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Janet Currie
N. Meltem Daysal
Mette Gørtz
Jonas Cuzulan Hirani

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ABSTRACT

Mental health disorders are the leading cause of childhood disability worldwide. We examine the impact of a relatively common household stressor on child mental health: the presence of a younger sibling with a physical disability. Using Danish administrative data from families with at least 3 children, we focus on differences between first and second born children in families with and without a 3rd child with a disability. Second-born children in these families spend a larger fraction of their early childhood in families that may be under stress. We find that second-born children are 11 percent more likely to use mental health services than first-born children. There is a 19% increase in psychiatric visits and a 16% increase in use of psychiatric medications. These results are confirmed by matching models.

Janet Currie
Department of Economics
Center for Health and Wellbeing
185A Julis Romo Rabinowitz Building
Princeton University
Princeton, NJ 08544
and NBER
jcurrie@princeton.edu

N. Meltem Daysal
Department of Economics and CEBI
University of Copenhagen
Øster Farimagsgade 5
1353 Copenhagen
Denmark
and CEBI and IZA
meltem.daysal@econ.ku.dk

Mette Gørtz
Department of Economics
University of Copenhagen
Øster Farimagsgade 5
1353 Copenhagen K
Denmark
mette.gortz@econ.ku.dk

Jonas Cuzulan Hirani
The Danish Center for Social
Science Research (VIVE)
Herluf Trolles Gade 11, 1052
Copenhagen
Denmark
jjh@vive.dk

Child mental health problems are common. According to the World Health Organization (2021) about 14 percent of children 10 to 19 years of age worldwide have such a disorder. Child mental health disorders are an important predictor of lower educational attainment, lower adult earnings, and lower probabilities of adult employment (Currie, forthcoming). Concern about child mental health issues has intensified significantly in the wake of the COVID pandemic. Understanding the underlying causes of childhood mental health disorders is likely to remain a global priority in the coming years.

This paper contributes to the literature on the effects of early childhood environments on the development of mental health conditions. We focus on the impact of a relatively common household stressor, the presence of a young child with a physical disability, on the mental health outcomes of older siblings in the household. In addition to requiring a significant share of the parents' time and other resources, parenting a child with a disability can be stressful for parents and may reduce the quality of the time parents are able to spend with the other, older, children.

Uncovering the causal effect of a disabled child on sibling mental health is complicated by the fact that child disability is not random: families in which disabled children are born tend to have lower income and parental education, which may be independently associated with child mental health conditions (e.g. Akee et al., 2024; Baird et al., 2013; Furzer et al., 2024; Golberstein et al., 2019), and they may also differ on unobservable characteristics such as genetic factors. To overcome this identification challenge, we use population-level Danish administrative data from 1987 to 2019 and implement a within-family design. Specifically, focusing on families with at least 3 children, we compare "treated" families in which the third-born child is diagnosed with a disability before age five to "control" families in which the third born does not have a

disability.[1] Identification is based on the idea that in treated families, second-born children spend a larger fraction of their own early childhoods in a household impacted by the youngest child's health challenges. Hence, we expect the second-born child to be impacted more than the first-born by the third-born's disability, an assumption that we test empricially using a matching model. We show that the negative mental health impacts of having a disabled sibling are primarily seen in second-born children, with no evidence of deteriorating mental health outcomes for first-born children.

Our results suggest that in affected families, second-born children are 2.6 percentage points (11 percent) more likely to use mental health services than first-born children. The greatest increase is in the use of psychiatric visits (19 percent) and mental health medications (16 percent), with smaller increases of about 10 percent in the use of counselling services.

Our empirical strategy assumes that the mental health of children in families with a disabled third born is evolving in a similar way before the birth of the third child. Although this assumption cannot be directly tested, we show that there are no differential birth order effects between treated or control families when considering sibling and family characteristics measured before the birth of the third child. We also show that the results are robust to excluding parents with mental health conditions, or families in which multiple children have disabilities. The results also hold for families with two-plus children in matching models, which speaks to the generalizability of our results.

The baseline effects are mainly accounted for by households in which mothers have less than a high school education. A plausible mechanism is hardship caused by inadequate resources. To shed light on this mechanism, we estimate difference-in-difference models

[1] Among families with at least three children, seven percent have a third child with a disability.

comparing the change in parental outcomes between the year before the birth of the third child and 6 to 10 years later (i.e. after the diagnosis window) in households where the third child does or does not have a disability. We find that having a disabled third-born child reduces the employment rate and earnings of mothers in low socio-economic status households by 13 and 5 percent, respectively. Similarly, fathers experience a reduction of 2.5-5 percent in employment and 3 percent in earnings. Parents in households in which mothers are highly educated do not incur labor market penalties from a disabled child.

Our paper contributes to a growing economics literature that seeks to understand the causes of childhood mental health problems. In addition to income shocks, some of the factors that have been highlighted in this literature include: A family history of mental illness (Bütikofer et al., 2024), school selectivity and peer composition (Bütikofer et al., 2023), social media (Alcott et al., 2020; Braghieri et al., 2022), *in utero* exposure to disease, nutritional deficiencies, or stressful events (e.g. Almond, 2006; Almond and Mazumder, 2011; Black et al., 2016; Persson and Rossin-Slater, 2018), and exposure to domestic violence (Bhuller et al., 2024) or mass shootings (Bharadwaj et al., 2021; Rossin-Slater et al., 2020). We add to these studies by examining the impact of having a disabled younger sibling, which is arguably milder than some of the shocks that have been studied in the literature.

Our paper is also related to previous studies examining the impact of a disabled child. Most of this literature has focused on the effects on parental outcomes and showed that having a disabled child leads to reductions in parent's labor supply (especially mothers), increases in the probability of divorce or separation, and increases in the use of social assistance (Deshpande 2016; Gunnsteinsson and Steingrimsdottir 2024; Kvist et al. 2013; Noonan et al. 2005; Powers 2003). Evidence on the effects on siblings is scarce, with the notable exception of Black et al. (2021) who investigate the effects of sibling (physical and mental health) disability on academic

achievement using a similar framework.[2] Our project fills this important gap.

Our results speak to the importance of stressful events in early childhood in the etiology of childhood mental health conditions. And given the generosity of the Danish support system, these results also speak to how difficult it is to fully buffer families from the stresses of coping with childhood disability.

The rest of the paper is laid out as follows: Background information about the effects of having a child with a disability on parents, and about the supports available to parents in Denmark is discussed in section 2. Section 3 provides an overview of the rich longitudinal Danish registry data we draw on. Section 4 discusses empirical methods, while the estimates are presented in section 5. Conclusions appear in section 6.

2. Background

2.1 Healthcare Services for Children and Adolescents

Denmark's universal public health insurance includes comprehensive maternity care and infant health screenings. Newborns are automatically enrolled in a pediatric examination program provided by the primary care physicians. This program includes health examinations at 5 weeks, 5 months, and annually until age 5 (Gørtz et al. 2020) and overlaps with a universal child vaccination program (Hirani and Wüst 2024). Participation rates are high, with more than 90 percent of infants attending the first three appointments (Mathiesen et al. 2016). In addition, infants receive care through a nurse home visiting program over the first year of life. Nurses provide advice and assistance for challenges such as breastfeeding and postnatal depression, screen for issues related to child development, and refer families in need of a higher level of care.

[2] Several studies offer evidence on sibling spillovers generally. See, for example, Daysal et al. (2022), Nicoletti and Rabe (2019), Joensen and Nielsen (2018) and Dahl et al. (2014).

This system means that most cases of early childhood disability are likely to be detected and referred to the child's primary care physician.

Primary care physicians (PCP) serve as gate keepers for specialist care. In the case of mental health care, the Danish Health and Medicines Authority advises that all children at risk of a mental health disorder should be referred to a specialist. PCPs are recommended to refer mild cases to private practice child psychiatrists and more severe cases to hospitals with psychiatric departments. Children can also receive psychotherapy from privately practicing psychologists, school counsellors, or municipality-based centers.[3] For children and adolescents below 18, prescription drugs for mental health conditions must be prescribed by a specialist in psychiatry.

Costs of health care services provided by PCPs are fully covered by the public health insurance. If the patient has a referral to a specialist, the national health insurance plan covers the full cost of psychiatric care and approximately 60 percent of the cost of psychotherapy provided by psychologists.[4] Costs of pharmaceutical treatments are subsidized based on a non-linear plan such that the coinsurance rate declines as prescription drug spending accumulates over a coverage year.[5]

2.1 Income Insurance Against Child Health Shocks

Denmark offers a generous sickness benefit program that compensates parents of disabled children for lost earnings. In addition to paid maternity leave and parental leave offered to all new parents,[6] parents of disabled children are allowed to take a paid temporary employment absence

[3] Young adults with mild mental health care disorders can receive some treatment from PCPs after having consulted a psychiatrist. Moderate to severe cases are handled by adult psychiatrists and psychologists.
[4] Individuals can receive care from specialists outside the national health insurance network without a referral but, in this case, costs have to be paid out of pocket. We do not have data on contacts with specialists outside the national insurance network.
[5] Parents of these children typically pay 40-50 percent of the first 1,500 DKK (200 USD), 25 percent of costs between 1,500-3,500 DKK (200-460 USD) and 15 percent of costs afterwards. There is a stop-loss amount, which was approximately 24,000 DKK (3,200 USD) in 2021.
[6] In the early part of our sample period, pregnant women got four weeks of leave before the birth and 14 weeks after

to care for their child (Adhvaryu et al. 2023). In addition, parents can receive assistance with daily tasks (such as cleaning and caring for healthy siblings) through additional municipality-based programs.[7] The availability of these support services for families with children with a disability suggests that the impacts of childhood disability in families without such a supportive environment could be even larger than those reported in this paper.

3. Data and Sample

We combine several Danish administrative data sets for 1987 to 2019 which record individual-level data for the entire population with unique personal identifiers that allow individuals to be followed over time and linked to family members. Information on birth order comes from the national *Birth Register*, which includes unique parental identifiers, child gender, birth weight and gestation, and the year and month of birth.

Measures of mental health outcomes include indicators for receipt of psychological counselling, outpatient/ER psychiatric visits, and psychiatric medications. Information on use of counselling services comes from the *Health Insurance Register.* This register includes reimbursements to private-practice physicians for any service covered by national health insurance.[8] Data on psychiatric visits is derived from both the *Health Insurance Register* and the *Psychiatric Central Research Register*, with the latter capturing outpatient visits to psychiatric

the birth. This was followed by 10 weeks of parental leave to be divided by the parents at their own discretion. In 2002, maternity leave was extended to 18 weeks shared parental leave was extended to 32 weeks, leading to a total leave period for parents of almost a year. Fathers are also allowed two weeks of leave right after the birth (Kleven et al. 2019).

