfare state arrangements that strongly support families with children (Park 2008; Xu 2008). Empirical estimates of the relationship between number of siblings and children's educational outcomes in contemporary Sweden is presented in the Appendix (section A1). Nevertheless, as additional siblings modify the family structure (or system) in terms of available parental resources, a sibling with a disease or illness could modify the availability of family resources in a similar manner. This is because a child with poor health may receive more parental care and emotional support, leaving less of these resources for healthy siblings (e.g., Prchal and Landold 2012; Mulroy et al. 2008). Hence, a sibling's poor health could affect other children in the family and their schooling outcomes, to varying degrees, partly depending on levels of parental resources.

¹³ See Study III for a more detailed discussion of these specific mechanisms.

4. Data and methods

4.1 Data

Objectives of this thesis were to investigate relationships between mental health problems and academic performance, their directionality during adolescence, as well as relationships between family members' health problems and young people's educational outcomes. To meet these objectives, longitudinal data were required that provide information on both health and academic performance at several points in time, as well as information on individuals' family members and their health conditions. Such data were obtained from the Umeå SIMSAM Lab (Lindgren et al. 2016), which provides access to prospectively collected individual-level data on the total population in Sweden for the years 1960-2017. Each individual is assigned a unique serial number allowing individual-linkage across multiple data sources, with intergenerational links that capture social relations of families. The core of the database is drawn from national population registers of Statistics Sweden (which holds demographic, socioeconomic and school information) and the National Board of Health and Welfare (holding information such as hospitalisations, prescribed drugs, and neonatal health).

As these registers were designed for administrative rather than research purposes they have limitations, as they do not include some information that would have been helpful, such as information on health problems that did not require substantial medical intervention and internal family dynamics. These limitations should be kept in mind. However, total population registers also have several methodological advantages. First, information on the entire population ensures representativeness and minimises risks of selection bias, such as those due to non-responses in survey-based research (Olsen 2011).¹⁴ Similarly, the large number of observations greatly reduces risks of recall bias and random findings (Thygsen and Ersbøll 2014). In addition, Swedish administrative registers have good quality (e.g., Ludvigsson et al. 2011) and individuals' unique serial numbers link them to family members across registers, enabling identification of family ties, which was particularly advantageous given the aim of the thesis.

4.2 Ethical considerations

Before moving on to describe the data in more detail, some comments on ethical considerations are warranted, because the applied data include sensitive personal information relating to individuals' health. Therefore, research involving use of these data must be ethically reviewed (SFS 2003:460). Research projects utilising

¹⁴ Note, however, that certain registers do also lack information on certain individuals. For example, information on parental level of education is more often missing for foreign born individuals.

data from the Umeå SIMSAM Lab, including the studies underlying this thesis, are approved by the Regional Ethical Vetting Board in Umeå (Dnr. 2010-157-31 & Dnr. 2018-99-21). Data are pseudonymised by Statistics Sweden before the Lab receives them. This de-identification procedure replaces personally identifiable information by artificial identifiers. Statistics Sweden also retains the keychain, preventing anyone accessing data through the Umeå SIMSAM Lab re-identifying individuals. In addition, researchers can only access data after the Umeå SIMSAM Lab steering committee has evaluated and approved their planned research, and a written contract has been signed that obliges them to follow specific terms of use. To minimise potential data dredging, a researcher must, when applying for access to data, specify the planned study's aims, methods, focal population and analytic variables. As the use of register data builds on the trust of the public, confidentiality (protection from unauthorised persons exploiting the information) is crucial, so data from the Lab can only be analysed in a specific room at Umeå University. The room is locked and can only be accessed by persons granted access by the SIMSAM steering committee. Moreover, the computers used to analyse data are not connected to the Internet, and while the data provide individual-level information, the results are only reported at aggregated levels, as summary statistics such as means, standard deviations or regression coefficients (cf. SFS 2001:99).

4.3 Measures of academic achievement – and failure

Two types of measures of academic achievement were used in Studies I–IV. The first consists of the school grades assigned to students by teachers. Grades in Sweden are goal-related and based on a criterion-referenced system, rather than a norm-referenced system.¹⁵ In criterion-referenced grading a student's skills and/or knowledge are compared to predetermined standards, while in norm-referenced grading students' performance is compared to that of their peers (Wikström 2005). School grades in Sweden show the extent to which students have achieved goals (knowledge requirements for particular grades) set for each subject and course. The overall grade sum [meritvärde] that students obtain in 9th grade (age 15-16) serve as a summary measure of school-relevant skills: an aggregated measure of students' assessments in multiple subjects by multiple teachers. They provide indications of the performance of all students in a cohort and are used as selection criteria in competition for places in upper secondary education programmes. Grades are thought to capture not only pure intellectual capacity, as they are also putatively influenced by motivation, effort and ability (Spinath 2012). In Studies I–IV, the outcome variables were based on the final

¹⁵ Historically, from its introduction in 1962 until 1994, the Swedish grading system was strictly norm-referenced and the distribution of grades was supposed to follow a 'normal' distribution (see Skolverket 2020).

grades that students obtained upon graduation from compulsory and upper secondary school.¹⁶

The second type of measure of academic achievement applied is a measure of academic failure: early school leaving (ESL), or dropping out. Reasons for this may include individual characteristics, such as learning difficulties, lack of motivation, or social problems, but also school and classroom characteristics, such as school climate and teacher-student relations (SKL 2013). When addressing academic or school failure, one should bear in mind that it has two sides. The focus should not solely be on the individual student's failure but also the school's failure to identify and meet different needs and, by extension, fulfil its pedagogical and social missions. For the individual, ESL is associated with a greater risk of exclusion and marginalisation from the labour market (SKL 2013). For society as a whole, this may lead to lower tax revenues, lower productivity and increased expenditure on income support. Study III investigated effects of parental health problems on the probability of youths leaving upper secondary education before completion. Early school leavers were defined as those who did not obtain a full upper secondary qualification within four to seven years of graduating from compulsory school. Upper secondary school education in Sweden normally takes three years and around one in three students requires more than three years to complete it or terminate their upper secondary school studies completely (SKL 2013).

4.4 Measures of poor health

Poor health was measured in Studies I-IV using data on outpatient visits to specialist healthcare facilities (Study I), prescriptions of psychotropic drugs (Study II) and admissions and discharges from Swedish hospitals (Studies III-IV). As measures of health, these data have both pros and cons. One disadvantage is that they only capture incidences of diseases and illnesses that require a doctor's diagnosis in outpatient care, prescription of medicines or hospital care. An alternative would be to use self-reported health measures, which would also provide information on the health of members of the population whose health does not require medical interventions and capture incidences of less severe health conditions. However, both types of measurements have strengths and weaknesses. A potential drawback of self-reported health measures, which complicates comparisons of groups, is that people who objectively have a similar state of health may experience their health very differently, especially if people's social backgrounds affect their responses to health surveys. Thus, they are much more subjective than the measures of health used in this thesis and the underlying

¹⁶ The present Education Act (SFS 2010:800) came into effect on July 1, 2011, and introduced a different grading scale from the one that outcome variables used in Studies II, III and IV are based upon.

studies. Furthermore, the data registers on which the applied measures are based are comprehensive, in the sense that they provide indications of the health of the entire Swedish population. Measures of health based on data on hospital admissions and prescriptions of drugs are common in well-recognised research, conducted by e.g. the Swedish Institute for Evaluation of Labour Market and Education Policy (IFAU: e.g. Mörk et al. 2015; Engdahl et al. 2022).

Data on healthcare visits and hospital admissions, in addition to signifying poor health, can also be regarded as information on utilisation of health care services. Hence, as different groups of individuals may have differing inclinations to seek care, a potential concern is uncertainty regarding whether the measures capture incidences of poor health or the demand for and availability of health care. For instance, unemployed adults are reportedly less likely to seek care than employed adults with the same level of self-assessed health (Åhs and Westerling 2006). Thus, a drawback of the measure, if the likelihood of hospital admission depends on socioeconomic status, is that it could both capture individuals' health and propensities to seek care. However, as health care is heavily subsidised in Sweden, especially for children, differences in financial resources should not affect the probability of hospitalisation. Moreover, studies have shown that children's hospitalisations are negatively correlated with family income (e.g. Mörk et al. 2014), implying that children with wealthy parents do not, generally, consume more healthcare.

