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## Parental unemployment and child health

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**IFAU**

Institute for Evaluation of Labour  
Market and Education Policy

# **Parental unemployment and child health**

Eva Mörk  
Anna Sjögren  
Helena Svaleryd

**WORKING PAPER 2014:8**

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# Parental unemployment and child health<sup>1</sup>

by

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## Abstract

We analyze to what extent health outcomes of Swedish children are worse among children whose parents become unemployed. To this end we combine Swedish hospitalization data for 1992-2007 for children 3-18 years of age with register data on parental unemployment. We find that children with unemployed parents are 17 percent more likely to be hospitalized than other children, but that most of the difference is driven by selection. A child fixed-effects approach suggests a small effect of parental unemployment on child health.

Keywords: Parental unemployment, child health, human capital

JEL-codes: I12, J13

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## 1 Introduction

Many children are exposed to parental unemployment during childhood. For example, Lovell and Isaacs (2010) note that as a result of the recession following the financial crisis, one out of nine American children has an unemployed parent. There are reasons to believe that children of unemployed parents fare worse than other children with respect to a number of different outcomes. UNICEF (2012) reported that the risk of deprivation is on average five times higher for children in jobless households than for children in general.<sup>1</sup> Part of this deprivation is likely to be related to underlying factors that affect both the likelihood that parents become unemployed and child health. However, it is also possible that unemployment per se may worsen family conditions and thus have a negative impact on child health.

Understanding the role of parental unemployment in shaping the human capital and well-being of children is important not only in order to estimate the full societal costs of unemployment, but also to guide the formulation of adequate human capital policies aiming to bridge and prevent permanent consequences of childhood disadvantage. Parental unemployment shocks may also have long-term consequences for the children: recent research points to the importance of early in life experiences for cognitive development and later success on the labor market (see e.g. Cunha and Heckman, 2007, 2008; Almond and Currie, 2011).

There are a number of studies that investigate the correlation between parental unemployment and child outcomes. Christoffersen (2000) finds, using Danish data, that children hospitalized for abuse more often have unemployed parents than other children. In addition, Christoffersen (1994) finds that at age 25, children of long term unemployed parents are more likely to have vocational training, being unemployed and to suffer from psychological problems than peers whose parents were not long term unemployed during their childhood. Also, Pedersen et al. (2005), using survey data from the Nordic countries, find that children in families with at least one parent without paid work fare worse when it comes to chronic illnesses and psychosomatic symptoms, but are not prescribed more medicine. They also show that controlling for the family's financial conditions only slightly reduces the associations between parental unemployment and children's health outcomes. In another study based on Swedish

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<sup>1</sup> According to the UNICEF deprivation index a child is deprived if it lacks two or more of fourteen listed items including three meals per day, books in the home, etc.

survey data, Ström (2002) also finds a positive correlation between parental unemployment and child accidents.<sup>2</sup>

Although analyzing interesting correlations, these studies tell us little about the causal effect of unemployment on child outcome, since unemployment may depend on individual characteristics that also affect health. In search for exogenous variation in unemployment, a large literature has turned to analyzing the effects of being exposed to a plant closure on outcomes. This literature has found that exposure to plant closures have negative consequences for worker's health, mental well-being, economic status and marriage stability, all of which influence the parents' capacity to invest in and care for their children (Jacobsen et al., 1993, Stevens, 1997, Sullivan and von Wachter, 2009, Eliason and Storrie, 2009, and Eliason 2011). Evidence from the plant-closure literature also suggests intergenerational consequences of parental job-loss on long run outcomes such as earnings and employment for children from disadvantaged families (Page et al., 2007; Oreopoulos et al., 2008). There are a few studies which find immediate effects on children's educational outcomes of parental job-loss (Coelli, 2010; Stevens and Schaller, 2010; and Rege et al., 2009). We will return to those studies in the next section.

Since a large share of job-losers is likely to find new employment relatively soon, plant-closure studies do not capture the effects of unemployment per se, although unemployment is likely to be one of the possible consequences of job loss. The purpose of this paper is therefore to further analyze the relationship between parental unemployment and child health outcomes. We combine Swedish hospitalization data for 1992-2007 with register data on unemployment, and analyze to what extent health outcomes of children in the ages 3-18, measured as hospital admissions, are worse among children whose parents become unemployed. In order to take selection into account, i.e. that parents who become unemployed are not a random sample of parents, we use an individual fixed effects approach. Thus we can compare cross section estimates to individual fixed effects estimates where the latter use within-child variation in parental unemployment.

An important contribution of this paper is to assess the extent to which this disadvantage is due to selection. This is particularly important when designing policies

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<sup>2</sup> See also the references within these studies for more correlation studies.

to address childhood disadvantage since the degree of selection will be informative on whether adequate policies should focus on alleviating the immediate negative consequences of unemployment or be directed towards improving the situation for children in vulnerable environments.

Our fixed effects approach allows us to handle and assess the importance of selection. However, to the extent that the health consequences of parental unemployment develop slowly or if they are long lasting, this approach risks underestimating the effect of adverse labor market outcomes and child health because some of the negative consequences are captured in the child fixed effects. To remedy this problem we study long run health consequences as well as health before and after the first time that a parent becomes unemployed.

Yet, we need to be cautious in drawing strong conclusions regarding causality. First, it is possible that the causality runs in the opposite direction, i.e. from child health to parental unemployment. That children's health status may affect parental labor supply is supported by, e.g., Powers (2001) and Heck and Makuc (2000) who find that parents of children with disabilities or special needs are likely to work fewer hours. To limit the risk of confusing parental unemployment with reductions in labor supply to care for an unhealthy child, we only categorize parents as unemployed if they are registered at the employment agency actively searching for work. We also limit the sample to families where the parents were in the labor force before they became unemployed. A second challenge to identification in the absence of true exogenous variation in either parental unemployment or child health is that it is hard to rule out that observed associations are in fact due to a presence of unobserved factors or shocks that may influence both parental unemployment and child health. Richness of data, however allows us to handle a number of such possible confounding factors. In particular, we can isolate effects of parental unemployment from shocks to parental health, family disruption and loss of household income. We are also able to investigate the dynamics of these possible confounders around unemployment and discuss possible biases, mechanisms and to what extent we can interpret estimates as causal.

We find that the children of unemployed parents are much more likely to be hospitalized than other children. Comparing the incidence of hospitalization of the children whose parents are unemployed to children whose parents are employed, the



former are 17 percent more likely to be hospitalized. However, we find that much of these raw differences are driven by selection. Using the child-fixed effect approach, we find that parental unemployment is associated with an immediate 1 percent increase in hospitalization and a 5 percent increase in the likelihood of hospitalization in the long run. Dynamics of child health and other outcomes in the family lend some support for a causal interpretation and suggest that declining disposable income and poor parental health may well be possible mechanisms.

Studying the impact of maternal and paternal unemployment spells separately shows that maternal unemployment is more strongly negatively associated to child health than is father's unemployment. We also find that the associations between parental unemployment and child health differ depending on parental characteristics. For example, although parental unemployment among families with low education level is correlated with worse child health, we find no remaining association between health and unemployment once we control for child-fixed effects. For families where at least one parent has some higher education, unemployment is however associated with a small but significant increase in the probability that the child is admitted to hospital.

The paper is organized in the following way: First we outline a theoretical framework for thinking about the consequences of parental unemployment for child health, and discuss empirical evidence on the effects of unemployment on parents and children. In section 3 we present the empirical strategy and definition of variables. We present the data and the institutional setting in section 4. Section 5 presents the main results and section 6 concludes.

## **2 Consequences of parental unemployment on child health**

In this section we will first formulate a simple production function for child health and discuss how the arguments in the production function are affected when a parent becomes unemployed. We will thereafter discuss earlier empirical evidence on the effect of parental unemployment on child outcomes.