[7] While parents of sick children enjoy high income security, they have low job protection. The sickness benefit scheme does not explicitly provide job protection.

[8] Private psychologists are identified using the physician's specialty code 63 and mental health services provided by primary care physicians are based on the physician's specialty code 80 combined with reimbursement codes for mental health diagnostic tests and counselling (802147–802149, 804003, 804021–804027, 804050, 804063, 804106, 804116, 806000, 806100, 806101).

departments in public and private hospitals.[9] Data about all prescriptions filled at Danish pharmacies come from the *National Prescription Register*. The Anatomical Therapeutic Chemical (ATC) classification of each medication can be used to divide drugs into broad categories such as psychoanaleptics (stimulants and antidepressants) and psycholeptics (antipsychotics and sedatives).[10] We measure children's receipt of mental health care services between the ages of 9 and 20 because data on children's mental health care utilization are available from 1997. We use the same data sets to derive measures of parental mental health care utilization.

Information about whether a child has a disability comes from the *National Patient Register*, a dataset of all patient contacts with public and private hospitals. We focus on physical disabilities that were diagnosed by age 5 in order to rule out genetic determinants of child mental health. The near universal screening of young children helps to alleviate concerns about the potential endogeneity of a child's disability diagnosis.[11] This data set is also used to construct a measure of the severity of the disability, based on the frequency of child hospital visits.

Since families of children with disabilities may differ from other families, we use several additional registers to obtain information about parental characteristics to include as control variables. The *Population Register* provides a snapshot of the demographics of all Danish residents as of January 1st of each year, including information about immigration status and the marital status of the parents. Information about parents' education comes from the *Education Register*, which reports each person's highest completed schooling level. Parental employment

[9] Visits to outpatient psychiatric clinics are identified in the Health Insurance Register based on the physician's specialty code 24 or 26.
[10] ATC codes are documented in https://atcddd.fhi.no/atc_ddd_index/.
[11] The conditions included in the definition of childhood disability, detailed in the Data Appendix, are based on the physical health conditions used in Black et al. (2021), conditions that are included in the United States Social Security Administration's List of Compassionate Allowances Conditions, and conditions included in the Global Burden of Disease Study that have a disability weight of more than 20% (see Gunnsteinsson and Steingrimsdottir 2024).

and income come from the *Register-based Labour Force Statistics* and the *Income Statistics Register*. The former records the labor force participation status of all individuals at the end of November each year, while the latter provides information extracted from tax records on total annual gross income and salaries for all Danish residents.[12]

Defining the Analysis Sample:

Starting with the entire population of families, the following restrictions are imposed to arrive at an analysis sample. We focus on families with at least three children born to the same mother in which the first two children also have the same father. Families in which one of the first three births was a multiple are excluded. We require that the first two children were born between 1988-1999 since the outcomes of interest are measured at ages 9–20. These restrictions leave 65,472 families. Of these, 4,325 families have a third child diagnosed with a physical disability by age 5.

Table 1 shows descriptive statistics by treatment status. Column 1 focuses on families where the third born was diagnosed with a physical disability by age 5. The most common disabilities among these children are congenital malformations and deformations (80%),[13] epilepsy (9%), hearing loss (7%), coagulation defects, purpura and other hemorrhagic conditions (4.9%), and cerebral palsy and other paralytic syndromes (4.5%). This distribution of disabilities is very similar to what is seen in the full population of children who have a diagnosed disability by age 5. Column 2 presents summary statics for families where the third born child has not been diagnosed with a disability by age 5. The final column reports p-values for the test of equal means between columns 1 and 2.

[12] Income and earnings are reported in 2015 prices.
[13] The specific types of congenital malformations and deformations are of the musculoskeletal system (31%), genital organs (16%), circulatory system (15%), eye, ear, face and neck (8.1%), urinary system (4.8%), or other (5.7%).

The table highlights some statistically significant differences in parental characteristics by the disability status of the third-born child. In this table, parental age, educational attainment, immigration status, and marital/cohabiting status are measured at the time of first birth, household labor market outcomes are measured in the year before the first birth and parental mental health care utilization is measured in the year before the third birth.[14] Parents whose third child is diagnosed with a disability are more likely to be immigrants (14–16% versus 12–13%) and are less educated on average (31% of treatment mothers have less than high school compared to 28% of control mothers). 27% of fathers with a disabled third born have less than high school compared to 25% of fathers without a disabled third born. Treatment families also have worse labor market outcomes in the year of the first child's birth: 14% of mothers and 10% of fathers are unemployed at the time of the first birth, compared to 13% and 8%, in the sample whose third child has not been diagnosed with a disability. Parental mental health indicators show that even before the birth of a child with a disability, mothers and fathers were more likely to have a psychiatric visit, receive psychological counselling, and use psychiatric medications.

The second panel of Table 1 shows that first- and second-born children in families where the third child has been diagnosed with a disability have slightly worse health endowments at birth. They have slightly lower average gestation length (39.65 versus 39.73 weeks) and birth weight (3,492 versus 3,520 grams), and a higher likelihood of having had a hospital contact in the first two years of life. There are also differences in birth spacing between families with and without a third child who has been diagnosed with a disability. The average spacing between births is wider in families where the third-born has a disability. The overall average spacing between the first and third births is 7.37 years for treatment families and 7.03 years for control

[14] Parental mental health indicators are measured in the year before the third birth because the psychiatric health registers are available only from 1995.

families.

Appendix Table A1 compares two-child families (column 1) to families in the analysis sample with three or more children (column 2).[15] The analysis sample is more likely to have immigrant parents (6% for children in 2-child families versus 12% in families with 3+ children), has parents with less education, and has lower average incomes (incomes are 23% and 18% lower for mothers and fathers, respectively). Parents in the analysis sample are also more likely to have a psychiatric visit in the year before the third birth, but less likely to receive psychiatric medications.

In contrast to these differences in parental characteristics, Appendix Table A1 shows that the first- and second-born children in the analysis sample are generally similar at birth to first- and second-born children in families with exactly two children. Mean gestation length, birth weight, and 5-minute Apgar scores are all slightly higher in the analysis sample, though not significantly so. Birth spacing between the first- and second-born siblings, on the other hand, is smaller in the analysis sample (2.59 versus 3.1 years).

In summary, parents with at least three children differ from parents with only two kids in a number of observable characteristics. This suggests that these families may also differ on unobservable characteristics implying that a simple comparison of the treatment and control groups, even controlling for observable variables, could be misleading. Hence, we first turn to an identification strategy that focuses on differences between first and second-born children in the same families and asks how these differences are affected when the third child is diagnosed with a disability by age 5. Second, we explore the robustness of these results using a matching model.

[15] As we require first and second born children in our analysis sample to have the same father, the descriptive statistics in column 1 are based on families with two children who have the same father.

4. Empirical Strategy

As we have just seen, child disability is not randomly distributed across families. Among families with three children, those in which the third child is diagnosed with a physical disability before age 5 tend to be negatively selected in terms of socio-economic characteristics, which could have an independent effect on children's mental health. Hence, we first use a difference-in-differences, family fixed effects strategy similar to Black et al. (2021): in the sample of families with 3 or more children, we compare the difference in the mental health outcomes of second- and first-born children in treatment and control families.

Because outcomes are measured at a fixed age the second born child is affected at a younger age in treatment households, and second-born children spend a larger share of their early lives with a disabled sibling. For example, if the two older children are five and two when the third is born, then the two-year-old is potentially affected from age two onwards, whereas the eldest child can only be affected from age five onwards. For these reasons, the second-born child is arguably more affected by the third child's disability.

To capture this intuition the following model is estimated:

$$Y_{if} = \alpha_f + \beta_0 + \beta_1 SB_i + \beta_2 SB_i D_f + \beta_3 X_{if} + \epsilon_{if}, i = 1,2,$$

where Y_{if} is one of the measures of mental health care utilization for child i in family f described above, SB_i is an indicator for the second-born child, D_f is an indicator equal to one if the third-born child was diagnosed with a physical disability by age 5, X_{if} is a set of child characteristics (indicators for gender, birth weight, gestational age, 5-minute Apgar score, and year and month of birth) and parental characteristics in the year before the birth of each child (indicators for age, deciles of gross personal income, marital/cohabitation status, educational attainment and employment status). Finally, α_f is a family-fixed effect that controls for fixed unobservable

differences between families that could be correlated both with mental health outcomes and the probability that a family has a child with a disability.[16]

The key coefficient of interest in model (1) is β_2 which measures the gap in the mental health outcomes of second-born children versus first-born children in families with and without a third-born child diagnosed with a disability by age 5. To interpret β_2 as a causal estimate of the effect of having a third child with a diagnosed disability on the second-born child compared to the first-born child involves assuming that differences in the mental health of first and second-born children would have evolved similarly in treatment and control households in the absence of the third child's disability. In order to assess the plausibility of this assumption, we first ask whether gaps between first and second-born children in predetermined child and parent characteristics differ in treatment and control families.

We next implement a matching method to see whether having a third-born child with a disability does have a larger effect on second-born children than on first born children in families with at least three children. Specifically, we identify families where children are diagnosed with a physical disability between 1999–2008 and we match each younger sibling of a disabled child to an unrestricted number of children from the control pool based on birth year, birth order, child gender, mother and father's age at first birth, mother's years of education at first birth, and the number of siblings in the family at the time of disability diagnosis.[17] The matching design requires the assumption that the occurrence and timing of a childhood disability diagnosis is

[16] Concerns have been raised about using family fixed effects models to identify causal effects (see Galama et al. 2018; Behrman et al., 1982; Price, 2008; Lleras-Muney et al., 2022; Lundborg et al., 2016; Halpern-Manners et al., 2020; Gensowski and Gørtz, 2024). The issue is that parents may reallocate resources within the family to compensate or reinforce initial endowments. In our setting, we are assuming that the way families reallocate towards the third child is more impactful for the second child than for the first because it affects more of the second child's early life. If parents tried to compensate the second child (more than the first child), then this would lead us to underestimate the effects.

[17] We only consider younger siblings born between 1988-1999 as in the analysis sample.

random conditional on the rich set of observable characteristics. However, we show below that both methods yield similar estimates.

Estimation of equation (1) requires us to focus on families with three or more children. As discussed above, the observable characteristics of these families differ from the characteristics of families with two children in several respects. We therefore try to shed light on the generalizability of our findings by estimating model (1) using the characteristics of families with two children as weights. We also estimate the matching model using both 3 plus child and 2 plus child families.