In Study I, information on contacts with psychiatric care units were used to measure mental disorders. Data were obtained from the National Patient Register (NPR) which contain information on all inpatient and outpatient doctor visits including psychiatric care provided by both private and public caregivers. Data regarding each contact include diagnoses of mental disorders according to the 10th revision of the International Classification of Diseases (ICD-10). Mental disorders were defined as receipt of diagnosis of the following six mental disorders: mood disorder (ICD-10 codes F30-F39), including unipolar depression (ICD-10 codes F32-F33); anxiety disorder (ICD-10 codes F40-F48), including obsessive compulsive disorder (OCD) (ICD-10 code F42); eating disorder (ICD-10 code F50); and attention deficit hyperactivity disorder (ADHD) (ICD-10 code F90). All diagnoses were defined as at least 1 registered contact(s)/diagnosis in the NPR any time before an individual received their final grade in ninth grade.

In Study II, information on psychotropic drug prescriptions, with details of the patient and the active substance prescribed, was used as a proxy to measure mental health problems. These data were obtained from the Swedish Prescribed Drug Register, which holds information on all drug prescriptions dispensed from Swedish pharmacies, excluding medical drugs consumed in inpatient hospital

care. The measure was operationalised to indicate whether the person of interest ever retrieved at least one dispensed psycholeptic (for treatment of psychological disorders, bipolar disorder, anxiety, and insomnia) or psychoanaleptic (for treatment of depression and attention deficit hyperactivity disorder) drug during a specific period of time (no/yes). The measure reflects medical drug treatment for, and consequently the presence of, a wide array of clinically diagnosed mental health problems. The downside with this measure is that the medical drug treatment ought to improve, or at least stabilise, mental health status over time. This inherently makes it difficult to distinguish the effects of the underlying health problems from the treatment effects.

In Study III, two indicators were used to measure parental illness. Detailed information on diagnostic codes was unavailable. Health problems could therefore only be categorised on the level of Major Diagnostic Categories (MDC) according to the ICD. Parental illness was divided into two broad categories; (1) maternal or paternal *psychiatric* illness and (2) maternal or paternal *somatic* illness. The first indicates whether the parent had been hospitalised for at least one day due to a diagnosis of psychiatric disorder (ICD-9: 290-319, ICD-10: F00-F99) (no/yes). The second indicates whether the parent had been hospitalised for at least 7 days in a single hospitalisation event based on a diagnosis other than a psychiatric disorder (no/yes). For mothers, hospitalisations due to normal delivery, care in pregnancy and delivery (ICD-9: 650-659, ICD-10: O00-099) were excluded from this indicator, even if they lasted more than 7 days. The reasoning behind these operationalisations was the following. Patients with mental illness in Sweden are treated in outpatient care at primary care centres or psychiatric specialist care units. Psychiatric hospitalisations, i.e. inpatient care, only occur in response to acute events. One day of hospitalisation would therefore indicate severe psychiatric illnesses. As for somatic illness, the operationalisation followed the Swedish Family Care Competence Centre's suggestion to use one week of hospitalisation as a cut-off for identifying severe somatic diseases when using Swedish registries (Hjern and Manhica 2013).

In Study IV, an indicator for whether a child had at least one sibling who had repeatedly been hospitalised for *any* diagnosis was used to measure sibling's poor health. Specifically, the measure indicates whether the child had one or more siblings who had at least 3 (or more) separate overnight hospitalisation events during each of the following 3 periods of the child's life, namely the years between the ages of 0 and 6, 7 and 12, and 13 and 16. The reasoning behind this operationalisation was that hospitalisations, regardless of diagnosis, generally occur as a result of severe health problems. Accordingly, if a child had a sibling hospitalised during several periods of his or her upbringing, this would capture siblings of children with a broad range of different and recurring health problems.

The attentive reader may have noticed that the health indicators are dichotomous. They have binary operationalisation, simply providing indications of whether individuals did or did not have poor health. This is one of their main drawbacks, because it is often desirable to establish degrees of health and measure health, both conceptually and empirically, along a continuum dimensionally (cf. Tengland 2007). Also, specific clinically diagnosed diseases were not investigated in Studies II-IV, mainly due to data restrictions, and thus were not addressed in them. Rather, in line with much medical sociology research, the indicators were applied as ‘ontological gestalt switches’, which sociologists use to “turn data about specific diseases into medical sociological concepts” (Timmermans and Haas 2008: 663). Such concepts include disease, illness and sickness: a conceptual triad that characterises medical, personal and social aspects of human ailment, as mentioned in section 3.2. When a person seeks medical care, there is usually, but not always, an underlying experience of illness. When a person is either prescribed medication or hospitalised, a medical assessment has been made in which a disorder has been observed and diagnosed. Accordingly, as measures of poor health, the indicators based on prescribed psychotropic drugs and hospitalisation reflect both personal and medical aspects of human ailment, both illness and disease, albeit in a binary and imperfect way.

The advantage of an ontological gestalt switch is that it allows discovery of social patterns that cut across many conditions. The price paid for such a ‘conceptual amalgamation’ is a loss of specificity (Timmermans and Haas 2006: 648). However, this transmutation is similar to that found in the literature on chronic illnesses and non-categorical approaches to chronic diseases (see, e.g., Davis and Bosco 2007). Conceptually, chronic disease includes numerous biological and medical conditions (e.g., diabetes, epilepsy and asthma), but in noncategorical approaches it is assumed that they have similar cross-category effects. A common feature of chronic diseases among children is that they affect the extent to which they can attend and actively participate in school activities due to symptoms and unintended treatment effects (Shaw and McGabe 2007). The concept of poor health and the way it was operationalised in Studies II-IV should be understood in a similar manner.

4.5 Analytical strategies

The analyses presented in Study I, III and IV all involved regression, which is probably the most important statistical technique for social scientists (Djurfeldt 2009). It is highly flexible and can be used to address many research questions. Its main advantage is that it can be applied to study relations between virtually any sets of independent and dependent variables. Thus, it was highly valuable in efforts to meet objectives of the studies underlying the thesis (to investigate

aspects of poor health and their relationships with academic achievement in Sweden).

In Study I, the aim was to examine associations between six mental disorders among children and youths in Sweden and their educational achievements at the end of ninth grade (when students are 15–16-year old). The analytical approach was straightforward: to use linear regression to assess differences in standardised mean grades between those with and without diagnosed mental disorders. The associations with another educational outcome (ineligibility for upper secondary education, indicating problems in completing compulsory education) were also examined. As this was a binary outcome, a regression technique for binary variables, logistic regression analysis, was used. In this manner, the study compared how much more or less likely individuals with diagnosed mental disorders were to attain eligibility for upper secondary education, than those without a diagnosis. Potential effects of comorbidity, i.e., the presence of two or more mental disorders, was also considered in the analyses, using models for each outcome that included all diagnoses.

In Study III, the aim was to examine the associations of several independent variables with the binary (yes/no) dependent variable early school leaving (ESL). Therefore, logistic regression analysis was used. The focal relationships were between the indicators of maternal and paternal illness and ESL. A rich set of covariates representing adolescents' health at birth and in later life as well as their sociodemographic and family characteristics were also included in the models to account for possible confounding effects. By decreasing the potential number of omitted variables, I sought to avoid specification errors, although it is impossible to identify and measure all relevant explanatory variables. Including too many explanatory variables also causes problems, as it dilutes true associations and leads to large standard errors with wide and imprecise confidence intervals. All regression equations are probably misspecified to some degree as it is difficult to strike a perfect balance between under- and over-adjustment of models. However, the aim was to obtain a model that was as parsimonious as possible, providing explanation with as few explanatory variables as possible, and including covariates deemed essential based on theory and prior research. In addition, interaction analyses were performed to investigate whether the effect of parental illness on the probability of ESL varied as a function of gender.