## 2.1 A production function for child health

In order to organize ideas on how parental unemployment may affect child health, it is helpful to start with a simple production function for child health.<sup>3</sup> The main elements of this production function are family consumption of market goods and parental care, where the latter is a function of parental time and parental human capital. Further elements are publicly provided goods and care, such as preventive health care programs and other forms of publicly provided health investments in school or otherwise, the child's previous human capital which in turn is a function of both previous health condition, genetic disposition and other cognitive and non-cognitive skills that may influence health outcomes. There is of course also an element of luck, or bad luck in the case of bad health shocks.

$$\text{child health} = H(\text{market goods}, \text{parental care}, \text{publicly provided goods}, \\ \text{publicly provided care}, \text{child human capital}, \text{health shock})$$

Parental unemployment is likely to affect several components in this production function. First, and perhaps most direct, unemployment implies lost earnings, which can lead to a reduction in both quantity and quality of market goods. To some extent, lost earnings are compensated with benefits from the unemployment insurance, but even if parents receive UI-benefits, these do not fully compensate for lost earnings. Also, there is a time limit on how long UI-benefits can be received.<sup>4</sup> Loss of income could potentially also lead to a reduction in the family consumption of goods and activities that are hazardous, such as alcohol and cigarettes.<sup>5</sup> Swedish evidence, however, suggests that job-loss leads to more alcohol related morbidity and mortality for both men and women (Eliason and Storrie, 2009, Eliason, 2014). We might at first suspect that changes in consumption patterns following income loss would have negative

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<sup>3</sup> Inspiration for the proposed health production function comes from Gronau (1974) and Rosenzweig and Schultz (1983).

<sup>4</sup> A person entitled to the income related benefit receives 80 percent of lost income, up to a low ceiling, for the first 200 days and thereafter 70 percent for an additional of 100 days. In practice, a majority of workers have earnings above the ceiling and therefore face lower effective replacement rates. (See e.g. Kolsrud, 2013) To receive unemployment benefit from unemployment insurance you need to fulfill a working requirement which implies that you need to have worked at least 80 hours per month for 6 months within the last 12 months, or a total 480 hours (min 50 hours per month) during uninterrupted 6 month period to qualify for basic benefits. Second you need to have been a member of an unemployment insurance fund for at least 12 months to qualify for income related benefits.

<sup>5</sup> The earlier evidence on adult health effects of economic recessions and down turns, often using aggregate data, show elements of counter cyclical health (Ruhm, 2000 and Ruhm and Black, 2002). One explanation for this pattern is that the consumption of hazardous goods decreases.

consequences mostly for child health in poor households, where nutrition levels are critical. However, lower or altered consumption patterns may also involve sports activities or other health promoting activities for the children that middle income families no longer can prioritize if they experience a drop in income.

Second, unemployed parents arguably have more time for their children since they do not spend time at work. However, to the extent that job search and home production of goods and services that previously could be outsourced or bought in the market require time, there may actually be less time for child health investments. Moreover, if the unemployed parent suffers from status loss, stress or poor health as a result of the job loss, (which Kuhn et al. 2009, Austria, and Eliason and Storrie, 2009, Sweden find), or if the job loss leads to a deterioration of the home environment due to parental conflict, the quality adjusted time spent with children may decline.<sup>6</sup> Eliason (2011) finds that the risk of marriage dissolution increases by 13 percent in Sweden as a consequence of husband's job loss.<sup>7</sup>

Publicly provided goods and care may also change as a result of parental unemployment. Clearly, publicly provided care may be compensatory and increase when parents become unemployed. On the other hand, spending on public care may decrease when local economic conditions deteriorate. However, in a Swedish context it is relevant to take into consideration that local spending, by the design of the redistributive funding system of Swedish municipalities, is only marginally influenced by local fluctuations in the tax base. However, if children who were previously enrolled in childcare instead are cared for at home, publicly provided care and goods investments in these children will decline. It is possible, that time and resources invested in child health at home make up for the difference. Also, to the extent that access to publicly provided health investments, such as immunization programs, check-ups and other forms of preventive care, require time investments from parents, unemployed parents

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<sup>6</sup> While Kuhn et al. (2009) find that expenditures on medical treatments in general are not strongly affected by job displacement they find that job loss significantly increases expenditures for antidepressants and related drugs, as well as for hospitalizations due to mental health problems for men (but not for women) although the effects are economically rather small. They also find that sickness benefits strongly increase due to job loss. In a study on Danish data, Browning et al. (2006) find no health effects of job loss. Job displacement has been found to increase mortality in Sweden, Norway and the US (Eliason and Storrie, 2009, Rege et al., 2009 and Sullivan and von Wachter, 2009) However, Martikainen et al. (2007) find no effect for Finland. In particular, Eliason and Storrie (2009) study the consequences of job displacement during a 12-year period and find that job loss significantly increases the risk of hospitalization due to alcohol-related conditions, among both men and women, and due to traffic accidents and self-harm, among men only.

<sup>7</sup> Huttunen and Kellokumpu (2012) find similar evidence for Finland.

may in some situation have better access to these resources, which could lead to improvements in child health.

Just as with other forms of human capital, it is possible that health and other forms of human capital begets health in the sense that previous investments in human capital influence the child's present health status and possibly how sensitive the child's health is to changes in resources.<sup>8</sup> Exposure to periods of low or insufficient health investments may thus continue to affect child health outcomes for a long time. To summarize, the direction in which parental unemployment affects child health outcomes is ambiguous, implying that it is an empirical question. Moreover, the nature of health production shows that focus should not only be on short run effects but also on long run effects.

## **2.2 Empirical evidence – child outcomes**

As mentioned in the introduction, several studies provide evidence of correlations between parental unemployment and child health. In addition, the vast plant closure literature is informative of what we can expect from unemployment, although we need to keep in mind that losing one's job does not necessarily mean that the person becomes unemployed. Many workers find a new job straight away. In the following section, we will present evidence of how parental job loss due to mass layoffs or plant closure affects children's outcomes.

There are a few studies on the long run consequences of parental job loss due to plant closure on children. Oreopoulos et al. (2008) study the intergenerational cost of job loss on child earnings. Using Canadian administrative data that follows more than 39,000 father-son pairs from 1978 to 1999, they find that children whose fathers were displaced have annual earnings about nine percent lower than similar children whose fathers did not experience an employment shock. These children are also more likely to receive unemployment insurance and social assistance as young adults. The estimates are driven by the experiences of children whose family income was at the bottom of the income distribution.

Page et al. (2007) similarly, find no evidence of intergenerational effects of parental job loss on the average child on US data. However, when they analyze disadvantaged children (defined by family income or race), they also find evidence of negative effects

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<sup>8</sup> See Cunha and Heckman (2007) for a general discussion of the production function for human capital.

of parental displacement on income, earnings, and completed education. Although the findings suggest that firm closings may have no intergenerational effects on average, there is evidence that such events impose long-term costs on disadvantaged children. Moreover, an interesting finding is that the effects of exogenous income shocks (from business closings) are largest among children who were younger than 7 at the time of the income shock. In a similar study on Norwegian data, Bratberg et al. (2008) find that although displaced parents experience significant reductions in both earnings and employment, there are no significant effects on earnings of the next generation. This results contrast from the studies on North America which found negative effects at the lower end of the income distribution.

Studies of the long run consequences for children do not provide information as to why parental job loss affects the children. A recent literature has attempted to study the immediate effects of parental job loss on children's schooling outcomes. Stevens and Schaller (2010) study the effect of parental job loss on grade retention. They find a fifteen percent increase in grade retention when controlling for child fixed effects. The effect is driven by children whose parents have no more than a high school education. There is no evidence of significantly increased grade retention prior to the job loss, suggesting a causal link between the parental employment shock and children's academic difficulties. In a study of Canadian youth, Coelli (2010) finds that parental job loss from mass layoffs and business failure that occurs when youths are in the process of completing high school, leads to drops in College enrollment by ten percent. The effect comes from main bread winner job loss – and not spousal job – loss suggesting that the main channel is the loss of income. It is also shown that parental job losses are followed by significant falls in parental income.