In additional tests of the robustness of the baseline estimates, we explore the sensitivity of the estimates to excluding parents with previous treatment for mental health conditions, excluding households where the first-born or second-born child has a disability, and experiment with replacing the indicator for having a third-born sibling with a disability with the gap in "exposure" to the third child's disability between the first- and second-born children.

5. Results

5.1 Effects of Exposure to a Disabled Sibling on Child Mental Health

Table 2 presents estimates of the difference-in-differences models based on Equation (1). Each cell presents the estimated coefficient on the interaction between the indicator for the second-born child and the indicator for the third-born child having a disability from a separate regression.[18] The dependent variable is indicated in the panel heading. Column (1) shows the difference-in-difference results from a model that includes family fixed effects and indicators for child gender and year and month of birth. The estimates suggest that exposure to a disabled third-born sibling increases the second-born child's likelihood of receiving mental health services

[18] The full regression models are shown in Appendix Table A5.

between the ages of 9 and 20 relative to the first-born child's probability, which is shown in the table as the control group mean. The point estimates of 2.6 percentage points for any service, 1.5 percentage points for any counseling, 2.1 percentage points for having a psychiatric visit, and 1.6 percentage points for any mental health prescription are large. They represent a 10 to 20 percent increase relative to the mean outcomes among first-born children.

Estimates including additional child characteristics are shown in column (2) and estimates adding parental characteristics in the year before the birth of each child are shown in column (3). These estimates are remarkably similar to those in column (1), suggesting that the estimates are not sensitive to the inclusion or exclusion of additional variables.

Appendix Table A2 presents simple difference-in-difference estimates. Each panel of the table corresponds to a different outcome variable. Within each panel, the first two rows correspond to families with and without a third child with a disability, respectively. The first two columns correspond to second- and first-born children. The third column and the third row of each panel presents t-tests of differences in the corresponding groups. As in the models with controls, Table A2 shows that second-born children have higher rates of mental health care utilization between ages 9 and 20 than first-born children. The results confirm that second-born children in families with disabled siblings have higher rates of mental health care utilization than second-born children with non-disabled siblings. The estimates are slightly higher than those in Table 2, but generally surprisingly similar.

5.2 Assessing Key Identification Assumptions

The key identifying assumption in the difference-in-differences approach is that the mental health gaps among first- and second-born children in families where the third-born does not have a disability provide a valid counterfactual for the evolution of the same gap in families where the third-born has been diagnosed with a disability. While this assumption cannot be tested

directly, we investigate its plausibility using child and parental characteristics that were established before the birth of the third child as outcomes in models similar to equation (1). The third child's disability should not have a significant "effect" on predetermined outcomes.

The estimates for this test are provided in Table 3. Panel A focuses on the health outcomes of first- and second-born children during the first two years of life, while Panel B treats time-varying parental socio-economic characteristics as the dependent variables. Panel A shows that there are no statistically significant gaps in predetermined health characteristics between first- and second-born children in treatment and control families. The magnitudes are also economically insignificant. For example, the difference between the birth weight of the second- and first-born children is only 8 grams (0.24%) lower in treatment families than in control families. Gaps in the use of hospital care at 1 year and at 2 years are also tiny. These insignificant estimates suggest that the mental health penalty among the second-born children is unlikely to be due to differential health care seeking behavior of parents.

The estimates in Panel B are equally small and statistically insignificant in all but one case. For example, in treated families, parents are 0.413 percentage points (0.5%) more likely to get married/start cohabiting between the first and second birth, relative to the parents in families where the third child is not diagnosed with a disability. Similarly, the difference-in-difference estimates for parental income (measured in the year before the birth of each child) are both statistically insignificant and correspond to less than 1.5% of the control mean. Unfortunately, we are not able to conduct a similar test for parents' mental health status because the register starts in 1995 and we are missing outcomes for many cohorts. However, we also show below that the results are robust to excluding parents with mental health problems in the year before the birth of the third child.

5.3 Additional Robustness Checks

Table 4 presents estimates that examine the sensitivity of the estimates to alternative ways of measuring third-born disability status and to different specifications. Each cell of Table 4 presents estimates from a separate regression using the outcome indicated in the column heading. Panel A shows the baseline difference-in-difference results for ease of comparison.

Panel B presents models that leverage variation in birth spacing between siblings. For example, if the first and second child are born three years apart, then the gap in "exposure" to the third child as of age 20 is three years. In these models, the interaction term $SB_i D_f$ in equation (1) is replaced with an interaction between the difference in exposure to the third child and the indicator for whether the family's third born has been diagnosed with a disability. The estimates in Panel B again suggest that exposure to a disabled younger sibling has substantial spillovers on the mental health of other children in the family. For example, the coefficient estimate indicates that an additional year of exposure to a disabled sibling increases the second-born sibling's probability of receiving counseling services by 0.888 percentage points. Multiplying this number by the mean gap in birth spacing between the first and second (2.59) years implies a treatment effect of 2.30 percentage points which is remarkably close to the corresponding baseline estimate of 2.59 shown in Panel A.

In Panel C, the baseline model is re-estimated excluding households where either the first- or the second-born sibling had a physical disability. The estimates are very similar to those shown in Panel A from the full analysis sample, suggesting that the estimated spillovers on sibling mental health are not driven by co-diagnosis of siblings.

Panel D shows estimates excluding households in which a parent received mental health services in the year before the third child was born. These estimates are all somewhat larger than the baseline estimates which suggests that having a sibling with a disability has a smaller impact

in households in which the parents are already suffering from mental health problems. Since parents who are receiving treatment for mental health conditions might be more likely to demand such services for their children, it is reassuring that excluding them only reinforces our conclusions.

Panel E turns to the generalizability of our results and shows estimates that weight the baseline model using characteristics of families with two children as the weights. The weights are defined so that the distribution of observable characteristics in the three plus child analysis sample matches the distribution among families with only two children.[19] This procedure injects some noise into the data which is reflected in larger standard errors. Nevertheless, the point estimates are similar to those in Panel A and those in columns (1) and (2) remain statistically significant. These estimates suggest that the evidence of spillovers is not driven by the particular characteristics of families with three or more children.

Table 5 shows estimates using an alternative identification approach based on matching. The format follows Table 4, and once again, the baseline estimates are shown in Panel A for ease of comparison. As described before, we identify families where children were diagnosed with a physical disability between 1999 and 2008 and match each *older* sibling of a disabled child to an unrestricted number of children from the control pool of families without a disabled child. The matching is based on birth year, birth order, child gender, mother's and father's age at first birth, mother's years of education at first birth, and the number of siblings in the family at the time of disability diagnosis. The outcomes are then regressed on an indicator for having a disabled sibling. Fixed effects are included for each matched treatment–control group. The samples in

[19] We use the following parental characteristics: age (0-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 50+), gross personal income, indicators for immigration status, marital/cohabitation status, educational attainment (basic school only, college graduate), and employment status. Age, marital status and immigration status are measured at the time of the first birth while labor market outcomes are measured in the year prior to the first birth.

these models are smaller than in the difference-in-differences because it was not always possible to find a match.

Panel B of Table 5 shows the matching specification that is most similar to our baseline estimates: It shows the effect of having a third-born sibling with a disability on second-born children. The estimates are remarkably close to those shown in Panel A. Panel C estimates the matching model using only the first-born children. These estimates are much smaller than the baseline which supports the assumption underlying the difference-in-difference models that second-born children are more affected by having a disabled third-born sibling. Panel D shows, not surprisingly, that when first- and second-born children are pooled together, the effects are halfway between those of Panels B and C.

Finally, matching models can be used to extend the analysis to families with two plus children, comparing first-born children in these families that do or do not have a disabled younger sibling. Panel E shows that in this sample the estimated effects of exposure to a disabled sibling are somewhat smaller than our baseline estimates but remain statistically significant for all outcomes.

Overall, the results from matching models are consistent with our baseline findings based on the difference-in-difference strategy. Given the differing assumptions between these identification strategies, the fact that both methods lead to similar conclusions provides evidence of the robustness of the effects and strengthens the credibility of the results.

5.4 Comparing Magnitudes to Existing Literature

How do our estimated effects on child mental health compare to those documented in the prior literature on determinants of child mental health? Our results suggest that exposure to a disabled sibling has major consequences for sibling mental health: second-born children in affected families are 10 percent more likely to use counselling services, 19 percent more likely to

have a psychiatric visit and 16 percent more likely to consume mental health medications. These effect sizes are generally comparable to those found in other studies evaluating the consequences of family stressors on child mental health. For example, Rossin-Slater and Persson (2018) show that *in utero* exposure to the death of a mother's close relative leads to a 25 percent increase in the likelihood of using an ADHD medication between ages 9-11. In Appendix Table A3, we document that exposure to a disabled sibling increases the likelihood of using a psychostimulant (used to treat ADHD) between the ages of 9-20 by 46 percent. Our effect sizes are also comparable to Buller et al. (2024) which find that children exposed to domestic violence experience a 19 percent increase in mental health diagnoses in the year of the event, with a sustained average increase of 15 percent in the four years afterwards.

It may also be helpful to compare our estimates to those found in studies examining the impact of income on child mental health. Exploiting changes in child benefits in Canada, Milligan and Stabile (2011) find that an extra $1,000 of benefit reduces children's hyperactivity-inattention score by 6.8 percent of a standard deviation, anxiety score by 9.6 percent of a standard deviation, and conduct disorder score by 10 percent of a standard deviation. Our effects sizes represent reductions of 6 percent of a standard deviation for use of any mental health care services and 5 percent of a standard deviation for consumption of prescription drugs.

5.5 Treatment Effect Heterogeneity

This section presents several analyses intended to shed light on the extent to which there are heterogeneous treatment effects. Table 6 shows models that allow the effect of having a third born diagnosed with a disability to vary with measures related to the disability severity. Panel B divides disabilities into those that result in above the median number of hospital visits by age 5 (more severe), and those that result in below the median hospital visits by age 5 (less severe). The estimates indicate that second-born children whose siblings have less severe disabilities are

more likely than first-borns to receive counselling while siblings of children with more severe disabilities are more likely to have psychiatric visits and to use psychiatric medications. These patterns are consistent with more serious mental health problems among siblings of children with more severe disabilities.

Panel C of Table 6 examines the impact of the third-born child's age at diagnosis. Figure A1 shows that a little over half of the disabilities that are ever diagnosed in third-born children occur by age 5. So far, we have considered only disabilities diagnosed before age 5 for several reasons. First, young children in Denmark get a lot of medical attention and screenings so that conditions that exist before age 5 are likely to be detected. Second, it is important to focus on conditions that occur early enough for the older siblings to be affected. Once older siblings reach school age, they are likely to spend more time out of the house and with peers, so that their younger sibling's disabilities may have less impact on them. Third, a disability that is not diagnosed until after age 5 might be less severe. Consistent with these arguments, Panel C shows that disabilities diagnosed when the third-born child was five to nine have no differential impact on the mental health care of first and second-born siblings.