In Study IV, a major aim was to examine the association between having one or more siblings with poor health and academic achievement. For this, the same basic strategy as in Study III was applied. An additional aim was to investigate the extent of the (hypothesised) indirect effect through which a sibling in poor health could affect healthy siblings' educational outcomes, i.e., diversion of parental resources (time and attention) away from the other siblings (section

3.2.3). While I had no direct way of investigating the potential role of disparities in parental time and resources, heterogeneity analysis was deemed helpful. Studies have shown that the recreational and instructional time parents spend with their children varies with their level of education. More educated parents devote more time to their children than less educated parents (Guryan et al. 2008; Dotti Sani and Treas 2016). Following this line of research, the analytical idea was to use parental level of education as a proxy for family resources, and I examined possible modification of the association between siblings' poor health and educational outcomes by family resources through estimation of interaction effects.

In Study II, a somewhat different strategy was employed. The principal aim was to investigate the directionality of associations between mental health problems and school grades across two timepoints. A cross-lagged panel design was applied, within a structural equation modelling framework, and several alternative cross-path models were compared. The models are considered 'crossed' because they can provide quantitative estimates of effects of one variable on another (and vice versa) and 'lagged' because they can provide estimates of relationships between variables across different timepoints (Allen 2017). By lagging dependent variables (in my case two: academic performance and mental health problems) their relationships between timepoints (e.g., T1 and T2) can be determined and used to predict future values from past values. Thus, measurements of a variable at two (or several) timepoints enables use of the variable at T1 (or other timepoint) as a proxy for all explanatory factors that gave rise to it (Teorell 2009). For instance, by controlling for academic performance at T1, all explanatory factors that gave rise to it up to that timepoint can be controlled. Cross-lagged panel analysis is above all a suitable analytical strategy for describing reciprocal relationships, or directional influences between variables over time (Allen 2017).

Four alternative models were compared in which the relationship between academic performance and mental health problems were differently specified. The models were evaluated through several model fit statistics, which provide diagnostic information about how well a statistical model explains the data (Kline 2016). A good model, with high data-model correspondence, allows separation of 'information' and 'noise'. Here, 'information' refers to the structure of relationships, estimates of model parameters and components of variance, while 'noise' refers to the residuals, i.e. variation left unexplained (Burnham and Anderson 2004). The aim is then to obtain a model that minimises information loss and maximizes separation of noise from structural information. According to an information-based approach to inference by statistical models, there are no true models that perfectly reflect reality. As encapsulated by the famous aphorism attributed to Box (1976): "all models are wrong but some are useful". However,

comparing *several* alternative models is like having “multiple working hypotheses” (Chamberlain 1965), entertaining not one but several null hypotheses (models). This enables one to decide which model provides the best explanation of data. In this way, I examined whether mental health problems can be predicted from academic performance, or vice versa, or if the two can be simultaneously and bidirectionally predicted from each other over time.

5. Summary of the empirical studies

5.1 Associations Between Children's Diagnosed Mental Disorders and Educational Achievements in Sweden (Study I)

Authors: Cristian Bortes, Karina Nilsson & Mattias Strandh. CB conceived the study and its design, performed the statistical analyses and drafted the manuscript. KN and MS provided critical revisions of the intellectual content. All authors read and approved the final manuscript.

Recent decades have seen an increase in frequencies of mental health problems among children and youths, including clinical diagnosis and treatment of psychiatric disorders. These trends are worrying as research has shown negative effects of mental illness among children and their learning in school. However, empirical studies on associations between clinically diagnosed mental disorders and educational outcomes in Sweden are rare. The aim of the study was to examine associations between multiple clinically diagnosed mental disorders among children in Sweden and their educational achievements at the end of ninth grade of compulsory school.

Data for the study consisted of prospectively collected individual-level data from several Swedish administrative registers covering the entire population. The study population comprised all individuals born in 2000, 2001 or 2002 who were alive and resident in Sweden in 2017. The final analytical sample consisted of nearly 267 000 individuals. Information on mental disorders was obtained from the National Patient Register (NPR) and all contacts with outpatient psychiatric care units. More specifically, the exposure (independent) variables were defined as receipt of a diagnosis of the following six mental disorders according to the ICD-10, as recorded in the NPR: mood disorder (ICD-10 codes F30-F39), including unipolar depression (ICD-10 codes F32-F33); anxiety disorder (ICD-10 codes F40-F48), including obsessive compulsive disorder (OCD) (ICD-10 code F42); eating disorder (ICD-10 code F50); and attention deficit hyperactivity disorder (ADHD) (ICD-10 code F90).

The outcome (dependent) variables were overall grade sums, which indicates students' levels of educational performance, and ineligibility for upper secondary national programmes, which reveals problems with completing compulsory education. Exposed and unexposed individuals were compared in terms of the outcome variables by fitting linear and logistic regression models. Effect modification by sex was investigated using stratified models. Crude models of associations between each diagnosis and each dependent variable were estimated, which then were adjusted for socioeconomic status. Then all diagnoses were included in a single model for each dependent variable to detect potential effects of comorbidity.

The results showed negative associations between all the examined mental disorders and educational achievements, except for positive associations between eating disorders and grade sums among female students. Being successful in school requires abilities such as cognitive, organisational and time-management skills, as well as social skills. Symptoms of disorders such as ADHD (inattention, hyperactivity, impulsiveness) and depression (reductions in energy, difficulties in concentrating) clearly impair these skills. Thus, it is not surprising that nearly all mental disorders tend to reduce school achievements.

However, the results revealed clear differences in associations between specific diagnoses and the considered outcomes, showing variations in vulnerability associated with different mental disorders. ADHD was the disorder that was, by far, the most strongly associated with students not successfully completing compulsory education, for both male and female students. This was followed by unipolar depression for males and anxiety disorder for females, while OCD had the least negative association with educational achievements.

The results also showed notable differences by sex (gender-based differences), especially for the outcome overall grade sums. Unipolar depression was more strongly associated with lower than average standardised mean grades among male students, who also were less likely to obtain eligibility for upper secondary education than their female peers with the same disorder. The negative association between anxiety disorder, OCD, ADHD and school grades were stronger for female students than for their male counterparts with the same diagnoses. As female students generally outperform male students in education, this is a highly noteworthy finding. Systematic gender-based differences in educational disadvantage associated with a diagnosis of particular mental disorders warrant attention in future research.

The associations between all the exposures and outcomes were greatly attenuated in the fully adjusted model, i.e. when all the diagnoses were included in the same model. This suggests that comorbidity explains much of the 'effect' of individual diagnoses, implying that individuals with psychiatric problems tend to have more than just one problem, which is also consistent with previous findings that comorbidity in mental disorders is very common.

5.2 Psychotropic Medication Use and Academic Performance in Adolescence: A Cross-Lagged Path Analysis (Study II)

Authors: Cristian Bortes, Evelina Landstedt & Mattias Strandh. CB & EL jointly devised the study design and prepared the manuscript. CB performed the statistical analyses and wrote most of the manuscript. MS provided critical revisions of the intellectual content. All authors read and approved the final manuscript.

The study aimed to investigate the interplay between academic performance and mental health problems during mid to late adolescence. The study asked whether poor academic performance would predict subsequent mental health problems. Or whether mental health problems would predict subsequent academic performance. Or whether academic performance and mental health problems would simultaneously predict each other (bidirectionality). The study also examined what influences socioeconomic background and parental psychiatric morbidity have on these associations. Additionally, the study explored heterogeneous patterns in associations by gender and across socioeconomic groups.