Using Norwegian register data, Rege et al. (2011) estimate how children's school performance is affected by their parents' exposure to plant closure. The estimates suggest that paternal job loss has a negative effect on children's school performance whereas maternal job loss has no statistically significant effect. The study explores and finds that the negative effect of paternal job loss appears to be unrelated to its effect on father's income, father's employment status, shifts in maternal time towards employment, marital dissolution, and residential relocation.

Our reading of the evidence from the job-loss literature suggests that children of weaker socioeconomic background are more adversely affected by job-loss. A possible reason is of course that their parents have a harder time recovering and finding new employment.

### **3 Empirical strategy**

There are mainly two issues we aim to analyze in this paper. First, we are interested in documenting the correlation between parental unemployment and child health outcomes, i.e. do children of unemployed parents experience worse health outcomes than children whose parents are working. We believe that these correlations are of their own interest. Second, we would like to control for selection into unemployment, i.e. the fact that some families are more likely to experience both unemployment and bad health. We do this by including child fixed effects in the estimation, which implies that we compare the health of a child when the parent is unemployed to the health of the same child when the parent is working. Our ambition is to get as close as possible to causal estimates – although absence of experimental data does put limits on how close we can get.

In order to be able to capture causal effects from fixed-effect estimates, there are two major concerns. First, we need to limit the scope for reverse causality and we need to limit the extent to which both unemployment and child health may be the consequence of outside events that we are not able to control for in the model. There are indeed reasons to believe that causality can run in both directions, such that parental unemployment can affect child health and that poor child health can cause parental unemployment or withdrawal from the labor market.<sup>9</sup> In order to limit the scope for reverse causality, we restrict our analysis to parents participating in the labor force.

Second, the child specific fixed effects are only able to capture family characteristics that are constant over time, and hence unable to control for time-varying factors that

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<sup>9</sup> Furthermore, it is not obvious how to sort out the exact timing of events event in monthly register data, both regarding unemployment spells and hospitalization. In the case of unemployment, a parent is likely to be given notice well in advance of actual registration at the unemployment office. Labor market contracts will typically dictate different lengths of the legal notification period, both depending on the type of job and on tenure. Since entitlement to benefits requires registration, it is however likely that those who become unemployed eventually register when they need benefits. Moreover, being registered as unemployed requires the individual to actively seek work. A parent, who has become unemployed because of the need to care for a sick child, may hence have to postpone registering as unemployed to when the child is getting better. Determining the timing of child health shocks is also problematic. It is likely that the child in many cases has been ill already a number of days before hospitalization.

affect both parental unemployment and child health. The richness of our data allows us to include a number of time varying family characteristics that may influence both parental unemployment and child health and limit the scope for omitted confounders. However, we are not able to control for unobservable time-varying factors or shocks that affect both unemployment and child health. In order to dig deeper into the issue of causality, we will also perform a dynamic analysis, investigating what happens in the years around when parents become unemployed.

We estimate the following econometric model both without and with a child specific fixed effect:

$$health_{it} = \alpha + \beta \text{parent unemployed}_{it} + \delta_i + \mathbf{X}_{it,(t-1)} + year_t + \varepsilon_{it},$$

where the outcome *health* is an indicator variable taking the value 1 if child *i* has been admitted to hospital at least once in year *t*. Our variable of interest is *parent unemployed* which is a dummy variable taking the value one if the mother or the father is unemployed and zero if both parents are employed. The year fixed effects capture calendar year variation in hospitalization and possible changes in coding practice that affect all admittance in a given year, regardless of age of the child.  $X_{it}$  is a vector of time varying (and fixed) parent and child characteristics. The time invariant characteristics included are age and sex of the child, parental age and education level, and an indicator for immigrant background, taking the value one, if both parents are born outside Sweden. Time varying parental – or family – characteristics included are: parental health, family disposable income and an indicator for if the child's parents live together, all measured in the previous period.<sup>10</sup> We also control for the local unemployment rate.  $\varepsilon$  is the usual error term. Standard errors are clustered by family (mother) since there may be random shocks to the family creating correlation in illness across siblings.

We believe that this approach allows us to handle the selection problem and to some extent limit the risk of misinterpreting associations running in the opposite direction and effects of confounding factors as effects of parental unemployment. However, if health consequences of parental unemployment develop slowly or persist after parents regain

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<sup>10</sup> The reason for lagging these variables is that they might be affected by unemployment. In specific, disposable income most likely is.

employment, this approach may underestimate the effect of unemployment on child health. We therefore also attempt to capture long run effects of parental unemployment by defining the variable *first unemployment* that takes the value zero until one of the parents become unemployed and the value one thereafter.<sup>11</sup> Since our unemployment data starts in 1992 we cannot observe the parental unemployment history of children that are born before 1992, and we will therefore focus on the cohorts born in 1992 and later for this part of the analysis.

In addition, we also explore the timing of possible health effects of parental unemployment by estimating the health dynamics the years before and after the first spell of parental unemployment. In order to establish causality, ideally such dynamics should show that child health changes with and after the exposure to parental unemployment. However, we need to keep in mind that parents who eventually become unemployed are likely to anticipate the risk of unemployment and also be given notice well in advance of registering at the unemployment office.

Since we are concerned that the family may be affected by other shocks which in turn increase parental unemployment and worsen child health, we also study the how family income, parental health and separations evolve around time the parent became unemployed. Finally, we study whether the effects of parental unemployment and child hospitalization are different for mother's and father's unemployment, different lengths of the unemployment spells and whether they differ with respect to the child's sex, immigrant background and parental education

#### **4 Data and variables**

The data analyzed in this paper are drawn from a number of official registers covering the entire Swedish population. We focus on children aged 3-18 during the years 1992-2007 and their biological parents.<sup>12</sup> For simplicity we limit our analysis to children with both biological parents alive. This gives us approximately 1.3 million observations (children) each year.

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<sup>11</sup> We define the variable as missing if any parent is outside the labor force before the first unemployment spell, but once a parent has experienced unemployment it takes the value one thereafter even if any parent leave the labor force.

<sup>12</sup> The reason for excluding children younger than age three is that parents are likely to stay home with parental leave benefits during the first two years.



We have chosen to study unemployment of the biological parents rather than, for example, the adults living in the same household as the child according to the register. The main motivation for this choice is that it is common in Sweden that parents share custody of children when separating, implying that the child alternately lives with both the mother and the father. In the registers the child can only be assigned to one household making it impossible to know exactly how the time is divided (if it is divided) between parents. Moreover, the child may be affected by parental unemployment although the child does not live with the parent, since it may imply lower contributions to the care of the child. Finally, due to data limitations, we cannot always observe whether an additional adult lives in a separated parent's household or not, unless the adults are married or have common children.

Data on health outcomes are taken from the National Patient Register which contains information about all in-patient care in Swedish hospitals. Our dependent variable is a dummy variable indicating whether the child has been in in-patient care for any diagnose during the year. Obviously, hospitalization is not always the first sign of bad health and in most cases children do not need hospital care at all. Thus, a limitation with our measure of child health is that hospitalization data only pick up severe health problems. An important advantage with using register data is however that it is a fairly objective measure of health. Since Sweden has a universally provided, publicly funded health care system of good quality and free health care for children, admittance to hospital should reflect the need of health care rather than the financial resources of the parents.

Data on children's health outcomes are linked to data on parents from the administrative register LOUISE from Statistics Sweden. LOUISE contains information on parental income, education and age. Information on unemployment comes from the Swedish Public Employment Service. In the data, we observe whether the parent has been registered at the employment office during the observational year. We define a parent as unemployed if he/she is registered as openly unemployed or participates in a labor market program at any occasion during the year, and as employed if he/she is not

registered as openly unemployed/participating in a labor market program and has an income from paid work or self-employment which exceeds the Income Base Amount.<sup>13</sup>

By imposing an earnings requirement for being categorized as employed we restrict the analysis to children whose parents are participating in the labor force and exclude children whose parents are not registered as unemployed and who have no earnings. The motivation for excluding parents outside the labor force is that we suspect that one reason for not participating in the labor force might be that parents take care of a sick child.<sup>14</sup> By excluding these parents we limit the risk of capturing reverse causality. In addition we avoid the risk of having the estimated relation between unemployment and child health affected by the possibility that parents who are out of the labor force to care for a sick child register as unemployed when the child gets well. Such behavior would imply that health improvements induce parental unemployment. Besides taking care of a sick child, there are a number of other potential reasons for being out of the labor force, e.g. being a full time student, staying at home taking care of (healthy) children. It is therefore likely that being out of the labor force affects children quite differently than parental unemployment.