Panel D of Table 6 shows estimates from models that focus on whether the third-born child was in poor health at birth rather than on whether the third-born child was diagnosed with a disability. Poor health at birth is defined as birth weight less than 2500 grams, APGAR less than 6, or gestation less than 37 weeks. By this definition, 3.64 percent of children have poor health at birth. However, only 14 percent of these children have a disability diagnosed before age 5. While this rate is much higher than the rate of disability in children who are not in poor health at birth, the correlation between disability and poor health at birth is only 0.06. Panel D shows that having a sibling with poor health at birth has little effect on the gap in mental health care utilization between first and second-born siblings. The only coefficient on poor health at birth

that is even marginally statistically significant is in the model for any psychiatric visits. It is smaller than the baseline estimates in Panel A.

Table 7 explores heterogeneity in the estimates by mother's education. The table shows that the overall effect of having a disabled sibling is driven by families in which the mother has less than high school education.[20] Despite the relatively generous supports for families with disabilities, these families may be the most burdened financially, and the least able to afford to hire additional caregivers. These stresses in turn may impact the quality of caregiving time that is available to older siblings.

Appendix Table A3 provides more detail about types of mental health prescribing by maternal education, focusing on receipt of antidepressants, stimulants (ADHD medications), and antipsychotics and other central nervous system depressors (psycholeptic drugs). When interpreting the size of the coefficients, it is important to note that the control group means are generally decreasing with maternal education, with children of mothers with only basic education being significantly more likely to be prescribed psychiatric medications. The evidence suggests that children of mothers with basic schooling are more likely to receive antidepressants while children whose mothers have a college education are more likely to receive ADHD medications. Children of mothers in the middle education group are more likely to receive central nervous system depressants including antipsychotics. Despite these effects, the education gradient in prescribing persists, as treated children of mothers with only basic education are always estimated to have higher prescribing rates. These sorts of differences in the way that children are treated by markers of socioeconomic status have also been noted in other settings in which

[20] This heterogeneity is unlikely to be driven by differences in the severity of the third-born child's disability as the distribution of hospital contacts for the disabled third-born child tends to be similar across parental education levels (see Appendix Figure A2).

children are fully insured (Currie, Kurdyak and Zhang 2024) and deserve further attention.

5.6 Potential Mechanisms

Strain on parents might be a possible mechanism for the effect of having a younger sibling with a disability on a child's mental health. This hypothesis is investigated in Tables 8 and 9 which show the relationship between having a third child with a disability and the mother and father's own use of mental health services, employment, and earnings. Specifically, we implement difference-in-difference models comparing the change in outcomes between the year before the birth of the third child and 6 to 10 years later in households where the third child does or does not have a disability.

The estimates in Table 8 support the idea that families in which the mother has only a basic education suffer financially after the birth of a third child with a disability: having a disabled third-born child reduces these mothers' employment and earnings by 13 percent and by 5 percent, respectively. There are no significant effects on maternal labor market outcomes in households with higher maternal education. The estimated effects are both economically small and statistically insignificant. The effects on maternal mental health care utilization are generally insignificant and do not vary by maternal education.

Table 9 shows similar estimates for father's outcomes.[21] Losses of employment and earnings are present both in the sample where mothers have a basic education, and in the sample where the mothers have high school. The magnitudes of the effects represent 2.5-5 percent reductions in employment and 3 percent declines in earnings when compared to the mean of the outcome in families without a disabled third child. In addition to labor market penalties, fathers of disabled children also seem to suffer from mental health problems. The results are statistically

[21] Note that the subsamples are still defined using maternal education as in Table 9. There are relatively few households in which fathers have less than high school.

significant in the full sample and in the sample where mothers have a basic education. The estimate in Column (3) of Panel B suggests that having a third child with a disability is associated with a 25 percent higher probability that the father will have a psychiatric visit.

Appendix Table A4 examines the same outcomes using a matching model. Recall that families are matched on mother's education and the models include a fixed effect for each treatment-control group set. Since the sample size is smaller than in the difference-in-difference specification due to missing matches, these estimates are not disaggregated by maternal education. The estimates in Panels A for families with three plus children show negative effects of having a third child with a disability on both mothers and father's employment. However, in addition, these estimates suggest that there is there is a positive effect on the use of mental health services among both mothers and fathers, with larger effects on counseling, psychiatric visits, and mental health prescriptions among mothers.

As discussed above, matching models can also be used to examine families with two plus children as shown in Panel B of Appendix Table A4. These estimates suggest even stronger effects on all the parental outcomes.

Overall, these results suggest that parental stress due to losses of employment and earnings is a plausible mechanism mediating the effect of a sibling's disability on the mental health of other children in the household.

6 Conclusion

We study the impact of a common family stressor, the presence of a younger sibling with a disability, on the utilization of mental health care among older siblings. Our estimates are based on two identification strategies that rely on complementary assumptions. First, we

compare families with at least three children in which the third-born child is diagnosed with a disability before age 5 to those in which the third born child does not have a disability in a fixed effect, difference-in-differences framework.

In treated families, second-born children spend a larger fraction of their early childhoods with a disabled sibling, so we expect them to be more impacted by stress arising from the disability than first-born children. Importantly, we are able to test this hypothesis using a matching framework which shows that most of the impact is indeed borne by second-born children. The matching model is also used to validate the findings from the difference-in-difference models, and to extend the results to families with two plus children.

We find that in affected families, second-born children are 11 percent more likely to use mental health services than first-born children. The biggest increases are in the use of psychiatric visits and mental health medications but there are also significant increases in the use of counselling services. The fact that first-born children are not much affected by the birth of a third-born with a disability suggests that it is family stress during the early years of childhood that matters.

The effects are driven by households in which mothers have less than a high school education. We show that these households bear the greatest losses in terms of employment and earnings following the birth of a child with a disability, suggesting that at least some of the stress experienced by these families may be due to resource constraints.

These results speak to the importance of stressful events in early childhood in the development of childhood mental health conditions. Given that the Danish welfare system is among the most generous in the world when it comes to supporting the families of children with disabilities, these results suggest that the effects of such household stressors could be much larger in countries that do not have these supports.

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Table 1: Descriptive Statistics by Third-Born Child's Disability Status

	Third born: disabled (1)	Third born: not disabled (2)	p-value (3)
Family Background Characteristics			
Mother is immigrant	0.14	0.12	0.00
Father is immigrant	0.16	0.13	0.00
Parents are cohabiting	0.95	0.95	0.29
Mother's age	25.04	25.31	0.00
Father's age	28.01	28.16	0.00
Mother has basic school	0.31	0.28	0.00
Mother has college degree	0.23	0.25	0.00
Father has basic school	0.27	0.25	0.00
Father had college degree	0.22	0.23	0.00
Mother is unemployed	0.14	0.13	0.00
Father is unemployed	0.10	0.08	0.00
Mother's income	159,893	165,797	0.00
Father's income	232,916	245,732	0.00
Mother receives counseling services	0.042	0.031	0.00
Mother has a psychiatric visit	0.010	0.006	0.00
Mother uses MH medication	0.059	0.046	0.00
Father receives counseling services	0.019	0.013	0.00
Father has a psychiatric visit	0.007	0.006	0.44
Father uses MH medication	0.047	0.042	0.06
Characteristics of First- and Second-Born Children			
Female	0.52	0.53	0.19
Gestation age in weeks	39.65	39.73	0.00
Birth weight in grams	3,492	3,520	0.00
5 minute APGAR	9.81	9.84	0.07
Hospital contact during the 1st year of life	0.34	0.29	0.00
Hospital contact during the 2nd year of life	0.49	0.43	0.00
Spacing 1st to 2nd	2.62	2.59	0.02
Spacing 2nd to 3rd	4.75	4.45	0.00
Spacing 1st to 3rd	7.37	7.03	0.00
Observations	4,212	60,090	

Notes: This table presents the means of observable characteristics by treatment status. Column (1) focuses on the subset of the analysis sample where the third child is diagnosed with a physical disability by age 5; while column (2) is restricted to the subset of the analysis sample where the third born child does not have a diagnosed physical disability by age 5. Column (3) presents p-values for the test of equality of the means between columns (1) and (2). Income is reported in 2015 prices. Parental age, educational attainment and marital/cohabiting status are measured at the time of the first birth, while household labor market outcomes and mental health care utilization are measured in the year before the first birth. Mental health care utilization of parents is measured in the year before the third birth as these data are available starting in 1995.

Table 2: Effects of Exposure to a Disabled Younger Sibling on Child Mental Health

	(1)	(2)	(3)
A. Any Mental Health Care Utilization			
3rd sibling disabled × 2nd born	0.0262***	0.0261***	0.0259***
	(0.00878)	(0.00878)	(0.00879)
Control group mean	0.224	0.224	0.224
B. Any Counseling Service			
3rd sibling disabled × 2nd born	0.0149*	0.0148*	0.0151**
	(0.00770)	(0.00769)	(0.00769)
Control group mean	0.156	0.156	0.156
C. Any Psychiatric Visit			
3rd sibling disabled × 2nd born	0.0211***	0.0208***	0.0202***
	(0.00698)	(0.00698)	(0.00698)
Control group mean	0.105	0.105	0.105
D. Any Mental Health Prescription			
3rd sibling disabled × 2nd born	0.0155**	0.0154**	0.0149**
	(0.00653)	(0.00653)	(0.00653)
Control group mean	0.091	0.091	0.091
Birth characteristics		X	X
Parental characteristics			X
Number of observations	128,604	128,604	128,604

Notes: This table presents the results of difference-in-differences models based on Equation (1). Each cell presents the estimate of the coefficient on the interaction term between the indicator for the second-born child and the indicator for the third-born child having a disability from a separate regression using the outcome indicated in the panel heading. All specifications include family fixed effects, and indicators for child gender, year and month of birth. The specification in Column (2) adds infant birth weight, gestational age, and 5-minute Apgar score. The specification in Column (3) further controls for parental characteristics in the year before the birth of each child: age, gross personal income, indicators for marital/cohabitation status, educational attainment (basic school only, college graduate), and employment status. The reported mean of the outcome is calculated among first-born children in families with a disabled third child. Standard errors are clustered at the family level. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table 3: Effects of Exposure to a Disabled Younger Sibling on Predetermined Characteristics