To answer these questions, the study made use of longitudinal data from several administrative registers that cover the entire Swedish population. The study sample comprised 85 186 individuals (50.7% girls) born in 1991 who were alive and resident in Sweden in 2010, and who received a complete diploma with grades *both* when graduating compulsory school, when they were 15–16-year-old (T1), *and* three years later, when graduating upper secondary school, when they were 18–19-year-old (T2). Information about their parent's level of education was used to measure socioeconomic background. Academic performance was measured by the school grades assigned to students by teachers in accordance with the Swedish grading system. Information about psychotropic drug prescriptions with details of the patient and the active substance prescribed was used as a proxy for mental health problems. These data were then used to model the directionality of associations between mental health problems and academic performance over time. Multigroup analyses were lastly performed, with gender, socioeconomic background, and upper secondary programme orientation as grouping variables, comparing results for boys and girls across different socioeconomic groups and for students on vocational vs. academic programmes.

The results did not provide support for a bidirectional relationship between the measures of academic performance and mental health problems across the selected time span. Mental health problems by the end of compulsory school were not associated with subsequent academic achievements by the end of upper secondary school, for neither boys nor girls in any of the socioeconomic groups. This result is interpreted as a potential consequence of the very measure of mental health problems used in the study. The medical drug treatment might have had the desired effect and improved functioning concerning academic

performance, implying that the effect of the underlying mental health difficulties and that of the drug treatment cancelled each other out. Nevertheless, the non-significant association between psychotropic drug use at T1 and academic performance at T2 suggests that drug treatment for mental health problems is at least not negatively associated with subsequent schooling outcomes in adolescence.

The empirical analyses did provide support for a unidirectional relationship. The results showed that higher school grades at T1 were associated with relatively lower rates of mental health problems by T2, for both boys and girls. The better adolescents were performing academically at T1, the fewer mental health problems, or, rather, the lower rates of psychotropic drug prescriptions they had at T2. This association was equally strong for both boys and girls. Stratifying the analysis by upper secondary school programme orientation revealed that these associations were statistically significant mainly in the socioeconomic groups with the highest educated parents. Youth from these groups are often the highest performing ones and are also probably experiencing higher expectations from their parents regarding academic achievement. Achieving high grades could therefore be of greater importance for their mental health. Moreover, when considering vocational vs. academic programme orientation, one is likely to capture factors such as academic aspirations, which are in part reflected through the choice of upper secondary programme. Thus, the results suggest that the importance of high grades and doing well in school for future mental health may differ as a function of academic aspirations.

5.3 Parental Illness and Young People's Education (Study III)

Authors: Cristian Bortes, Mattias Strandh & Karina Nilsson. CB & MS conceived of the study idea. CB performed the statistical analyses and drafted the manuscript. MS & KN provided critical revisions of the intellectual content. All authors read and revised the final manuscript.

Poor health is not just an individual problem that only affects the person who has fallen ill. Health problems in families affect other family members as well as the person who is ill. While the psychosocial difficulties associated with parental illness are widely recognized, its educational consequences have received much less attention in the existing literature. The few published studies on the topic have yielded mixed results and are inconclusive. In Sweden, a country with a comprehensive welfare system that provides publicly funded health care and education to the entire population, as well as monetary benefits to those who are ill and cannot work, the issue of how parental illness affects children have only recently started to receive serious attention. This study investigated whether having a parent with psychiatric or somatic health problems, that necessitated hospitalisation, is associated with an increased probability of early school leaving

(ESL) from upper secondary school. The study also analysed how the interaction between the gender of the ill parent and that of the child affects the probability of ESL.

Medical and social microdata from Swedish administrative registers were used and the study population covered nearly 400 000 individuals born between 1987 and 1990. The dependent variable, ESL, was operationalised as a binary variable indicating whether a student had or had not obtained a full upper secondary school qualification within four to seven years of completing compulsory schooling. Maternal and paternal somatic and psychiatric health problems were measured by indicators based on hospitalisations occurring after the year of the child's graduation from compulsory school. Logistic regression models were used to analyse the association between the indicators of parental illness and young people's early school leaving, in relation to health and sociodemographic covariates.

The results showed that maternal and paternal psychiatric health problems were both independently associated with an increased probability of ESL. Covariate adjustment attenuated the associations, suggesting the presence of confounding, although evidence of a parental psychiatric illness effect remained. Magnitudes of the associations appeared modest but of potential significance. For example, the effect sizes of parental psychiatric illness on the probability of ESL were similarly as large as the observed difference in the probability of ESL between children with the lowest and the highest educated parents. Given that parental level of education (frequently used as a measure of students' social background) is one of the strongest determinants of children's educational outcomes, the effect of parental psychiatric illness must here be considered as anything but trivial.

The most detrimental effect was observed for own individual lifetime history of psychiatric illness, which by far increased the probability of ESL more than the other included variables. Two other variables with larger effects than parental illness were family type; if the child lived in a single-parent household and residential instability; whether the child had changed their place of residence at least three times (or more) between the age of 7 and the end of their compulsory schooling. The analysis confirmed that social circumstances are important in determining young people's early school leaving from upper secondary school.

The effects of parental somatic health problems (causing hospitalisation at least seven days), on the other hand, was non-significant. The estimates were equal to zero for paternal somatic illness and close to zero for maternal somatic illness. This result is interpreted in the light of Sweden's institutional welfare system which appears to protect against some of the adverse effects parental illness can have on children's schooling in other national contexts.

The results also confirmed the complexity of ESL, whose determinants range from individual to school- and classroom level characteristics, as well as wider social and economic conditions. This complexity is reflected in the results showing that merely 30% of the variability in the dependent variable (ESL) was accounted for by all the included variables in the model. In addition, the analyses showed no significant interaction effect between the genders of the ill parent and the child on the probability of ESL. Hence, as far as early school leaving from upper secondary education is concerned, there are seemingly no systematic differences in the reactions of boys and girls to parental illness in Sweden, irrespective of the ill parent's gender.

5.4 Sibling Ill Health and Children's Educational Outcomes (Study IV)

Authors: Cristian Bortes, Mattias Strandh & Karina Nilsson. CB & MS jointly conceived the study idea and its design. CB performed the statistical analyses and drafted the manuscript. MS & KN provided critical revisions of the intellectual content. All authors read and approved the final manuscript.

The presence of health problems in a child is known to be negatively associated with later academic achievement, but less is known about the educational outcomes for siblings of children in poor health. Although a few studies have demonstrated the existence of spillover effects of health between siblings in relation to achievement, most related research has been based on small convenience samples and is predominantly based on data from Anglo-Saxon countries. Whether achievement outcomes that are relevant in the Swedish school system are affected by sibling health effects is unexplored. The study investigated how having a sibling with health problems that required repeated hospitalisations is related to a healthy sibling's academic achievements in the final year of compulsory education. The study also analysed whether the parental level of education, as a measure of socioeconomic background and a proxy for family resources, moderated this relationship.

Medical and social microdata from Swedish administrative registers were utilised and the study sample consisted of just more than 115 000 individuals of the cohort born in 1990 in Sweden. The dependent variables were grade sums, which indicates differences in levels of academic achievement, and ineligibility for upper secondary national programmes, which reveals problems with completing compulsory education. Having a sibling with health problems was operationalised using data from the National Patient Register; an indicator for whether a child had one or more siblings who had recurring hospitalisations during the child's life was used as the focal independent variable. Parental level of education was operationalised as the highest level of education attained by either parent when the child started compulsory education. Children with ill

siblings were compared to children whose siblings did not have poor health. Sibling's hospital admissions, the academic achievements of the healthy sibling and interactions with parental level of education were analysed in relation to individual health and family-related covariates using linear and logistic regression models.

The results showed that having had one or more siblings with health problems that necessitated recurrent hospitalisations was associated with lower grades, net of family structure, own individual birth and later life health problems. Children with ill siblings were also less likely to be eligible for an upper secondary education compared to children whose siblings did not have poor health. The fact that these associations remained after adjustment for such a rich set of covariates is a rather clear indication of the existence of sibling health spillover effects also in the Swedish education system.

However, one must ask whether the observed effect sizes are large enough to be of practical interest. As in Study III, other covariates had a somewhat larger effect on the outcomes, such as parental level of education and parental country of birth. This confirms that social background matters greatly with regards to student achievement and that schools fail to fully compensate for differences in social background. Nonetheless, the sibling health effect was not negligible in size and warrants attention. School social workers cannot encourage parents to further educate themselves to a more advanced level to create better conditions for their children. Working with children who are anxious and stressed over conditions at home that are related to their sick sibling is however within the scope of their responsibility and something school social workers could address in their practice.