How good is our measure of unemployment, or put in another way, is there a risk that we miss people that are actually in the labor force searching for jobs, but have chosen not to register at the Employment Services? We believe that this risk is limited, since there are strong financial and other incentives for unemployed to register at the Employment Services. First of all, only registered unemployed are eligible for unemployment benefits. Second, access to training and coaching requires registration. Also, calculating the unemployment rate using this measure gives very similar numbers as using self-reported data on employment status.

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<sup>13</sup> The Income Base Amount is set every year by the Swedish Government and depends on the development of wages in the economy. Among other things it is used to determine amount paid to the public pension system.

<sup>14</sup> However, in Sweden all working parents get compensation from the public insurance system when they temporarily need to stay home from work to care for a sick child under the age of 12, and in special circumstances until age 16. During the 1990's and early 2000's, mothers took about 65 percent of the total number of days. In case of longer illnesses lasting more than 6 months, parents are entitled to a special care allowance.

Table 1: Summary statistics – annual observations for children ages 3-18 for the years 1992-2007

	i	ii	iii	iv
	Parents in labor force	Any parent unemployed	Both parents unemployed	Both parents employed
Sick	38.55	43.78	46.92	36.25
Age	10.50	9.79	9.12	10.82
Girl	0.486	0.485	0.484	1.49
Non-immigrant background	0.901	0.812	0.631	0.940
Parents. living together	0.744	0.622	0.575	0.798
Age, mother	39.12	37.13	35.39	39.99
Age, father	41.84	40.25	38.97	42.54
Years of education, mother	11.76	11.04	10.62	12.06
Years of education, father	11.72	11.13	10.86	11.97
Sick, mother	78.83	103.63	129.97	67.92
Sick, father	47.00	60.33	75.20	41.15
Disp. Income	271,854	214,092	178,152	297,280
Any parent unemployed	0.305	1	1	0
Both parents unemployed	0.068	0.224	1	0
Mother unemployed	0.210	0.688	1	0
Father unemployed	0.164	0.536	1	0
Number of observations	21,109,926	6,445,896	1,444,610	14,664,030

Column (i) in Table 1 shows summary statistics for in-patient care, a number of child and parental characteristics as well as parental unemployment for the sample used in the estimations. Approximately 38.6 children out of 1,000 have at least one hospital stay during the year. Furthermore, 30.5 percent have at least one parent who experiences unemployment during a year, whereas only 6.8 percent experience that both parents are unemployed during the year.<sup>15</sup> It is also somewhat more common that the mother is unemployed than the father. Finally, we note that hospitalization is considerably more common among mothers than among fathers. The likely reason is that women experience spells of hospitalization in connection with child births.

In the next three columns we have divided the sample by parental unemployment status. Children whose parents are unemployed during the year are more likely to have at least one hospital stay. They are also slightly younger, which is also true for their parents, and live in families with lower disposable income. Moreover, parents experiencing unemployment have worse health outcomes.

In sum, from simple summary statistics it does seem that children whose parents experience unemployment have worse health outcomes than other children. However,

<sup>15</sup> Note that the unemployment spells of the mother and father do not need to occur at the same time.

this may be due to the fact that these families typically are younger or that parents have worse health. In addition, there may be other, unobservable family characteristics that affect both the likelihood that parents are unemployed and the likelihood that children experience bad health.

Table 2 Summary statistics – annual observations for children ages 3-18, born 1992 or later, for the years 1992-2007

	i Parents in labor force	ii Any parent unemployed	iii Both parents employed
Sick	36.28	37.38	33.10
Age	7.16	7.53	6.75
Girl	0.487	0.487	0.488
Non-immigrant background	0.851	0.831	0.957
Parents living together	0.769	0.706	0.883
Age, mother	36.53	35.98	37.73
Age, father	39.43	38.93	40.15
Years of education, mother	11.72	11.37	12.44
Years of education, father	11.67	11.39	12.26
Sick, mother	107.56	110.92	80.12
Sick, father	45.38	49.10	33.60
Disposable income	273,351	247,440	338,954
Any parent unemployed	0.671	1	0
Number of observations	9,384,169	5,641,407	2,771,080

As mentioned in Section 3, we will in addition to analyzing the direct links between parental unemployment and child health also analyze longer run consequences of parental unemployment by focusing on a sample for which we observe parental outcomes through childhood, i.e. by focusing on children born 1992 and later. Table 2 shows summary statistic for this reduced sample with younger children. Compared to the full sample described in Table 1 these younger children are less likely to be in in-patient care and the parents are, among other things, younger and more likely to be born outside Sweden. As in the full sample, children with parents who have been unemployed are more likely to have been admitted to hospital than other children.

## 5 Results

### 5.1 Graphical analysis

Before turning to the results from the estimations, we present a graphical analysis. Figure 1 shows how children's health varies through childhood and by parental

unemployment status. The dashed line shows the number of children out of a thousand who are hospitalized at some point during a year at a particular age whose parents are unemployed and the solid line shows the corresponding number for children whose parents are not unemployed. The left figure shows the age-health profiles for boys and the right figure shows the profiles for girls.

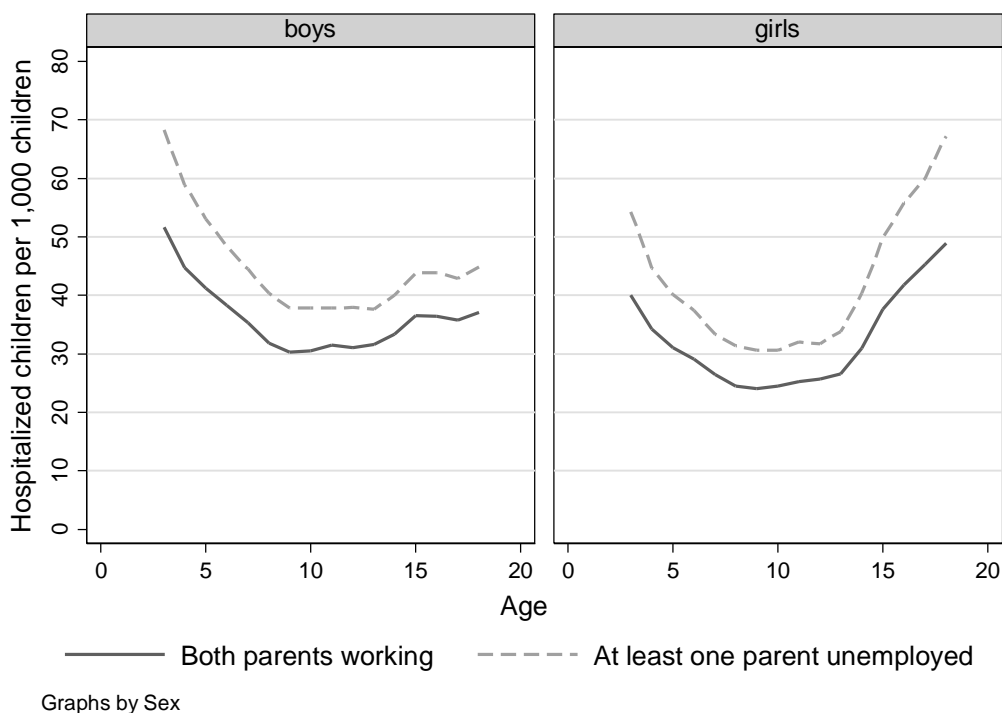


Figure 1 Hospitalization per 1 000 children, by parents' employment status. Boys and girls, ages 3-18, in 1992-2007

It is evident that admissions to hospital are most common for very young children. As the children grow older, the incidence decreases until the age of nine, when the curve flattens out. During adolescence the curve turns upward again, especially for girls. Note also that preschool and primary school boys have a higher incidence of hospitalization than girls, but that teenage girls are more likely to be hospitalized than teenage boys. It is also clear that children where at least one of the parents experiences unemployment are subject to a higher level of hospitalization. This is true for all ages.