	Birth weight	Log BW	Low BW	Gestation weeks	Preterm	APGAR 5	Hosp. contact 1y	Hosp. contact 2y
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Predetermined Health Outcomes of First- and Second-Born Children								
3rd sibling disabled × 2nd born	−7.824	−0.00244	−0.000935	−0.0194	0.000428	0.0130	0.00707	0.00897
	(8.826)	(0.00293)	(0.00400)	(0.0326)	(0.00429)	(0.0187)	(0.00986)	(0.0103)
Control group mean	3,417	8.122	0.044	39.612	0.051	9.798	0.322	0.460

	Married	Basic school only		College graduate		Income	
		Mother	Father	Mother	Father	Mother	Father
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
B. Predetermined Time-Varying Parental Characteristics							
3rd sibling disabled × 2nd born	0.00413	0.00359*	−0.00260	−0.00410	−0.00847***	-1823.0	-1529.3
	(0.00411)	(0.00192)	(0.00203)	(0.00326)	(0.00280)	(1704.6)	(2344.6)
Control group mean	0.945	0.311	0.272	0.227	0.216	159,893	232,916
Number of observations	128,604	128,604	128,604	128,604	128,604	128,604	128,604	128,604

Notes: This table presents the results of difference-in-differences models based on Equation (1). Each cell presents the estimate of the coefficient on the interaction term between the indicator for the second-born child and the indicator for the third-born child having a disability from a separate regression using the outcome indicated in the column heading. All specifications include family fixed effects, and indicators for child gender, year and month of birth. The reported mean of the outcome is calculated among first-born children in families with a disabled third child. Standard errors are clustered at the family level. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table 4: Robustness Checks

	Any MH Utilization (1)	Any Counseling (2)	Any Psychiatric Visit (3)	Any MH Prescription (4)
A. Baseline Results				
3rd sibling disabled × 2nd born	0.0259***	0.0151*	0.0202***	0.0149**
	(0.00879)	(0.00769)	(0.00698)	(0.00653)
Control group mean	0.224	0.156	0.105	0.091
Number of observations	128,604	128,604	128,604	128,604
B. Measuring Exposure with Birth Spacing				
Exposure × 2nd born	0.00878***	0.00565**	0.00640***	0.00460**
	(0.00309)	(0.00277)	(0.00247)	(0.00228)
Control group mean	0.224	0.156	0.105	0.091
Number of observations	128,604	128,604	128,604	128,604
C. Excluding Households where the First- or Second-Born Children Have a Physical Disability				
3rd sibling disabled × 2nd born	0.0281***	0.0141	0.0225***	0.0152**
	(0.00982)	(0.00872)	(0.00783)	(0.00726)
Control group mean	0.218	0.158	0.101	0.086
Number of observations	108,948	108,948	108,948	108,948
D. Excluding Households where either Parent Uses Mental Health Care Services Before the Third Birth				
3rd sibling disabled × 2nd born	0.0309***	0.0171*	0.0269***	0.0215***
	(0.0102)	(0.00891)	(0.00809)	(0.00748)
Control group mean	0.213	0.148	0.098	0.083
Number of observations	94,738	94,738	94,738	94,738
E. Effects Weighted by Differences in Characteristics Between Families with 2 and 3+ children				
3rd sibling disabled × 2nd born	0.0280**	0.0288**	0.0156	0.0173
	(0.0138)	(0.0118)	(0.0105)	(0.0106)
Control group mean	0.224	0.156	0.105	0.091
Number of observations	125,972	125,972	125,972	125,972

Notes: Each cell presents estimates from a separate regression using the outcome indicated in the column heading. Panel A reproduces the baseline difference-in-differences estimates. Panel B replaces the interaction term in the baseline model with an interaction term between the difference in exposure to the third-child and an indicator for whether the family has a disabled third-born. Panel C re-estimates the baseline model after excluding households where either the first- or the second-born sibling has a physical disability. Panel D estimates the baseline model using the characteristics of families with two children as weights. All specifications include family fixed effects, year and month of birth fixed effects, child characteristics (gender, birth weight, gestational age, 5-minute Apgar score) and parental characteristics in the year before the birth of each child (age, gross personal income, indicators for marital/cohabitation status, educational attainment and employment status). Income is reported in 2015 prices. Standard errors are clustered at the family level. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table 5: Effects of Exposure to a Disabled Younger Sibling on Child Mental Health Based on Matching Methods

	Any MH Utilization (1)	Any Counseling (2)	Any Psychiatric Visit (3)	Any MH Prescription (4)
A. Baseline Results				
3rd sibling disabled × 2nd born	0.0259***	0.0151*	0.0202***	0.0149**
	(0.00879)	(0.00769)	(0.00698)	(0.00653)
Control group mean	0.224	0.156	0.105	0.091
Number of observations	128,604	128,604	128,604	128,604
B. Effects Based on Matching Methods, Second-Born Children in Families with 3+ children				
Disabled sibling	0.0259***	0.0135**	0.0220***	0.00924*
	(0.00778)	(0.00671)	(0.00598)	(0.00558)
Control group mean	0.208	0.148	0.096	0.089
Number of observations	43,244	43,244	43,244	43,244
C. Effects Based on Matching Methods, First-Born Children in Families with 3+ children				
Disabled sibling	0.00646	0.00334	0.0157***	0.00182
	(0.00730)	(0.00625)	(0.00549)	(0.00498)
Control group mean	0.205	0.143	0.088	0.081
Number of observations	43,306	43,306	43,306	43,306
D. Effects Based on Matching Methods, Children in Families with 3+ children				
Disabled sibling	0.0162***	0.00835*	0.0194***	0.00565
	(0.00535)	(0.00458)	(0.00407)	(0.00373)
Control group mean	0.207	0.146	0.092	0.085
Number of observations	86,550	86,550	86,550	86,550
E. Effects Based on Matching Methods, Families with 2+ children				
Disabled sibling	0.0211***	0.0146***	0.0122***	0.00795***
	(0.00298)	(0.00261)	(0.00220)	(0.00206)
Control group mean	0.214	0.154	0.092	0.086
Number of observations	942,927	942,927	942,927	942,927

Notes: Each cell presents estimates from a separate regression using the outcome indicated in the column heading. Panel A reproduces the baseline difference-in-differences estimates. Panels B–E present coefficients on the indicator for the having a disabled sibling from a matching model estimated in the sample described in the panel heading. The reported mean of the outcome is calculated among children in families without a disabled child. Standard errors are clustered at the family level. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table 6: Heterogeneous Effects of Exposure to a Disabled Younger Sibling by Disease Severity

	Any MH Utilization (1)	Any Counseling (2)	Any Psychiatric Visit (3)	Any MH Prescription (4)
A. Baseline Results				
3rd sibling disabled × 2nd born	0.0259***	0.0151*	0.0202***	0.0149**
	(0.00879)	(0.00769)	(0.00698)	(0.00653)
Control group mean	0.224	0.156	0.105	0.091
Number of observations	128,604	128,604	128,604	128,604
B. Effects of Disabilities by Disease Burden				
Less Severe × 2nd born	0.0348***	0.0240**	0.0164*	0.00900
	(0.0119)	(0.0103)	(0.00925)	(0.00854)
More Severe × 2nd born	0.0167	0.00485	0.0262**	0.0227**
	(0.0126)	(0.0111)	(0.0103)	(0.00971)
Control group mean	0.224	0.156	0.105	0.091
Number of observations	128,604	128,604	128,604	128,604
C. Effects of Disabilities Diagnosed at Different Ages				
Disabled (0–4) × 2nd born	0.0257***	0.0146*	0.0200***	0.0147**
	(0.00879)	(0.00770)	(0.00699)	(0.00654)
Disabled (5–9) × 2nd born	−0.00944	−0.0175	−0.00722	−0.00576
	(0.0134)	(0.0120)	(0.0102)	(0.00987)
Control group mean	0.224	0.156	0.105	0.091
Number of observations	128,604	128,604	128,604	128,604
D. Effects of Poor Health at Birth				
3rd sibling poor health × 2nd born	0.0116	0.0116	0.0172*	−0.000930
	(0.0117)	(0.0104)	(0.00922)	(0.00926)
Control group mean	0.247	0.159	0.112	0.116
Number of observations	128,604	128,604	128,604	128,604

Notes: This table presents the results of difference-in-differences models based on Equation (1). Each Panel has 4 regressions using the outcome indicated in the column heading. Panel A reproduces the baseline difference-in-differences estimates. Panel B replaces the interaction term in the baseline model with two interaction terms that separately capture the effects of less and more severe disabilities. We measure severity using the number of hospital contacts the disabled third-born child has by age 5. We classify a child as having a severe disability if they have more than the median number of hospital contacts. Panel C re-estimates the baseline model after including an interaction term for the second-born child and an indicator for the third-born child having a disability diagnosis between the ages of 5–9. Panel D replaces the indicator for the third-born child having a disability by age 5 with an indicator for the third-born child having poor health at birth, defined as the third-born having a birth weight below 2,500 grams or gestational age below 37 weeks or five minutes Apgar score below 6. All specifications include family fixed effects, year and month of birth fixed effects, child characteristics and parental characteristics in the year before the birth of each child. The reported mean of the outcome is calculated among first-born children in treated families. Standard errors are clustered at the family level. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table 7: Heterogeneous Effects of Exposure to a Disabled Younger Sibling by Mother's Education

	Any MH Utilization (1)	Any Counseling (2)	Any Psychiatric Visit (3)	Any MH Prescription (4)
A. Baseline Results				
3rd sibling disabled × 2nd born	0.0259***	0.0151*	0.0202***	0.0149**
	(0.00879)	(0.00769)	(0.00698)	(0.00653)
Control group mean	0.224	0.156	0.105	0.091
Number of observations	128,604	128,604	128,604	128,604
B. Basic School				
3rd sibling disabled × 2nd born	0.0361**	0.0152	0.0383***	0.0277**
	(0.0170)	(0.0151)	(0.0141)	(0.0133)
Control group mean	0.274	0.190	0.137	0.115
Number of observations	36,226	36,226	36,226	36,226
B. High School or Some College				
3rd sibling disabled × 2nd born	0.0208	0.0153	0.00941	0.0104
	(0.0128)	(0.0109)	(0.00996)	(0.00938)
Control group mean	0.209	0.143	0.099	0.085
Number of observations	60,718	60,718	60,718	60,718
C. College Graduate				
3rd sibling disabled × 2nd born	0.0236	0.0154	0.0177	0.00786
	(0.0170)	(0.0154)	(0.0127)	(0.0119)
Control group mean	0.184	0.135	0.072	0.069
Number of observations	31,660	31,660	31,660	31,660