The results further showed that the associations did not vary by parental level of education. That is, no significant interaction effect was detected. This means that the observed associations did not vary as a function of parental resources. Since the associations were stable across different parental educational levels, a tentative conclusion is that the hypothesised indirect effect through which a sibling's poor health might affect children's schooling, i.e. through parental time and attention constraints (section 3.2.3.), is not the main mechanism driving the association. Had this been the case, the association would have been stronger among those with fewer resources and weaker among those with relatively more resources. This, in turn, implies that having a sibling in poor health is equally disadvantageous for children's schooling independent of their socioeconomic background.

6. Discussion

Having summarised the empirical studies presented in the appended papers, this concluding section discusses the main findings and their implications. The starting point for the thesis was that the relationship between ill health and children's educational achievement cannot be addressed in isolation. Factors of multiple contextual levels must also be considered, and key factors include the schools' student health services, specific family policies, and other elements of the Swedish welfare system.

6.1 Functional impairments and social responses

The first research objective was to study the relationships between multiple clinically diagnosed mental disorders and educational achievements among children in Sweden. The empirical results showed that specific diagnosed mental disorders have varying, largely disadvantageous, associations with educational achievements of students that differ between boys and girls. By documenting this in Sweden the study adds to the existing body of evidence that mental disorders have a negative overall association with educational achievement, despite substantial variation in support and educational systems across countries (Wickersham et al. 2021; Tosto et al. 2015; Riglin et al. 2014).

Regarding support systems, Swedish schools are obliged, according to the Education Act (SFS 2010:800), to provide (as far as possible) conditions that enable all students to achieve the knowledge goals stipulated in the curriculum. Thus, schools are responsible for providing special support or other compensatory adjustments during the teaching for students who are at risk of not achieving the goals. Additional adjustments may include giving them clear instructions, explaining terms or concepts before a new topic is introduced, and provision of access to scanned material, digital aids, or sessions with special education teachers. Special support is usually more extensive, and lasts longer. Examples include formation of special teaching groups, or recruitment of either a special education teacher to work with a student regularly or an assistant who can help the student throughout most of the school day.

These support services are not restricted to students with poor health or a diagnosed mental disorder. Nevertheless, many schools incorrectly only provide them following such diagnosis, although it is not a legal requirement (Skolinspektionen 2015). This is partly due to the difficulties experienced by school staff in determining which school difficulties legitimise special support measures; medical classifications tend to outweigh pedagogical assessments as

they are often perceived to be more ‘objective’ measures of deviations and need for support (see e.g. Isaksson et al. 2009).

This should be considered when interpreting results of Study I, in which links between *diagnoses* of specific mental disorders and academic performance were examined. No evidence of special support that schools may or may not have or have offered students before or after diagnosis was applied in the empirical analyses, but it is nevertheless worth some reflection. Other studies have shown a clear relationship between children having such a diagnosis and receiving special support in school (see, e.g., Skolinspektionen 2016). Thus, it would not be unreasonable to assume that a large share of the thousands of students with a diagnosed mental disorder included in the study population (Study I) obtained additional adjustments or special support. Despite this, the schools did not provide sufficient compensation for students to meet the knowledge goals (on average and group levels). This is one way of viewing the difference in eligibility for upper secondary education between students with and without diagnosed mental disorders. As a group, students with mental disorders had a significant educational disadvantage, even when socioeconomic background was taken into account, which is a major determinant of inequalities in educational outcomes.

The main contribution of Study I, however, is that it shows that the educational disadvantage (and hence presumably vulnerability) associated with diagnoses of specific mental disorders varies. Some of this is partly due to corresponding variation in the degree of functional impairment in terms of abilities required for academic achievement. However, as different mental illness symptoms elicit different social responses in public settings (e.g., Perry 2011), the varying disadvantage associated with different diagnoses could also be partly due to varying responses to them in school settings. Symptoms such as passivity and withdrawal, commonly associated with depression, mood and anxiety disorders, could be interpreted as a lack of motivation and interest in achievement (Farkas 2003; McLeod et al. 2012). Conceivably, students with these symptoms may be less frequently identified as in need of special educational support than those (for example) with symptoms of ADHD. The latter disrupt activities in the classroom and may clearly need more active adjustments and support measures. Thus, the negative association between mental health problems and educational achievements can be understood as a result of not only individual functional impairments but also social responses (or lack thereof). The individual educational plans, which must be established for students needing special support, is an example of a social response. The adequacy of the response in terms of identifying students’ difficulties at individual, group and organisational levels, and providing suitable compensatory efforts, could then determine the educational consequences of poor health.

When such needs are identified, an individual educational plan must be drafted that includes information about the student's school situation and performance, conditions in the class, teaching, and other potentially relevant matters. Furthermore, such a plan should be developed in close cooperation between the school, student and parents. In designing appropriate support, professionals with a wide array of competences (medical, psychological, psychosocial, special education) in the student health team should play important roles. Cooperation between the pedagogical and student health staff is therefore crucial for optimising the support delivered. Unfortunately, student health services' work and coordination have a number of shortcomings and face several challenges, as stated in the Introduction (section 1). For instance, the student health services' responsibilities are not regarded as part of the main responsibilities of schools by education providers and head teachers, and prioritized less strongly than teaching cohorts and meeting class-based pedagogic targets (SOU 2021:11). This could of course affect the adequacy of social responses to students' needs. In addition, special support is more common in school-year 9 (secondary school) than the grades in junior and middle school, while in the Finnish school system (for instance) special support is most common in the lower grades and then declines (Holmlund et al. 2020). This indicates that needs may not be identified early enough, and special support delivered too late in Sweden, with associated risks of negative spirals as interventions that are started too late consume resources, while preventive efforts lag behind.

6.2 Bidirectionality

The second objective (addressed in Study II) was to study the bidirectional relationship between mental health problems and academic performance. The results of Study II provided no support for a bidirectional relationship across the studied age range (15-16 to 18-19 years). Thus, the assumption that the relationship between mental health problems and academic performance is reciprocal did not receive empirical support. As in all cases, however, these results should be viewed in the light of the study's design and measurement of the constructs. As previously emphasised, the relationship between mental health and educational outcomes depends on which aspect is examined. For instance, a previous study (not included in the thesis) found support for a bidirectional relationship between a *positive* aspect of mental health, subjective well-being¹⁷, and academic performance across the age range addressed in Study II, but only for girls (Bortes et al. 2021). Subjective well-being by the end of compulsory

¹⁷ Subjective well-being has often been defined as a construct with cognitive and affective dimensions comprising three components: life satisfaction, positive affect and negative affect. Life satisfaction, the cognitive dimension of subjective well-being, refers to a person's overall evaluation of the quality of his or her life. Positive affect refers to a person's tendency to feel positive feelings, such as happiness, while negative affect refers to the tendency to feel distress (see e.g. Diener 2009).

school was a positive predictor of achievements in upper secondary school, but academic achievements by the end of compulsory school was a negative predictor of subjective well-being in upper secondary school. The study concluded that the subjective well-being of adolescent girls may be important for their ability to perform at school, but their efforts to achieve may also inflict negatively on their well-being. This suggests not only that promoting well-being in school is important but also that school personnel should pay attention to high-achieving adolescent girls and their sense of well-being. The study demonstrates some of the potential insights that can be obtained by examining a relationship's longitudinal directionality.

Focusing on *negative* aspects of mental health, in Study II psychotropic medication was used as a proxy for general mental health problems and the results indicated that it was not associated with subsequent academic performance. This conflicts with findings in Study I, that outpatient contacts due to diagnosed psychiatric conditions were associated with lower educational achievements by the end of ninth grade. This clearly demonstrates that definitions and operationalisations affect estimates. A methodological insight from Study II is that psychotropic medication use is analytically useful as an outcome, but less suitable as an exposure variable, because distinguishing the treatment effect from effects of the underlying health problems is difficult. Nevertheless, the empirical results in Study II provide support for a unidirectional relationship, as school grades at graduation from compulsory school were negative predictors of subsequent psychotropic medication in upper secondary school. This result supports the notion that academic competence may have beneficial effects for young people's mental health. It also has implications for practice and underscores the importance of early interventions to promote children's academic competence.