The next figure, Figure 2, shows the hospitalization rate for children who experienced the first parental unemployment spell at different ages compared to hospitalization rate for children with employed parents. For example, the solid line shows the relative hospitalization rate for children whose parent became unemployed

when they were of age 0-2, the second line “parent unemployed at ages 3-5” shows the relative incidence of in-patient care for children for whose parent became unemployed for the first time when the child was of age 3-5, and so forth.

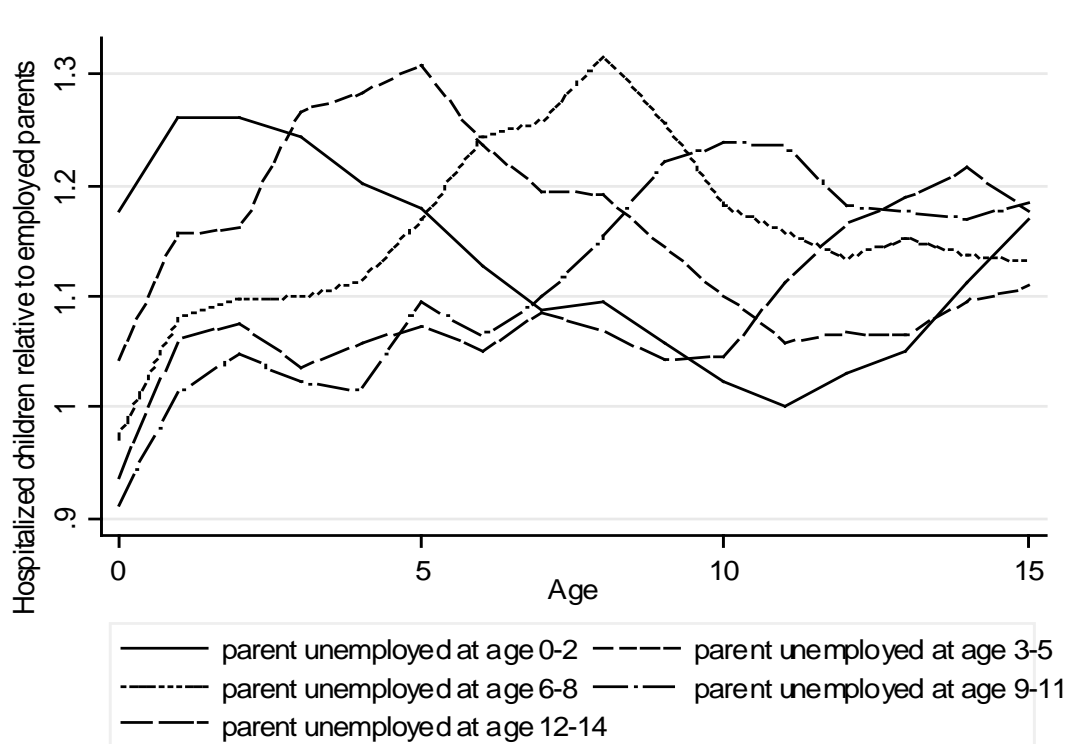


Figure 2 The ratio of hospitalization of children with unemployed parents relative to children with employed parents, by the child’s age at the first unemployment spell. Ages 3-14 in 1992-2007

The lines in Figure 2 show that the relative hospitalization rate at a specific age is the highest among children who at that age have a parent who becomes unemployed for the first time. As discussed before, this pattern of worse health for the children of the unemployed can be due to selection, i.e. that there is some underlying reason why a parent both is unemployed and has sick children. Most curves are persistently above one, suggesting higher hospitalization rates of children whose parents become unemployed at some point as compared to children whose parents are always employed, also at times when parents of the former group are employed.

## 5.2 Estimation results

In this paper, we are interested in measuring the overall correlation between parental unemployment and child health as well as understanding to what extent this correlation is driven by selection. Our ambition is to get as close to a causal estimate of the effect of

unemployment as is possible absent true exogenous variation in parental unemployment. We start by investigating the short run association between parental unemployment and child health. Thereafter we turn to a dynamic setting where we allow for unemployment to affect child health during several years after the first unemployment spell. We also investigate the dynamic pattern of child health around the year of parental unemployment. Finally, we investigate whether our results differ with respect to a number of child and parental specific characteristics.

### **5.2.1 Short run association between parental unemployment and child health**

Column (i) in Table 3 shows the correlation between parental unemployment (measured as having at least one parent unemployed at some point in time during a year) and children's hospitalization, controlling for sex of the child as well as fixed child age- and calendar year-effects. There is a strong positive correlation between having a parent who is unemployed and being admitted to hospital. The estimate implies that between 6 and 7 (6.6) more children per thousand children are hospitalized at least one night if at least one of their parents experiences unemployment during the year. If we compare these figures to the mean hospitalization rate, which is 38.55 per thousand children, our estimate corresponds to a 17 percent higher hospitalization rate. In column (ii) we also control for parental characteristics such as parental age, education, past hospitalization, and whether the parents were living together last year, as well as if they have immigrant background, in order to handle some of the potential selection into unemployment. Doing this reduces the parameter estimate somewhat to 4.3. In column (iii) we also control for lagged family income<sup>16</sup>, which increases the point estimate somewhat. In column (iv) we further include municipal unemployment, resulting in a point estimate of around 4, which corresponds to a ten percent higher likelihood of hospitalization if a parent is unemployed.<sup>17</sup>

Hence, it is clear that there is strong correlation between parental unemployment and children's health outcomes. It is also clear that some of the correlation is due to selection: the initial estimates are reduced as controls are introduced. In a further attempt to handle selection, we instead include child specific fixed effects that capture

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<sup>16</sup> In this specification, we include percentile ranked lagged disposable income in the mother's family. We have also experimented with including the family income in levels as well as defining families differently. This does not alter the results to any large extent.

<sup>17</sup> We have also included municipality fixed effects, but it turns out that this gives the same result as when including municipal unemployment.

any genetic pre-disposition or family or child specific characteristics that are constant over time. Such an approach relies on individual observations that change status over time for identification, i.e. children whose parents work in some years and are unemployed in others. Thus, it is worth noting that the identifying variation comes from the sample of children whose parents change employment status during their childhood. As a result we cannot say anything about what the effects of parental unemployment are for children whose parents always or never are unemployed.

The results in column (v) in Table 3 show that the point estimate diminishes considerably, but we still find a statistically significant relation between unemployment and child hospitalization. As discussed earlier, including a child fixed effect implies that effects of permanent factors which affect both parental unemployment and child health are removed. There can however be time-varying factors which cause the observed relation between parental employment and child health. In order to get a picture of how important such time-varying factors might be, column (vi) includes both child fixed effects and a number of observable time-varying factors such as parental health, disposable income and whether the parents live together. Comparing the estimates in columns (v) and (vi), we note that including these observable factors reduces the estimate somewhat from 0.449 to 0.342. This suggests that other, unobservable time-varying, factors are likely to be of some importance but given the small change in the estimated parameter when time-varying controls are included, other unobservable time-varying factors are arguably unlikely to completely alter the qualitative results. The point estimate of 0.34 corresponds to a 1 percent increase, which would suggest that parental unemployment per se accounts for only a small share, 6% (1/17), of the worse health suffered by these children.