Notes: This table presents the results of difference-in-differences models based on Equation (1). Each cell presents estimates from a separate regression using the outcome indicated in the column heading. Panel A reproduces the baseline difference-in-differences estimates. Panels B–D present results by mother's education, measured at the time of the first birth. All specifications in Panels A–D include family fixed effects, year and month of birth fixed effects, child characteristics (gender, birth weight, gestational age, 5-minute Apgar score) and parental characteristics in the year before the birth of each child (age, gross personal income, indicators for marital/cohabitation status, educational attainment and employment status). The reported mean of the outcome is calculated among first-born children in treated families. Standard errors are clustered at the family level. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table 8: Effects of a Disabled Third-Born Child on Mother's Outcomes

	Any MH care	Counseling	Psychiatric Visit	MH Prescription	Employment	Earnings
	(1)	(2)	(3)	(4)	(5)	(6)
A. Full Sample						
After the birth of 3rd child	0.283***	0.215***	0.0350***	0.204***	0.604***	91,139.2***
	(0.00223)	(0.00200)	(0.000926)	(0.00198)	(0.00260)	(564.5)
After the birth of 3rd child × 3rd child disabled	0.00250	0.0148*	−0.000733	0.00454	−0.0458***	-3,608.0
	(0.00889)	(0.00805)	(0.00380)	(0.00785)	(0.0109)	(2,425.1)
Control group mean	0.368	0.256	0.046	0.261	0.773	22,7630
Number of observations	106,910	106,910	106,910	106,910	128,340	128,340
B. Mother's education: basic school						
After the birth of 3rd child	0.357***	0.267***	0.0671***	0.287***	0.272***	63,899.9***
	(0.00455)	(0.00415)	(0.00241)	(0.00427)	(0.00581)	(874.4)
After the birth of 3rd child × 3rd child disabled	0.00405	0.0160	−0.00375	0.00813	−0.0739***	-7,179.2**
	(0.0171)	(0.0157)	(0.00924)	(0.0161)	(0.0227)	(3,003.4)
Control group mean	0.473	0.319	0.082	0.366	0.571	134,407
Number of observations	29,470	29,470	29,470	29,470	36,184	36,184
C. Mother's education: high school or some college						
After the birth of 3rd child	0.266***	0.207***	0.0274***	0.184***	0.685***	93,403.9***
	(0.00318)	(0.00285)	(0.00119)	(0.00278)	(0.00335)	(781.2)
After the birth of 3rd child × 3rd child disabled	−0.00624	0.00687	−0.00180	−0.00989	−0.0172	-2,818.1
	(0.0127)	(0.0115)	(0.00490)	(0.0110)	(0.0139)	(2,763.9)
Control group mean	0.340	0.238	0.037	0.229	0.839	239,880
Number of observations	51,100	51,100	51,100	51,100	60,584	60,584
D. Mother's education: college graduate						
After the birth of 3rd child	0.233***	0.171***	0.0142***	0.149***	0.823***	117,627.6***
	(0.00419)	(0.00370)	(0.00121)	(0.00347)	(0.00375)	(1,376.6)
After the birth of 3rd child × 3rd child disabled	0.00375	0.0187	−0.000790	0.0130	0.00538	6,055.0
	(0.0174)	(0.0156)	(0.00484)	(0.0143)	(0.0150)	(7,915.1)
Control group mean	0.281	0.204	0.015	0.184	0.917	330,751
Number of observations	26,340	26,340	26,340	26,340	31,572	31,572

Notes: This table presents the effects of having a disabled third-born child on the mother's mental health and labor market outcomes. The results are based on a difference-in-difference model comparing the change in outcomes 6–10 years after the birth of the third child relative to the year before the birth of the third child, between households where the third child has a disability or not. Third-born child's disability status is based on receiving a diagnosis by age 5. Panel A presents the estimates for the full sample, while Panels B–D present effects by mother's education, measured at the time of the first birth. The reported mean of the outcome is calculated among families without a disabled third child in the year before the third birth. Earnings are reported in 2015 prices. Robust standard errors are in parenthesis. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table 9: Effects of a Disabled Third-Born Child on Father's Outcomes

	Any MH care	Counseling	Psychiatric Visit	MH Prescription	Employment	Earnings
	(1)	(2)	(3)	(4)	(5)	(6)
A. Full Sample						
After the birth of 3rd child	0.177***	0.110***	0.0268***	0.138***	0.790***	114,478.4***
	(0.00194)	(0.00153)	(0.000836)	(0.00175)	(0.00197)	(1,383.8)
After the birth of 3rd child × 3rd child disabled	0.0133*	0.00569	0.00718**	0.00507	−0.0291***	-8,780.5**
	(0.00776)	(0.00615)	(0.00352)	(0.00696)	(0.00818)	(4,372.9)
Control group mean	0.248	0.129	0.042	0.191	0.841	346,775
Number of observations	106,934	106,934	106,934	106,934	127,759	127,759
B. Mother's education: basic school						
After the birth of 3rd child	0.221***	0.132***	0.0444***	0.182***	0.622***	67,503.3***
	(0.00410)	(0.00320)	(0.00209)	(0.00379)	(0.00474)	(1,431.4)
After the birth of 3rd child × 3rd child disabled	0.0110	0.00629	0.0198**	0.00660	−0.0375**	-6,204.5
	(0.0157)	(0.0122)	(0.00876)	(0.0146)	(0.0182)	(5,478.3)
Control group mean	0.306	0.152	0.077	0.249	0.722	233,999
Number of observations	29,478	29,478	29,478	29,478	35,931	35,931
C. Mother's education: high school or some college						
After the birth of 3rd child	0.167***	0.107***	0.0228***	0.128***	0.840***	11,7628.1***
	(0.00272)	(0.00217)	(0.00110)	(0.00245)	(0.00251)	(2,077.0)
After the birth of 3rd child × 3rd child disabled	0.00996	−0.00273	−0.000765	−0.00253	−0.0220**	-10,557.0*
	(0.0108)	(0.00868)	(0.00419)	(0.00942)	(0.0106)	(6,364.6)
Control group mean	0.224	0.121	0.028	0.164	0.879	360,189
Number of observations	51,106	51,106	51,106	51,106	60,336	60,336
D. Mother's education: college graduate						
After the birth of 3rd child	0.149***	0.0919***	0.0150***	0.111***	0.884***	161,390.6***
	(0.00357)	(0.00280)	(0.00120)	(0.00314)	(0.00296)	(3,545.5)
After the birth of 3rd child × 3rd child disabled	0.0151	0.0176	0.00327	0.0107	0.00219	2,023.1
	(0.0150)	(0.0120)	(0.00512)	(0.0134)	(0.0122)	(11,736.8)
Control group mean	0.215	0.114	0.021	0.168	0.926	474,389
Number of observations	26,341	26,341	26,341	26,341	31,492	31,492

Notes: This table presents the effects of having a disabled third-born child on the father's mental health and labor market outcomes. The results are based on a difference-in-difference model comparing the change in outcomes 6–10 years after the birth of the third child relative to the year before the birth of the third child, between households where the third child has a disability or not. Third-born child's disability status is based on receiving a diagnosis by age 5. Panel A presents the estimates for the full sample, while Panels B–D present effects by mother's education, measured at the time of the first birth. The reported mean of the outcome is calculated among families without a disabled third child in the year before the third birth. Earnings are reported in 2015 prices. Robust standard errors are in parenthesis. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Child Disability and Effects on Sibling Mental Health

Online Appendix

Janet Currie *Princeton University and NBER*

N. Meltem Daysal *University of Copenhagen, CEBI, CESifo, and IZA*

Mette Gørtz *University of Copenhagen*

Jonas Cuzulan Hirani *VIVE*

A1 Description of Disabilities

A. Physical disability conditions included in Black et al. (2021)

- Neoplasms: C00-C99, D32-D33, D39-D40, D42-D43, D46
- Anaemias: D50-D64
- Coagulation defects, purpura and other hemorrhagic conditions: D65-D69
- Diabetes mellitus: E10-E14
- Disorders of porphyrin and bilirubin metabolism: E80
- Epilepsy and status epilepticus: G40-G41
- Cerebral palsy and other paralytic syndromes: G80-G83
- Visual impairments: H54
- Hearing impairments: H90-H91
- Crohn disease: K50
- Juvenile arthritis: M08-M09
- Nervous system malformations: Q00-Q07
- Eye, ear, face and neck malformations:Q10-Q18
- Circulatory system malformations: Q20-Q28
- Respiratory system malformations: Q30-Q34
- Clef lip and palate: Q35-Q37
- Genital organs malformations: Q50-Q56
- Urinary system malformations: Q60-Q64
- Musculoskeletal system malformations: Q65-Q79
- Other malformations: Q80-Q89
- Other chromosomal abnormalities : Q90-Q99

B. Additional conditions from the List of Compassionate Allowances Conditions

- Huntington's disease: G10
- Other specified degenerative diseases of nervous system: G318
- Metachromatic Leukodystrophy: E752E
- Other specified myopathies: G7289
- Alpers Disease: G318A
- Alpha Mannosidosis, Fucosidosis Type I: E771

- Amyotrophic lateral sclerosis: G122A
- Ataxia Telangiectasia: G113
- Batten disease: E754
- Beta Thalassemia Major: D561
- Bilateral Optic Atrophy: H472
- Childhood Ataxia: E752
- Cerebrotendinous Xanthomatosis: E755
- Chronic Idiopathic Intestinal Pseudo Obstruction: K598
- Creutzfeldt-Jakob disease: A810
- Disorders of arteries and arterioles: I778
- Early-onset Alzheimer's Disease: G300,G308,G309
- Farber's disease: E756
- Fatal Familial Insomnia: A818B
- Fibrodysplasia Ossificans Progressiva: M611
- Friedreich's Ataxia: G111
- Frontotemporal Dementia: G310
- Fukuyama Congenital Muscular Dystrophy : G710
- Giant Cell Myocarditis: I428
- Galactosialidosis: E889
- Giant Axonal Neuropathy: G600
- Glutaric Acidemia - Type II: E713
- Heart Transplant Graft Failure: T862
- Heart Transplant wait-list: Z941
- Hemophagocytic Lymphohistiocytosis - Familial Type: D761
- Hepatopulmonary syndrome: K768
- Hepatorenal Syndrome: K767
- Histiocytosis: J848
- Hutchinson-Gilford Progeria Syndrome: E348
- Hypocomplementemic Urticarial Vasculitis Syndrome : M359
- Hypophosphatasia: E833