6.3 A family perspective

The third objective was to study effects of parental somatic and psychiatric health problems on the probability of youths leaving upper secondary education before completion. The empirical results showed that having a mother or father with psychiatric, but not somatic, illness that necessitated hospitalisation after the child's completion of compulsory schooling was associated with increased probability of leaving upper secondary education early (ESL). This is consistent with previous demonstrations of the vulnerability of children of parents with mental illness (Yamamoto and Keogh 2018; Gladstone et al. 2011).

The null-effect of parental somatic illness on the probability of ESL must be discussed here. First, we should remember that the measure includes somatic diseases causing hospitalisations for at least one week. The measure was also

operationalised to include one day of hospitalisation, as an alternative to 7 days. This did not significantly change the results. Since 1990, the number of acute care hospital beds per head of population in Sweden has fallen and is now the lowest of all EU countries, with only 2.3 acute care beds per 1 000 people, compared to an EU average of 4.2 (OECD 2017). Most care is instead provided via outpatient health centres and/or home care. The average length of hospital stay is also very low at 5.9 days, which is the third lowest among EU countries (OECD 2017). In this thesis, I argue that the empirical measures of poor health used in Studies II-IV should be regarded as reflecting disease and illness as broad medical sociological concepts (cf. Twaddle 1994; Timmermans and Haas 2008) to discover patterns that cut across many health conditions.

However, if the measure of somatic illness (in Study III) includes mild conditions, this could explain the null-effect. Official statistics inform us that the seven most commonly recorded diseases and illnesses in 2018 in inpatient care (excluding delivery) were abdominal pain, gastroenteritis, pneumonia, cardiac arrhythmias, kidney and urinary tract infections, heart failure and shock, as well as specific vascular diseases of the brain (Socialstyrelsen 2020). A previous Swedish study (Hjern et al. 2013) assessed associations of specific severe somatic diseases in parents such as: inflammatory bowel disease, including Morbus Chron and ulcerative colitis, multiple sclerosis (MS), and a cancerous disease (leukaemia). Using information from the Swedish patient register, results showed that these somatic diseases had no, or at most very weak, association with children's academic achievements at the end of compulsory school. In an international research perspective, these and the results of Study III are highly interesting. They differ from results of analyses of the relationship in other national contexts, with less developed welfare systems, where clear negative effects of parental somatic medical conditions on children's educational outcomes have been observed (e.g., Johnson and Reynolds 2013; Boardman et al. 2012; Bratti and Mendola 2014). This suggests that Sweden's institutional welfare system might provide protection against some of the adverse effects that parental illness can have on children's schooling in other national contexts.

This also puts the effect of parental *psychiatric* illness in perspective as it was, despite the Swedish welfare context, associated with an increased probability of ESL. This may be due to the high degree of comorbidity among psychiatric conditions (Plana-Ripoll et al. 2019), as well as covariation between psychiatric illnesses and other social problems (cf. Hjern et al. 2013). In addition, psychiatric illnesses cause a greater degree of functional disability than somatic disorders and interfere with fulfilment of complex daily duties and participation in all areas of life (Linden et al. 2015). Notably, for example, it may oblige some children to act as 'young carers' (Aldridge and Becker 1999) for a relative (see section 3.2 and Study III). This involves taking on substantial caring tasks and levels of

responsibility that would usually be associated with an adult. Having to manage daily chores (e.g. supervising and helping siblings with homework or buying and cooking food) and/or the emotional responsibility of providing substantial or regular care (e.g., comforting siblings and parents who are sad, dissatisfied, angry or unhappy) can affect a child's development, participation and opportunities (Winton 2003). This is especially likely in cases of 'parentification', where a child takes on a developmentally inappropriate role, acting as a partner of his or her parent (Harstone and Charles 2012). Although the indicators applied in Study III do not reflect the burden of care responsibilities it seems reasonable to assume that such psychosocial mechanisms underlay the negative relationship observed.

This has clear implications for schools' responsibilities to identify children in need of special support and pay special attention to risk groups (Backlund et al. 2017). Given what we know about children of parents with mental illness, it can be difficult for them to disclose circumstances regarding their parents, as they are afraid of being stigmatised (Yamamoto and Keogh 2018; Gladstone et al. 2011). For this reason, among others, it can be challenging to identify students in school who are young carers. Schools should therefore continue striving to destigmatize mental illness in general, as also desired by young people with mental illness in Swedish schools (Rosvall 2020). Furthermore, when establishing an individual educational plan for a student in need of special support, teachers should pay attention to the student's difficulties at multiple levels. This should include adoption, among others, of a family perspective, as the student's difficulties may not be individual learning difficulties *per se* but part of a more complex psychosocial situation. However, teachers should not work with this alone but, again, in collaboration with professionals in student health teams who have specific, relevant competencies. The school counsellor (the school social worker) is the professional in the student health team with specific competence in psychosocial issues. Moreover, application of screening instruments specifically designed to identify young carers (see Joseph et al. 2009) could be useful. Such an instrument could, for instance, be used in health dialogues offered to all Swedish children on four occasions: in preschool, fourth grade, seventh grade and the first year of upper secondary school, when they are 6, 10, 13 and 16 years old, respectively. Working preventively and identifying problems early in this manner is important. Currently, however, the resources of the student health services and their efforts are predominantly focused on interventions after problems have already arisen (SOU 2021:11).

The fourth objective was to study the relationship between having a sibling with health problems and a healthy sibling's school grades in the final year of compulsory education. The empirical results showed that having had one or more siblings with health problems that necessitated recurrent hospitalisations was associated with lower grades. Children with ill siblings were also less likely to

attain eligibility for an upper secondary education than children whose siblings did not have poor health. This indicates that health has spillover effects among on siblings' achievement outcomes in the Swedish school system, and consistent with findings that siblings of children with a chronic disease may present with psychological, academic, and peer-related difficulties at school (Gan et al. 2017). However, Study IV extended results of prior studies by demonstrating that the negative *experiences* reported are also reflected in lower grades. This result corroborates the importance of considering the child's context. In supporting students who are at risk of not meeting the knowledge goals in school, and to understand their difficulties adequately, it is important to consider their situations on several levels. The thesis brings attention to family relationships as part of children's central life contexts where causes may exist and efforts may be needed.

6.4 Gender and social roles

Another major finding is the difference in associations between specific mental disorders and educational achievements between boys and girls (Study I). For instance, the negative associations between anxiety disorder, OCD, ADHD and school grades, were stronger for girls than for boys with the same diagnoses. As female students generally outperform male students in education (Voyer and Voyer 2014) this is a highly noteworthy result. A possible explanation for these gender differences may lie in the different social responses to girls and boys with mental health problems. For instance, females with ADHD reportedly have weaker hyperactive/impulsive symptoms and more inattentive symptoms than males with ADHD (Gershon 2003). However, they have more internalised symptoms, which could imply that their difficulties in school settings are less often detected than those of boys with ADHD, who present more externalised symptoms (e.g. disruptive behaviours). Thus, the support given to, and/or the social responses to, boys and girls with mental health problems may differ. In that case, this could explain why girls with an ADHD diagnosis were to a much greater extent ineligible for upper secondary education compared to boys with ADHD. In contrast, previous research has found more *similarities* than differences between boys and girls with ADHD in executive function (see e.g. Rucklidge 2010), which is considered a central element of the disability associated with ADHD (Willcutt et al 2005). Other studies of children with emotional, conduct and hyperactivity problems have found that girls tend to be perceived as less impaired than boys by teachers and parents (e.g. Sellers et al. 2014). Systematic gender-based differences in educational disadvantage associated with diagnosis of particular mental disorders warrant further attention, including potential extents of links with differential social responses of health and school personnel.