Table 3 Parental unemployment status and child hospitalization, short run

	i	ii	iii	iv	v	vi
Any parent unemployed	6.617*** (0.114)	4.255*** (0.119)	4.673*** (0.121)	3.996*** (0.122)	0.449*** (0.150)	0.342** (0.151)
Year, age	Yes	Yes	Yes	Yes	Yes	Yes
Parental controls	No	Yes	Yes	Yes	No	Yes
Family income	No	No	Yes	Yes	No	Yes
Municipal unemploy.	No	No	No	Yes	No	Yes
Child fixed effect	No	No	No	No	Yes	Yes
No of obs	21,109,926	21,109,926	21,109,926	21,109,926	21,109,926	21,109,926
No of ind.					2,945,267	2,945,267

Clustered (by mother) robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Parental controls in ii-iv: age, education, immigrant background, disposable income t-1, parents separated t-1 and parental hospitalization t-1, in v: age, disposable income t-1, parents separated t-1 and parental hospitalization t-1.

The identifying variation in the estimation of the parameters in columns (v) and (vi) comes from the sample of children whose parents change employment status during their childhood. Thus the reduction of the point estimate, when including the child fixed effects, may partly be due to that the effect is estimated for the population of children whose parents are unemployed some, but not all years. It is likely that hospitalization patterns are different for this group compared to the full population. In order to investigate to what extent the change in the estimated parameter is driven by the selected sample, Table 4 investigates the relationship between unemployment and child health in this particular population of children. Comparing the estimated relation between parental unemployment in column (i) with the results in Table 3 shows that the relation between parental unemployment and child health is indeed weaker in the selected population. This suggests that children with parents who are never unemployed are less likely to be hospitalized than children with parents who are unemployed. There is however, still a rather strong relation between parental unemployment status and child hospitalization also among children of “occasionally unemployed parents”. In columns (ii)-(vi) different parental and regional time-varying controls are included and columns (v) and (vi) show the results with child fixed effects. The results are similar to the results in Table 3, thus the reduction of the estimated effect in the fixed effects model in Table 3 is not due to that the identifying variation only comes from a selected sample.

Table 4 Parental unemployment status and child hospitalization, short run. Only children whose parents change unemployment status

	i	ii	iii	iv	v	vi
Any parent unemployed	4.209*** (0.130)	2.933*** (0.133)	3.372*** (0.135)	2.854*** (0.136)	0.439*** (0.152)	0.340** (0.152)
Year, age	Yes	Yes	Yes	Yes	Yes	Yes
Parental controls	No	Yes	Yes	Yes	No	Yes
Family income	No	No	Yes	Yes	No	Yes
Municipal unemploy.	No	No	No	Yes	No	Yes
Child fixed effects	No	No	No	No	No	Yes
No of obs	12,458,252	12,458,252	12,458,252	12,458,252	12,458,252	12,458,252
No of ind.					1,603,459	1,603,459

Clustered (by mother) robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Parental controls in ii-iv: age, education, immigrant background, disposable income t-1, parents separated t-1 and parental hospitalization t-1, in v: age, disposable income t-1, parents separated t-1 and parental hospitalization t-1.

In Table 5, we explore if the degree to which a family is hit by unemployment matters. We investigate (i) whether it matters if only one or both parents experience unemployment during the year, and (ii) to what extent the relation differs with the length of the parental unemployment spell. To limit the number of point estimates we focus on the cross-section model with a full set of controls, corresponding to column (iv) in Table 3 and the child fixed-effects model of column (vi).

The results in column (i) show a positive correlation between having both parents unemployed and being hospitalized, in addition to having one unemployed parent. Yet, in column (ii), when controlling for child-fixed effects, we do not find any additional effect of having both parents unemployed. In columns (iii) and (iv) we have instead created a dummy taking the value one if either parent experiences more than 6 months of unemployment during the year. The results in column (iii) show a strong association between both short and long-term unemployment and child health. The results presented in column (iv) using the fixed-effects model suggests, however, that it is long term unemployment which is associated with negative effects on health. Short spells have a positive but insignificant coefficient once a dummy for longer spells is included in the model.

Table 5 Severity of unemployment in the family, both parents unemployed and long-term unemployment

	i	ii	iii	iv
Any parent Unemployed	3.491*** (0.126)	0.353** (0.152)	2.642*** (0.140)	0.156 (0.163)
Both parents Unemployed	2.964*** (0.235)	-0.132 (0.286)		
Any parent unemployed more than six months			2.845*** (0.175)	0.531*** (0.190)
Year, age	Yes	Yes	Yes	Yes
Parental controls	Yes	Yes	Yes	Yes
Family income	Yes	Yes	Yes	Yes
Municipal unemployment	Yes	Yes	Yes	Yes
Child fixed effect	No	Yes	No	Yes
No of observations	21,109,926	21,109,926	21,109,926	21,109,926
No of individuals		2,945,267		2,945,267

Clustered (by mother) robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Parental controls in (i) and (iii): age, education, immigrant background, disposable income t-1, parents separated t-1 and parental hospitalization t-1, in (ii) and (iv): age, disposable income t-1, parents separated t-1 and parental hospitalization t-1.

### 5.2.2 Long run association between parental unemployment and child health

In the analysis above we investigated the association between parental unemployment and child hospitalization, taking place within the same year. However, there are reasons to believe that this analysis may underestimate the detrimental effects of parental unemployment, since it is likely to take some time before a parent's unemployment affects child health. Especially since we are analyzing a quite serious indications of bad health; hospitalization. In Table 6 we therefore estimate a long-run model where the variable "Any parent unemployed" takes the value one from first year that any parent is unemployed and remains at that value all consecutive years. Since we only observe the full employment history of parents whose children are born in 1992 and after, we limit the sample to this population.<sup>18</sup>

Looking at the correlation controlling only for child age and sex in column (i), we see that approximately 5.8 more children out of 1,000 are hospitalized if at least one of their parents has been unemployed compared to other children. This corresponds to an increase with around 16 percent. Comparing the results in Table 6 to the short-run results in Table 3, it is clear that the same the pattern of decreasing point estimates when controlling for potential selection appears. However, the point estimate in column (v), i.e. when controlling for child-specific fixed effects, is considerably larger than the corresponding point estimate in Table 3. The point estimate of 1.8 indicates that a child

<sup>18</sup> Also in this part of the analysis we focus on children ages 3 and older.

is 5 percent more likely to be hospitalized the years following parental unemployment. Comparing the point estimates in column (i) and (v), it seems like 70 percent of the correlation estimated in column (i) is due to selection, and that 30 percent of the correlation remains when controlling for any unobserved differences that are constants over time.

Table 6 Parental unemployment status and hospitalization: Long run

	i	ii	iii	iv	v
Years after first parental unemployment	5.785*** (0.167)	3.771*** (0.179)	3.939*** (0.183)	3.135*** (0.183)	1.752*** (0.503)
Year, age	Yes	Yes	Yes	Yes	Yes
Parental controls	No	Yes	Yes	Yes	Yes
Family income	No	No	Yes	Yes	Yes
Municipal unemployment	No	No	No	Yes	Yes
Child fixed effect	No	No	No	No	Yes
No of observations	8,412,487	8,412,487	8,412,487	8,412,487	8,412,487
No of individuals					1,242,178

Clustered (by mother) robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Children born 1992 and later. Parental controls in ii-iv: age, education, immigrant background, disposable income t-1, parents separated t-1, and parental hospitalization t-1, in v: age, disposable income t-1, parents separated t-1 and parental hospitalization t-1.

### 5.3 Health dynamics and mechanisms

In the analysis above we are able to control for selection by controlling for child fixed effects and for a number of potential confounders that may affect both health of children and unemployment of parents. We are also able to limit the identification problems related to reverse causality. For example, by excluding families in which at least one of the parents are not in the labor force, we exclude the risk of picking up effects that are due to that parents with sick children drop out of the labor force. In this section we investigate if the timing of health effects lends further credibility to a causal interpretation. To this end we estimate a model capturing the dynamics of child health in the years before and after the child's first exposure to parental unemployment. Ideally, we should see health deteriorating in the year of, and after the first spell of, unemployment. Unemployment cannot, however, be regarded as a truly random event in this analysis. Even if unemployment is unexpected, families are likely to find out that a member will lose, or is at risk of losing, a job well before they actually do so. Thus, it is possible that negative health effects precede registered unemployment.