- I Cell Diseas: E770
- Idiopathic Pulmonary Fibrosis: J841
- Intracranial Hemangiopericytoma: M850
- Disorder of carbohydrate metabolism: E749
- Muscular dystrophy: G710
- Neuronal ceroid lipofuscinosis: E754
- Jervell and Lange-Nielsen Syndrome: I458
- Joubert Syndrome: G111
- Kufs disease: E75
- Lesch-Nyhan syndrome: E791
- Lowe Syndrome: E720
- Malignant Multiple Sclerosis: G35
- Marshall-Smith Syndrome : C870
- Menkes Disease: E830
- Metachromatic leukodystrophy: E752
- MPS I: E760
- MPS II: E761
- Multiple System Atrophy: G903
- Nephrogenic Systemic Fibrosis: L908
- NFU-1 Mitochondrial Disease: E884
- Obliterative Bronchiolitis: J449
- Ohtahara Syndrome: G403
- Ornithine Transcarbamylase (OTC) Deficiency: E724
- Paraneoplastic Pemphigus : L108
- Pearson Syndrome: D640
- Malignant Mesothelioma: C450
- Pompe disease: E740
- Progressive Bulbar Palsy: G122
- Progressive multifocal leukoencephalopathy: A812
- Progressive supranuclear ophthalmoplegia: G231

- Retinopathy of Prematurity: H351
- Severe Combined Immunodeficiency: D819
- Smith Lemli Opitz Syndrome: E787
- Spinal Muscular Atrophy: G12
- Spinocerebellar Ataxia: G119
- Stiff Person Syndrome: G258
- Subacute Sclerosing Panencephalitis: A811
- Tabes Dorsalis: A521
- Myotonic disorders: G711
- Ullrich Congenital Muscular Dystrophy: G712
- Usher Syndrome Type I: H355
- A Ventricular Assist Device: Z958
- Wolman disease: E780
- X-Linked Lymphoproliferative Disease: D823

C. Additional conditions from the Global Burden of Disease Study

- Blindness, both eyes: H540
- Blindness, one eye, low vision other eye: H541
- Encephalopathy: G934

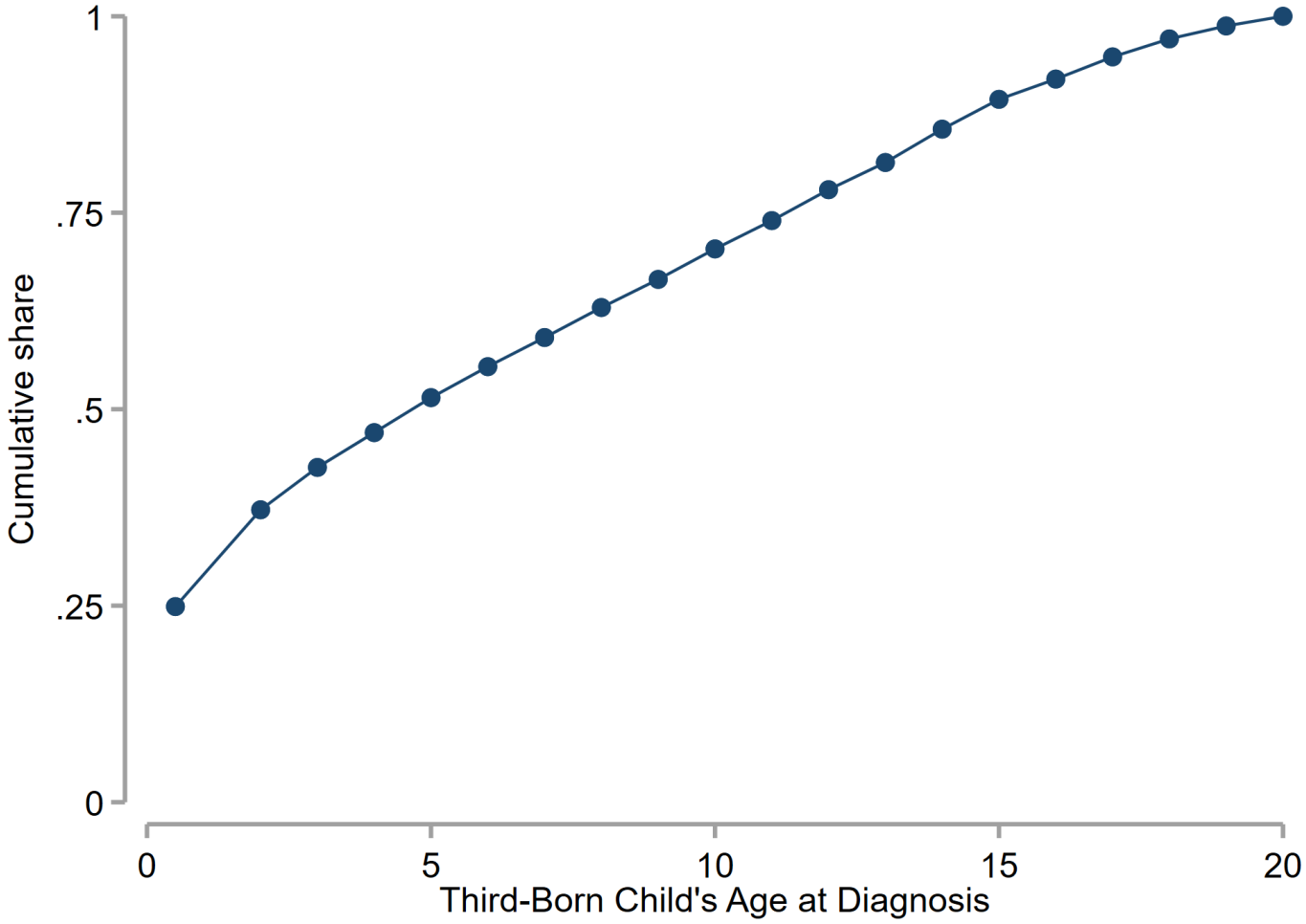
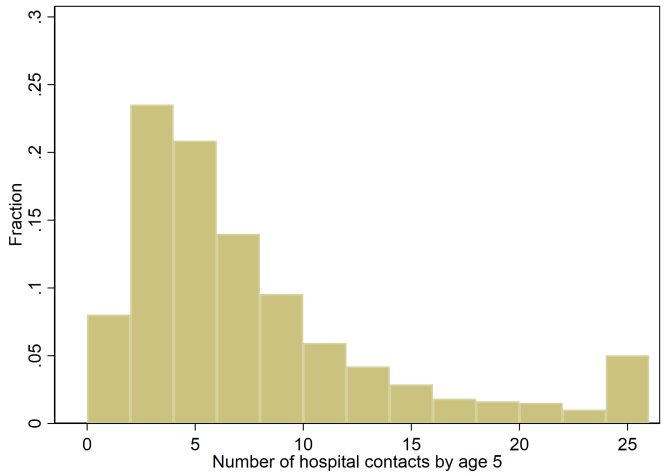
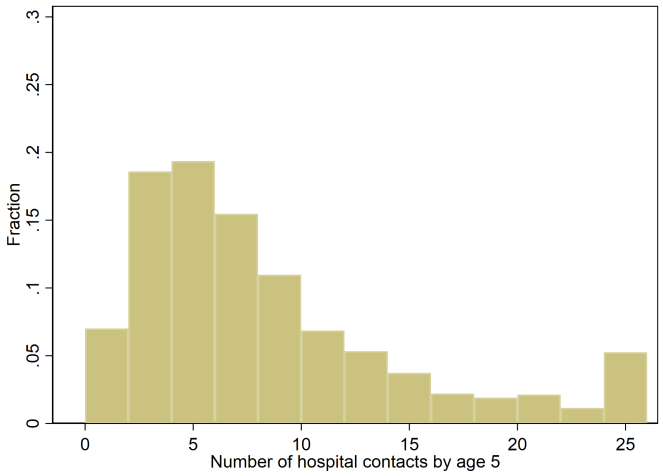


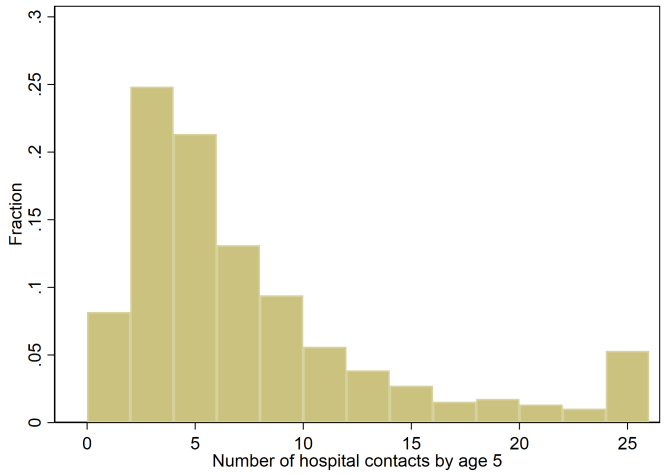
Figure A1: Cumulative Density of Third-Born Child's Age at Diagnosis



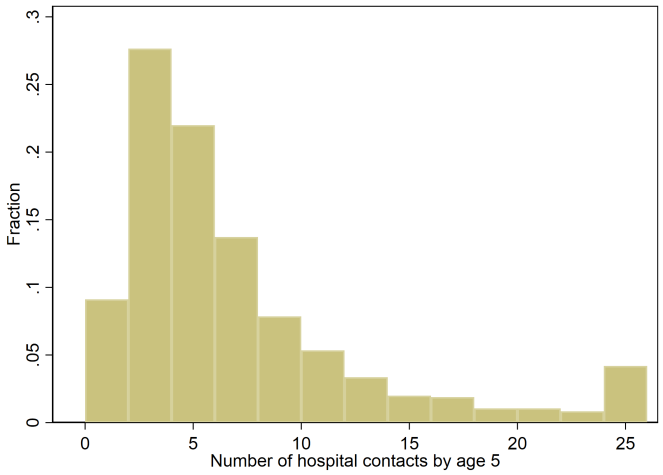
a Full Sample



b Mother's Education: Basic School



c Mother's Education: High School or Some College



d Mother's Education: College Graduate

Figure A2: Distribution of Third-Born Child Disability Severity

Notes: Each figure presents the distribution of the severity of the third-born child's disability in the sample indicated in the figure caption. We measure severity using the number of hospital contacts the disabled third-born child has by age 5. The distribution is censored at 25 contacts due to data confidentiality rules.