A further gender-related element of the third objective was to investigate potential gender patterns in the association between parental illness and ESL. Studies of patterns in other national contexts have shown that effects of parental illness may depend on the genders of both the ill parent and the child, for example, in the USA (Johnson and Reynolds 2013), Bosnia and Herzegovina (Bratti and Mendola 2014) and Tanzania (Alam 2015). These gender-based differences could be attributed to gender roles, as fathers and mothers contribute different resources to households. Stereotypically, the father is the household's primary earner (providing monetary inputs) and the mother generally spends more time (providing non-monetary inputs) with their children than fathers. Thus, if a parent suffers a serious health problem there may be an imbalance in the availability of these resources for the children in the family. Simply, the household and children in it are deprived of either time and emotional support if the mother becomes ill, or money if the father becomes ill. The latter may lead to an increased probability of children leaving school to enter the labour market (Bratti and Mendola 2014; Mendolia et al. 2019). However, the results of Study III revealed no such gender-based effects in Sweden for either boys or girls, whether their father or mother suffered from a health problem that necessitated hospitalisation. By employing 'gender' as an analytical category, in contrast to merely 'sex' as a (biological) variable (cf. Shen et al. 2016), these results are given a social scientific explanation here.

Given important features of the family in the Swedish context (section 3.3.2), the absence of a gender-based difference could be interpreted as partly a result of Sweden's gender equality policies. This interpretation is corroborated by the difference between results of Study III and other studies in countries with less gender equality, where there are clear differences between maternal and paternal health effects on children's educational outcomes (e.g. Johnson and Reynolds 2013; Bratti and Mendola 2014; Alam 2015). This could be due to reduction of risks by parents having multiple social roles. If specific resources are attached to a role held primarily by only one parent (family provider or child-carer) there could be severe losses of those resources if that parent suffers from a role-impairing illness or disease. In contrast, if both parents' have similar, mixed social roles, the loss of a role by one parent can be at least partly covered by the other parent, whose roles involve similar resources, and thus will not be as harmful to the family system.

This reasoning draws on ideas that multiple social roles, e.g. combining both work and family-life, have benefits for adults. According to role expansion theory and empirical research supporting it (Barnett 2008; Nordenmark 2004; Barnett and Hyde 2001), multiple social roles generally have beneficial mental, physical and relationship health effects. While there are, of course, upper limits to the benefits (overload and distress may occur beyond certain threshold), multiple social roles

generate social resources and enable people to find satisfaction in one area of life when there are difficulties in other areas.

In addition to benefits for adults, having parents with multiple social roles, which is common in Swedish families, can also have benefits for children. If members of a family have multiple social roles, the family system is less sensitive to potential disruptions arising from disease or illness (cf. Asen 1985; Rolland 1999). This is because if both mothers and fathers have similar roles with similar attached resources (financial and emotional) there is less necessity to redistribute roles and thus less disturbance of the family system's equilibrium. This may at least partly explain why no gender-based differences detects in Study III and why the health of both mothers and fathers are equally important for both boys' and girls' education in Sweden.

6.5 Conclusions

Results presented in this thesis clearly corroborate the importance of health for children's education. They show that Swedish children's educational achievements at the end of compulsory school are inversely related to mental health problems in their adolescence. There are also important gender-related differences in both symptoms of mental disorders and their educational impact. The reciprocal aspect of the relationship between mental health and academic performance among school-aged children remains an important issue that requires further investigation. However, the results also show that it is not sufficient to consider individual children's health in isolation; parents' and siblings' health problems can affect children and have negative 'spillover' effects on their schooling and educational achievements. Moreover, the social context strongly shapes the relationships involved, and the institutional setting of the Swedish welfare state likely mitigates some adverse effects of parental illness documented in other national contexts. The health of both mothers and fathers is equally important for the education of their sons and daughters, probably due to the relatively high gender equality in Sweden. Taken together, health, and thus the school's student health task, is highly associated with academic achievement and schools' pedagogical responsibilities.

Acknowledgements

En ständigt närvarande metafor under min tid som doktorand, och som avhandlingsarbetet har liknats vid, har varit den om att springa ett maraton. Att springa ett maraton betraktas i allmänhet som en rejäl utmaning och det är med sina 42 195 meter en distans som även erfarna löpare är ödmjuka inför. I viss mån är löpning i allra högsta grad en individuell aktivitet, något man gör själv. Att genomföra ett långlopp kräver därför motivation och disciplin. Men, för att det ska bli en positiv upplevelse och för att man ska ta sig över mållinjen utan (större) skador krävs också bra tränare, en bra arrangör, hängivna funktionärer samt stöd och hejarop från publik längs med banan. Nu när jag har passerat min mållinje vill jag därför tacka alla som på ett eller annat sätt bidragit till detta.

Först och främst vill jag tacka min handledare Mattias och medförfattare Karina vars forskningsprojekt var det som ens möjliggjorde min tillvaro som doktorand. Dina kommentarer på mina utkast Mattias är något jag alltid sett fram emot. Tack för allt stöd, för att du har varit, och är, så snäll och generös. Tack till Veronica – som längs med vägen blev min huvudhandledare – för allt fix samt mentalt och själsligt stöd, framförallt under den sista mest utmattande av de drygt fyra milen. Att ha kunnat prata med dig om processens alla vedermödor har betytt mycket. Tack också till Per-Åke som alltid varit tillgänglig och hjälpt mig navigera i de skolrelaterade frågorna.

Petra Ahnlund har varit den som vid de årliga avstämningarna sett till att alla vitala parametrar varit i gott skick. Lite av en farthållare och ”medic” med andra ord, som sett till att man håller rätt fart och inte behöver bryta loppet. Tack Petra för ditt engagemang för oss doktorander. Tack till Evelina för din gasen-i-botten-plattan-i-mattan-mentalitet som gör att saker och ting händer och går framåt. Samarbetet med dig kan liknas vid att ha en bra sparring- och träningskompis, vilket har varit utvecklande. Tack även till Ylva B Almquist som langade lite vätska och extra energi vid en servicestation, kan man säga.

Tack till alla doktorandkollegor genom åren – ingen nämnd, ingen glömd – för gemenskap och inspiration. Till Jenny Häggström för att du med tålmod bemött alla mina datarelaterade frågor. Tack till Hildur för dina inspel, de lämnade ju avtryck i marginalen. Tack till alla i granskningsgrupp 1 för era insatser inför och under mittseminarium – era synpunkter gav mig en välbehövd riktning inför slutfasen av arbetet. Likaså ett tack till Bitte Modin för din noggranna läsning av mina texter och ett trevligt slutseminarium. Samt till Urban Markström och Frida Rudolphi vars grönläsning hjälpte till med den slutliga tillspetsningen. Tack till alla andra vid institutionen för socialt arbete för att vi sköter om varandra så fint.

Tack till Syrran, Patrik, Rebeca och Valter för att ni finns och har hejat på. Tack till Rosmarie och Johan för somrarna vid ”pensionat Lundqvist” – en oas för mig präglad av löparromantik kombinerat med god mat och dryck – där en betydande del av denna avhandling blev till. Tack till min kära mor för att du alltid finns där och är mitt ovärderliga stöd, inte bara i detta utan också i det större loppet som kallas livet. Slutligen, min kära Cissi, som i vått och torrt står vid min sida och alltid är beredd att hjälpa till. Du har inte bara vinkat av mig vid start och mött mig vid målgång, utan har följt med längs hela banan, funnits vid varje vätskestation, peppat och plåstrat om. Du har nog sett fram emot min målgång. Men ett slut innebär bara en ny början.

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Appendix

A1. Numbers of siblings and educational achievement in Sweden

During the studies underlying this thesis I encountered theories suggesting that educational outcomes should be poorer for children in larger families and discussed their validity in societies such as Sweden with colleagues. This fostered interest in the relationship between numbers of siblings and children's educational outcomes. Economic theories on the relationship between family size and child outcomes propose a 'quantity-quality trade-off', as increases in numbers of children force parents to decrease their investment per child (Becker and Lewis 1973; Becker and Tomes 1976). Sociological theories also propose that the amount of parental involvement, attention and time devoted to each child, is diluted with increases in numbers of children (Blake 1989; Downey 1995).