In addition to studying how child health evolves around the time of parental unemployment, we also analyze the dynamic patterns of the family's disposable income, parental hospitalization and family disruption, i.e. if the parents separate.

Income, parental health and marital stability are all factors that may be affected by unemployment. They may also in turn affect child health and hence constitute possible mechanisms through which parental unemployment affects children. However, parental health and possibly also family disruption may also have a role in causing, or increasing the risk of parental unemployment and directly affect child health. Analyzing the dynamics of these factors around the year when parents first become unemployed, thus hopefully sheds light on the timing of events, reveal possible mechanisms and thereby help us interpret our results.

We restrict the sample to families where both parents participate in the labor market and are employed all years prior to the first unemployment spell. Since we need a pre-unemployment period to compare with, we include children younger than three in the sample, but restrict the analysis to unemployment spells from age three and onwards. Hence, children whose parents become unemployed before the child turns three are excluded. These sample restrictions imply that we in this section focus on families with parents who are rather well established on the labor market, since they have been employed for at least three years. In addition, the remaining sample is considerably smaller than the samples analyzed above.

Table 7 Dynamics

	Child health i	Log of Family income ii	Parental health iii	Separations iv
t-4	1.545 (1.881)	-0.0136*** (0.00255)	3.883 (2.894)	0.0101*** (0.00227)
t-3	2.438 (1.766)	-0.0225*** (0.00273)	3.101 (2.661)	0.0157*** (0.00252)
t-2	2.622 (1.672)	-0.0353*** (0.00287)	5.429** (2.474)	0.0219*** (0.00266)
t-1	2.682* (1.605)	-0.0514*** (0.00304)	25.91*** (2.578)	0.0328*** (0.00277)
Year of first parental unemployment spell	4.224*** (1.561)	-0.204*** (0.00385)	5.391** (2.424)	0.0405*** (0.00289)
t+1	4.280*** (1.575)	-0.119*** (0.00352)	15.24*** (2.483)	0.0161*** (0.00297)
t+2	3.939** (1.626)	-0.121*** (0.00358)	17.84*** (2.549)	0.0259*** (0.00307)
t+3+	2.744* (1.560)	-0.123*** (0.00369)	19.04*** (2.242)	0.0501*** (0.00320)
No of observations	4,431,297	4,416,540	4,431,297	4,431,297
No of individuals	663,919	660,523	663,919	663,919

Clustered (by mother) robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Children born 1992 and later, of age 0-18 of whom both parents are employed at ages 0-2. Child-fixed effects included in all specification. Parental controls in (i) age, family disposable income in t-1, parents separated in t-1 and hospitalization in t-1, in (ii) age, parents separated in t-1 and hospitalization in t-1, in (iii) age, family disposable income in t-1, parents separated in t-1, and in (iv) age, family disposable income in t-1, and hospitalization in t-1.

Table 7 column (i) presents the child-fixed effects results from a model like the long-run-model estimated previously, but when we estimate separate effects for the years before and after a parent first becomes unemployed. The negative point estimates appearing already before the parent becomes unemployed indicate that children have worse health already a number of years before the family is hit by unemployment. We note, however, that there is a significant increase in the likelihood of hospitalization in the year a parent becomes unemployed. This increased likelihood of hospitalization lasts for 1-2 years and then returns to pre-unemployment levels, suggesting that some health conditions may take time to develop.

Next we turn to studying how disposable income, parental health and family disruption evolve around the time the parent becomes unemployed. These are all factors that we believe may affect both parental unemployment and child health, which is why we control for lagged values of these variables in the analysis above as well as in column (i) in Table 7.<sup>19</sup> Starting with the findings for family income, presented in column (ii), it is clear that there is a sharp and significant drop in income the first year of parental unemployment, although there is some evidence that disposable income starts to decline already the years leading up to unemployment. The results also suggest that it takes some time before family income recovers. Hence, families are not able to make up completely for the income loss due to job loss through unemployment insurance or increased labor supply of the other parent. The pre-unemployment decline in income supports the need to control for lagged disposable income. The reason is that these reductions in disposable income may cause children's health to deteriorate regardless of parental employment status. However, declining disposable income prior to the first unemployment spell, may in fact be the result of processes that precede registered unemployment, but which are directly related to events that lead to unemployment. Yet, the sharp decline in disposable income accompanying unemployment shows that income loss is a possible mechanism for why health of children is negatively affected by parental unemployment.

The corresponding results for parental health are presented in column (iii). There is a significant increase in hospitalization the year prior to the start of the unemployment spell. One interpretation of this result is that deteriorating parental health may be a

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<sup>19</sup> The models in columns (ii-iv) are identical to the model in column (i), except that we do not include a control for lagged values of the dependent variable of interest in the respective models.

factor causing parental unemployment. Hence, it is crucial to control, as we do, for lagged parental health in models attempting to estimate effects of parental unemployment. Another potential interpretation of pre-unemployment increases in parental hospitalization is that the process leading up to unemployment, such as re-organization of the firm, early warnings or announcements of plant closure and/or extended notice periods may be causing parental stress and lead to worsened health already before parents register as unemployed. Column (iii) shows that parental hospitalization rates are also higher the years following the entry into unemployment and that the magnitude of effects is greater than the effect on the children.<sup>20</sup>

Finally we investigate if the parents live together as a family and how this likelihood changes around unemployment. Results in column (iv) show that parents who experience unemployment are indeed more likely to separate. There is, however, no sharp jump in the separation rate in the first year of unemployment. Instead families experiencing unemployment appear to be on a trend with larger risk of separation both before and after the first unemployment spell. Hence, it does not seem as if family disruption is a major mechanism through which parental unemployment hurts child health. Neither does family disruption seem to have a role in causing parental unemployment.

To conclude, we interpret the results in Table 7 as supportive of a causal interpretation of the results. It seems fair to interpret some of the association between parental unemployment and child health uncovered in Table 3-Table 6 as evidence of a causal effect of parental unemployment on child health, especially since we are able to control for a number of likely confounders as well as control for selection through child-specific fixed effects. It should however be kept in mind that our identification strategy does not take unobservable time-varying shocks that affect both unemployment and child health into account.

#### **5.4 Heterogenous effects**

In the analysis above, we have studied average associations or effects of unemployment. In this section we turn to analyze whether parental unemployment has similar effects on child hospitalization across children who differ with respect to a number of individual

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<sup>20</sup> From the analysis we cannot tell whether it is the parent that becomes unemployed that experiences worse health outcomes, or if it is the spouse of the unemployed parent that is affected in ways similar to the children.

and family characteristics. First, we analyze whether it matters whether it is the father or the mother that experiences unemployment. Then, we investigate whether the effects of unemployment differ with respect to child gender and parental education. We have analyzed both short-run associations (as in Table 3) and long-run associations (as in Table 6). Because results show similar patterns, we report only short-run results, except for the results for gender differences, where we find notable differences between the short and the long run perspective.

In order to put the estimates into perspective, Table 8 presents summary statistics of hospitalization and parental unemployment in these subgroups. Note that boys are more often hospitalized than girls and that hospitalizations decrease with parental education. Also, note that unemployment decreases with education, just as hospitalization.

Table 8 Summary statistics: hospitalization and parental unemployment for different subgroups. Sample used in short-run analysis

	Hospitalization	Any parent unemployed
Girls	37.65	0.305
Boys	41.33	0.306
Non-immigrant background	39.98	0.275
Immigrant background	36.62	0.579
Low education	45.15	0.490
Medium education	40.41	0.313
High education	35.52	0.240

#### 5.4.1 Mothers or fathers? Does it matter?

As discussed in section 2, there is earlier empirical evidence suggesting that effects may differ depending on which parent it is who experiences unemployment. In Table 9 we distinguish between maternal and paternal unemployment and estimate the model both without (column (i)) and with (column (ii)) child-specific fixed effects. From the results it is evident that there is a stronger association between maternal unemployment and child health. In the fixed-effect estimations, the coefficient on paternal unemployment is close to zero and not statistically significant. This suggests that maternal employment status is more important for child health.