Table A1: Descriptive Statistics by Family Size

	2-child families (1)	3+ child families (2)
Family Background Characteristics		
Mother is immigrant	0.06	0.12
Father is immigrant	0.06	0.13
Parents are cohabiting	0.96	0.95
Mother's age	27.56	25.29
Father's age	30.17	28.15
Mother has basic school	0.20	0.28
Mother has college degree	0.27	0.25
Father has basic school	0.21	0.25
Father had college degree	0.25	0.23
Mother is unemployed	0.07	0.13
Father is unemployed	0.05	0.09
Mother's income	215,544	165,411
Father's income	298,318	244,895
Mother receives counseling services	0.011	0.011
Mother has a psychiatric visit	0.002	0.005
Mother uses MH medication	0.030	0.010
Father receives counselling services	0.004	0.003
Father has a psychiatric visit	0.002	0.004
Father uses MH medication	0.025	0.012
Characteristics of First- and Second-Born Children		
Female	0.51	0.53
Gestation age in weeks	39.60	39.72
Birth weight in grams	3,471	3,518
5 minute APGAR	9.81	9.83
Spacing 1st to 2nd	3.10	2.59
Spacing 2nd to 3rd		4.47
Spacing 1st to 3rd		7.06
Number of families	126,648	64,302

Notes: This table presents the means of observable characteristics by family size. Only families with same father of first two children are included. Income is reported in 2015 prices. Parental age, educational attainment and marital/cohabiting status are measured at the time of first birth, while household labor market outcomes and mental health care utilization are measured in the year before first birth. Parent's mental health care utilization are only available from 1995.

Table A2: Difference-in-Difference Tabulations

	2nd born (1)	1st born (2)	Difference (3)
A. Any MH Care Utilization Service			
3rd sibling disabled by age 5	0.269	0.224	0.0453***
	(0.444)	(0.417)	(0.00938)
3rd sibling not disabled by age 5	0.238	0.218	0.0198***
	(0.426)	(0.413)	(0.00242)
Difference	0.0313***	0.00579	0.0313***
	(0.00681)	(0.00659)	(0.00705)
B. Any Counseling Service			
3rd sibling disabled by age 5	0.180	0.156	0.0240***
	(0.384)	(0.363)	(0.00814)
3rd sibling not disabled by age 5	0.163	0.153	0.0104***
	(0.370)	(0.360)	(0.00210)
Difference	0.0165***	0.00291	0.0165***
	(0.00591)	(0.00574)	(0.00611)
C. Any Psychiatric Visit			
3rd sibling disabled by age 5	0.146	0.105	0.0413***
	(0.353)	(0.307)	(0.00721)
3rd sibling not disabled by age 5	0.115	0.0951	0.0199***
	(0.319)	(0.293)	(0.00177)
Difference	0.0313***	0.00985**	0.0313***
	(0.00512)	(0.00469)	(0.00560)
D. Any Mental Health Prescription			
3rd sibling disabled by age 5	0.119	0.0907	0.0280***
	(0.323)	(0.287)	(0.00667)
3rd sibling not disabled by age 5	0.103	0.0911	0.0123***
	(0.304)	(0.288)	(0.00171)
Difference	0.0153***	0.000387	0.0153***
	(0.00487)	(0.00459)	(0.00514)
Number of observations (families)		128,604 (64,302)	

Notes: This table presents the results of difference-in-differences models with no covariates included. Each panel focuses on a different mental health outcome. Within each panel, the first two rows correspond to families with and without a disabled third child, respectively, while the first two columns correspond to second- and first-born children, respectively. The third column and the third row of each panel presents *t*-test differences in the corresponding group. Difference-in-differences estimates are presented in the bottom right corner of each panel. Standard errors are adjusted for clustering at the family level. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table A3: Effects of Exposure to a Disabled Younger Sibling on Child Mental Health Prescription Use

	Psychoanaleptics (N06)			Psycholeptics (N05)	
	All N06	Antidepressants N06A	Psychostimulants N06B	All N05	Antipsychotics N05A
	(1)	(2)	(3)	(4)	(5)
A. Full Sample					
3rd sibling disabled × 2nd born	0.0114**	0.00458	0.00918**	0.00777	0.00439
	(0.00572)	(0.00487)	(0.00373)	(0.00495)	(0.00347)
Control group mean	0.066	0.052	0.020	0.046	0.020
Number of observations	128,604	128,604	128,604	128,604	128,604
B. Mother's education: basic school					
3rd sibling disabled × 2nd born	0.0268**	0.0167*	0.0122	0.00903	0.000146
	(0.0116)	(0.00968)	(0.00805)	(0.0103)	(0.00745)
Control group mean	0.079	0.059	0.027	0.066	0.032
Number of observations	36,226	36,226	36,226	36,226	36,226
C. Mother's education: high school or some college					
3rd sibling disabled × 2nd born	−0.000752	−0.00482	0.00410	0.0152**	0.00993**
	(0.00821)	(0.00699)	(0.00525)	(0.00687)	(0.00482)
Control group mean	0.068	0.054	0.021	0.035	0.014
Number of observations	60,718	60,718	60,718	60,718	60,718
D. Mother's education: college graduate					
3rd sibling disabled × 2nd born	0.0153	0.00902	0.0141**	−0.00732	−0.000676
	(0.0103)	(0.00924)	(0.00599)	(0.00894)	(0.00587)
Control group mean	0.046	0.039	0.009	0.042	0.016
Number of observations	31,660	31,660	31,660	31,660	31,660

Notes: This table presents the results of difference-in-differences models based on Equation (1). Each cell presents estimates from a separate regression using the outcome indicated in the column heading. Panel A presents results from the full sample. Panels B–D present results by mother's education, measured at the time of the first birth. All specifications include family fixed effects, year and month of birth fixed effects, child characteristics (gender, birth weight, gestational age, 5-minute Apgar score) and parental characteristics in the year before the birth of each child (age, gross personal income, indicators for marital/cohabitation status, educational attainment and employment status). The reported mean of the outcome is calculated among first-born children in treated families. Standard errors are clustered at the family level. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table A4: Effects of a Disabled Child on Parental Outcomes Based on Matching Methods

	Any MH care (1)	Counseling (2)	Psychiatric Visit (3)	MH Prescription (4)	Employment (5)	Earnings (6)
A. Families with 3+ children						
Mothers						
Disabled sibling	0.0221***	0.0160**	0.00551*	0.0165**	−0.0214***	-5,933.9**
	(0.00744)	(0.00661)	(0.00314)	(0.00672)	(0.00490)	(2,670.7)
Control group mean	0.309	0.210	0.029	0.215	0.863	247,317
Number of observations	53,371	53,371	53,371	53,371	53,371	53,371
Fathers						
Disabled sibling	0.0221***	0.0127**	0.00438	0.00131	−0.0172***	-22,080.4***
	(0.00744)	(0.00520)	(0.00289)	(0.00598)	(0.00448)	(5,987.0)
Control group mean	0.309	0.101	0.023	0.153	0.913	394342
Number of observations	53,371	53,371	53,371	53,371	53,371	53,371
B. Families with 2+ children						
Mothers						
Disabled sibling	0.0307***	0.0241***	0.00481***	0.0212***	−0.0223***	-7,989.8***
	(0.00344)	(0.00307)	(0.00138)	(0.00314)	(0.00220)	(968.6)
Control group mean	0.278	0.182	0.023	0.192	0.890	235,372
Number of observations	907,449	907,449	907,449	907,449	907,449	907,449
Fathers						
Disabled sibling	0.0216***	0.0164***	0.00380***	0.0141***	−0.0102***	-13,698.9***
	(0.00306)	(0.00233)	(0.00127)	(0.00277)	(0.00186)	(2,212.1)
Control group mean	0.172	0.085	0.020	0.135	0.939	372,773
Number of observations	907,449	907,449	907,449	907,449	907,449	907,449

Notes: This table presents the effects of having a disabled child on the parents' mental health and labor market outcomes. Children's disability status is based on receiving a diagnosis by age 5. Parental outcomes are measured 6–10 years after the birth of the disabled child. The results are based on a matching model using the analysis sample (Panel A) or all families with at least two children (Panel B). Specifically, we identify families where children are diagnosed with a physical disability between 1999–2008 and we match each younger child of a disabled sibling to an unrestricted number of children from the control pool based on birth year, birth order, child gender, mother's and fathers age at first birth, mother's years of education at first birth, and the number of siblings in the family at the time of disability diagnosis. We then regress the outcomes on an indicator for having a disabled child and fixed effects for each matched treatment–control group. Each cell presents the coefficient on the indicator for having a disabled child for the outcome indicated in the column heading. The reported mean of the outcome is calculated among families without a disabled child. Earnings are reported in 2015 prices. Robust standard errors are in parenthesis. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.

Table A5: Effects of Exposure to a Disabled Younger Sibling on Child Mental Health, All Estimates

	Any MH Utilization	Any Counseling	Any Psychiatric Visit	Any MH Prescription
	(1)	(2)	(3)	(4)
Second born	-0.00184	-0.00489	-0.00142	0.00351
	(0.00576)	(0.00505)	(0.00438)	(0.00424)
3rd disbaled sibling × 2nd born	0.0259***	0.0151**	0.0202***	0.0149**
	(0.00879)	(0.00769)	(0.00698)	(0.00653)
Birth weight (in grams)	-0.00000614	0.00000653	0.000000385	-0.00000929**
	(0.00000482)	(0.00000425)	(0.00000371)	(0.00000362)
Child gender (girl)	0.0799***	0.107***	0.00607**	0.0158***
	(0.00318)	(0.00283)	(0.00238)	(0.00236)
Parents are cohabiting	-0.0230**	-0.00738	-0.0124	-0.0142*
	(0.00942)	(0.00845)	(0.00773)	(0.00741)
Mother has basic school	-0.0220	0.0190	-0.0242	-0.0165
	(0.0177)	(0.0156)	(0.0149)	(0.0135)
Mother is college graudate	0.00204	0.00518	0.00227	0.00000300
	(0.0101)	(0.00904)	(0.00756)	(0.00712)
Father has basic school	-0.00880	-0.0234	0.00163	-0.00765
	(0.0194)	(0.0179)	(0.0155)	(0.0148)
Father is college graudate	-0.0280**	-0.0124	-0.0205**	-0.0151*
	(0.0113)	(0.0101)	(0.00840)	(0.00809)
Mother is unemployed	0.00175	-0.000320	0.00341	0.00168
	(0.00562)	(0.00499)	(0.00441)	(0.00428)
Father is unemployed	0.0138*	0.0150**	0.00404	-0.000262
	(0.00744)	(0.00649)	(0.00569)	(0.00556)
Constant	0.182	0.216	0.0180	-0.0599
	(0.403)	(0.376)	(0.130)	(0.164)
Control group mean	0.224	0.156	0.105	0.091
Number of observations	128,604	128,604	128,604	128,604

Notes: This table presents the results of difference-in-differences models based on Equation (1). Each column represents a separate regression with the outcome indicated in the column heading and the covariates indicated in the rows. The regression models also include indicators for child gestational age, and 5-minute Apgar score; parental age and income decile in the year before the birth of each child, and fixed effects for child birth year, birth month, and family. The reported mean of the outcome is calculated among first-born children in families with a disabled third child. Standard errors are clustered at the family level. Significance levels: * p<0.1 ** p<0.05 *** p<0.01.