However, treating 'attention' and 'time' as resources, it may be simplistic to consider merely their top-down transfer from parents to children. Socioemotional resources that are beneficial for outcomes in life could also be obtained 'horizontally' (in generational terms) from siblings who may act as role models, provide social support, and inspire each other to progress at school or in other domains of life. This possibility (the social support hypothesis) is often overlooked in economic theories on intrahousehold resource allocation. In addition, the Swedish welfare system encompasses a number of measures to support children and their parents, including various kinds of healthcare and child care, an inclusive education system, and financial aid, which may strongly ameliorate any adverse effects of family size in Sweden (Åslund and Grönqvist 2010).

Results of regression analyses of the relationship between number of siblings and two educational outcomes — overall grade sum in ninth grade (Figure 1) and ineligibility for a national programme in upper secondary school (Figure 2) — are presented below. Two caveats are that the analyses included both full and half siblings and do not take into account the order in the sibling group. A previous Swedish study found the latter to be important, at least for adult earnings, which were found to be positively affected by having one younger sibling, i.e., being the older sibling (Skog 2019). The cited study also found that only children (i.e. being the only child) and those with more than two siblings had lower adult earnings

than children who had one sibling, if they grew up in poor families, but not otherwise.¹⁸

The models that generated the estimates presented below are based on a sample of individuals born in the period 2000-2002 who were alive and resident in Sweden in 2017 (n=291 264). The models are adjusted for the family’s disposable income per consumption unit and the index-persons sex.¹⁹

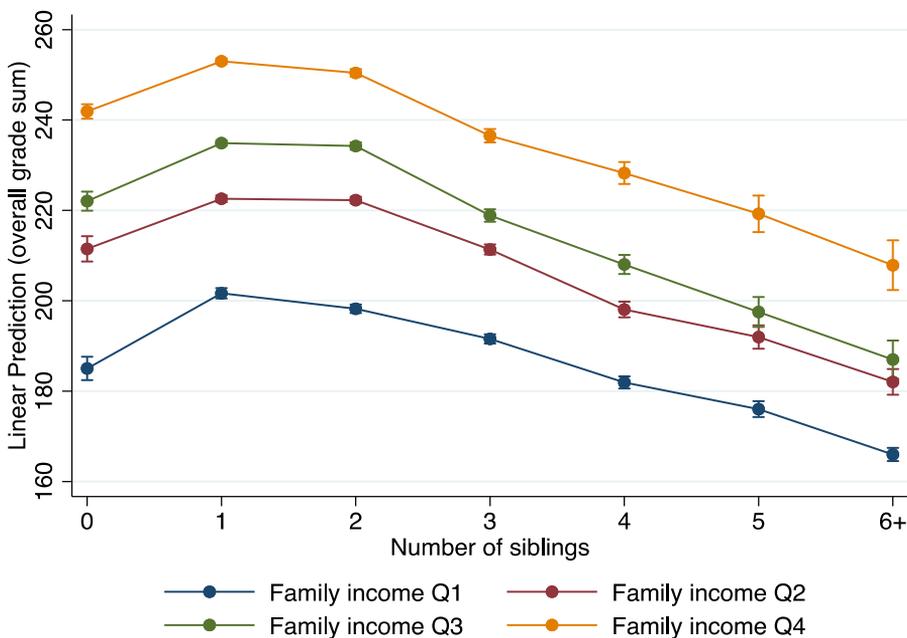


Figure 1. Predictive margins of overall grade sum by number of siblings and family income.

Figure 1 shows estimates (with 95% confidence intervals) of overall grade sum (vertical axis) predicted from the index-person’s number of siblings (horizontal axis) and family income quartiles. The figure shows a clear income gradient. Children from families with higher income than average have higher grades than average, and children from families with lower income have lower grades. Clearly,

¹⁸ The study by Skoog (2019) included four Swedish cohorts born in the period 1971-1974. Poor and wealthy families were discriminated by the bottom 10th and top 90th earnings percentiles, respectively, of the sum of the total earnings of both parents. Adult earnings were measured when the individuals in the sample were between 37 and 40 years old. The study also discusses mechanisms of how these effects operate.

¹⁹ Disposable income per consumption unit is obtained by dividing the sum of all disposable income of all members of the family by the consumption weight that applies to the household (see Statistics Sweden 2019).

having many siblings is associated with lower grades, on average. However, the relationship is not linear. Children with no siblings tend to have lower grades than children with one, two, and (in the lowest income quartile) three siblings. Thus, children with no siblings have an educational disadvantage and only children with four or more siblings have a greater disadvantage in Sweden.

The figure also shows the significance of socioeconomic background. Children in families from the lowest income quartile gain the most from one additional sibling, as the slope from only children to having one sibling is visibly steeper than the corresponding slope for the other income quartiles. This is consistent with findings by Skog (2019) that being an only child negatively impacts adult earnings of poor children, but not others, and that relational aspects of the sibling configuration (whether one has a sibling or not, and the birth order of siblings) depend on family resources. The results presented here indicate that one sibling provides children of poor families with somewhat larger benefits than children of more affluent families. This pattern is even clearer when ineligibility for upper secondary education is used as the outcome (Figure 2).

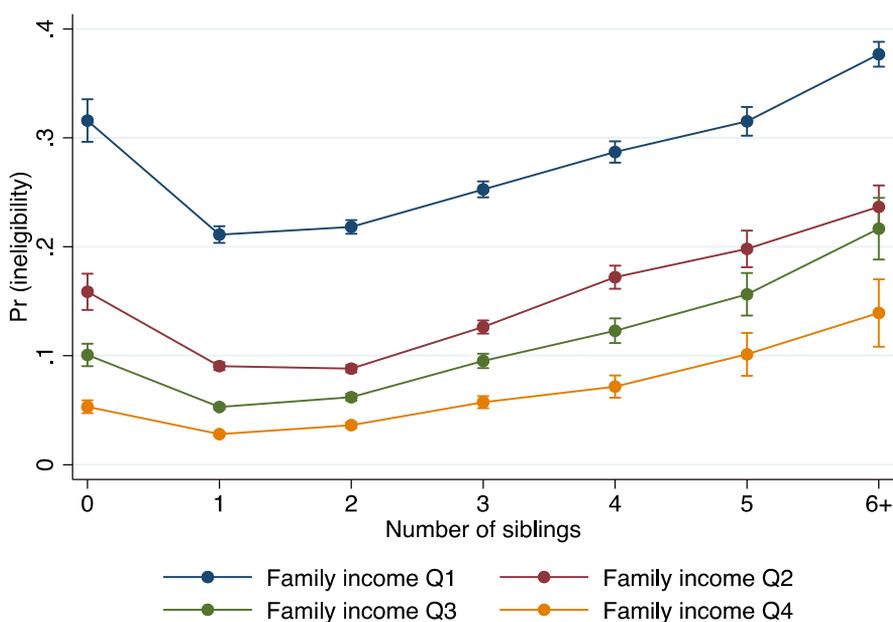


Figure 2. Predicted probability of ineligibility for upper secondary education by number of siblings and family income.

Figure 2 displays the relationship between number of siblings and the probability of ineligibility for upper secondary education by family income. The vertical axis

shows the probability scale ranging from, in total, 0 to 1. The pattern is very similar to the pattern obtained with grade sum as the outcome. However, the educational disadvantage of children of families in the lowest income quartile is even clearer, especially for only children. Overall, these empirical estimates indicate that having a large family, or rather having many siblings, is associated with lower educational achievements even in contemporary Sweden. This supports the quantity-quality trade-off hypothesis. Most interestingly, however, is the non-linear aspect of the association; relative to being an only child, having one to three siblings is rather beneficial in terms of educational achievement, supporting the social support hypothesis.