This finding is in line with the evidence presented in Christoffersen (2000), but at odds with the findings of Rege et al. (2011) regarding effects of job loss due to plant closure on academic achievements.



Table 9 Maternal or paternal unemployment and hospitalization

	i	ii
Maternal unemployment	3.960*** (0.139)	0.337** (0.171)
Paternal unemployment	2.633*** (0.151)	0.0639 (0.194)
Number of observations	21,109,926	21,109,926
Number of individuals		2,945,267
Year, age	Yes	Yes
Parental controls	Yes	Yes
Family income	Yes	Yes
Municipal unemployment	Yes	Yes
Child fixed effect	No	Yes

Clustered (by mother) robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Parental controls in i: age, education, immigrant background, disposable income t-1, separated parents t-1 and parental hospitalization t-1, in ii: age, disposable income t-1, separated parents t-1 and parental hospitalization t-1.

#### 5.4.2 How are boys or girls affected?

In Table 10 we estimate our models for girls and boys separately. One reason for conducting the analysis separately for girls and boys is the pattern found in Figure 1 where it is clear that especially for teenagers, both the level of hospitalization and the differences between hospitalization rates of children with and without unemployed parents differ for boys and girls. Results are displayed both for the short run (top panel) and for the longer run (bottom panel).

Focusing on the short run it seems like, if anything, the overall association is stronger for girls than for boys. Note also that because hospitalization rates are lower for girls than for boys (37.6 compared to 41.3), this implies that in relative terms the association is stronger for girls than for boys. However, once we include child-specific fixed effects, it is only the point estimate for boys that is statistically significant (although quite similar in size to that for girls). Next, focusing on the long run, the fixed effect estimate is larger for girls than for boys.

A possible interpretation is that boys are indeed negatively affected in the short run while girls are more sensitive to health conditions that develop over time. In view of the evidence in National Board of Health (2009), a likely explanation is that boys are more likely to be hospitalized because of injuries, while girls are - and in particular teenage girls - over-represented among patients with mental illness. Thus, one explanation is

that injuries may be an immediate result of parental distress, problems with mental health may emerge slowly.

Table 10 Parental unemployment and hospitalization: Heterogeneous effects w.r.t. sex

	i	ii	iii	iv
	Girls		Boys	
	<b>Short run</b>			
Any parent unemployed	4.297*** (0.169)	0.227 (0.209)	3.730*** (0.169)	0.463** (0.214)
No of observations	10,268,114	10,268,114	10,841,812	10,841,812
No of individuals		1,431,919		1,513,348
	<b>Long run</b>			
Any parent unemployed	3.217*** (0.247)	2.607*** (0.675)	3.066*** (0.266)	0.961 (0.740)
No of observations.	4,096,451	4,096,451	4,316,036	4,316,036
No of individuals		604,276		637,902
Year, age	Yes	Yes	Yes	Yes
Parental controls	Yes	Yes	Yes	Yes
Family income	Yes	Yes	Yes	Yes
Municipal unemp.	Yes	Yes	Yes	Yes
Child fixed effect	No	Yes	No	Yes

Clustered (by mother) robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Parental controls in i and iii: age, education, immigrant background, disposable income t-1, separated parents t-1 and hospitalization t-1, in ii and iv: age, disposable income t-1, separated parents t-1 and hospitalization t-1.

### 5.4.3 Does parental background matter?

A common finding in the plant closure literature is that children with weak socioeconomic background are hurt more than other children when their parents suffer from job loss due to plant closures. In this section we will investigate to what the association between parental unemployment and child health differ with respect to parental background, more specifically, education.<sup>21</sup>

In Table 11 we investigate whether estimates differ with respect to parental education. We have divided parents into three categories depending on educational attainment of the parents. We define parents to have *low education* if both parents have no more than compulsory schooling, to have *high education* if any of the parents has a university degree, and to have *medium education* otherwise.

<sup>21</sup> The long-run estimates are qualitatively very similar to the short run estimates and are available upon request

Cross-sectional associations are higher for children of low and medium educated parents, whereas the point estimates when controlling for child-fixed effects are somewhat larger for children with medium or highly educated parents. Although precision of the estimates decreases as sample size is reduced, the pattern suggest that there is stronger selection in the sample of children who have parents with low education and that unemployment spells per se are less detrimental to health for these children.

Table 11 Parental unemployment status and hospitalization: Parental Education

	i	ii	iii	iv	v	vi
	Low education		Medium education		High education	
Any parent unemployed	4.157*** (0.472)	-0.833 (0.607)	4.233*** (0.143)	0.385** (0.176)	2.790*** (0.262)	0.616* (0.331)
No of obs.	1,250,826	1,250,826	14,664,664	14,664,664	5,194,436	5,194,436
No. of individuals		200,772		1,965,913		778,582
Year, age	Yes	Yes	Yes	Yes	Yes	Yes
Parental controls	Yes	Yes	Yes	Yes	Yes	Yes
Family income	Yes	Yes	Yes	Yes	Yes	Yes
Municipal unemp.	Yes	Yes	Yes	Yes	Yes	Yes
Child fixed effect	No	Yes	No	Yes	No	Yes

Clustered (by mother) robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Parental controls in i, iii and v: age, education, immigrant background, separated parents t-1 and hospitalization t-1, in ii, iv and vi: age, separated parents t-1 and hospitalization t-1.

## 6 Conclusions

Using rich register data on child hospitalizations and parental labor market outcomes for all Swedish families over the period 1992-2007, we analyze how parental unemployment is related to hospitalization of children aged 3-18. We confirm that there is a strong correlation between parental unemployment and children's hospitalization: having an unemployed mother or father is associated with on average a 17 percent higher likelihood of having to stay at least one night at a hospital in the same year. We find that much of this correlation is driven by selection. After controlling for child-fixed effects and a number of time varying family characteristics, we find that unemployment is associated with a 1 percent increase in hospitalization in the short run and 5 percent increase in the long run, and that effects are larger for longer unemployment spells.

Exploring child health the years around the parents' first unemployment spell, we find that children have worse health already before the first occurrence of

unemployment, but that hospitalizations increase significantly in the year parents become unemployed and remain higher for some years. This dynamic pattern, together with extensive controls for possible confounders, is suggestive of a causal interpretation. However, putting the estimated 1-5 per cent increase in hospitalizations in perspective, the effect is small if we compare it to average differences in health between different groups of children. For example, the hospitalization gap between children with low and high parental education is 22 percent.

Further exploring possible mechanisms, we find that family disposable income drops rather dramatically as a parent becomes unemployed and that parental health deteriorates in connection to the first unemployment spell. These dynamics suggest that reduced family income and deteriorating parental health are possible mechanisms through which parental unemployment affects child health.

We also explore heterogeneous effects: Along a gender dimension, we find that mothers' unemployment is found to have stronger effects on child health than fathers' unemployment, which is in line with previous Danish evidence (Christoffersen, 2000). Effects on boys and girls suggest immediate and short lived effects for boys, while effects on girls only show up in the longer run. A possible interpretation is that girls, particularly teenage girls, are more likely to develop mental conditions. We also explore differences by family background and find that associations between parental unemployment and child health in low educated families is entirely driven by selection. However, in families with parents with a university degree we find a significant relation between parental unemployment and child health also when we control for child fixed effects and other possible confounders. This result contrasts to previous findings in the plant-closure literature which find negative intergenerational effects of job-loss only for disadvantage groups.

Our overall conclusion is that parental unemployment does hurt child health. The assessed effects are, however, not large in relation to socially determined health gaps between children. Hence, in order to improve the health of children we need not only address the consequences of temporary parental unemployment, but rather focus on alleviating the long term vulnerability of children growing up in families with weak labor market attachment.

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