ONLINE APPENDIX

Family Spillover Effects of Marginal Diagnoses: The Case of ADHD

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A Symptoms and Diagnosis of ADHD

Health care providers use the guidelines in the American Psychiatric Association's Diagnostic and Statistical Manual, Fifth edition (DSM-5) to diagnose ADHD.[1] Individuals with ADHD show a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development. The following are listed as symptoms of ADHD:

Inattention Symptoms:

1. Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or with other activities.
2. Often has trouble holding attention on tasks or play activities.
3. Often does not seem to listen when spoken to directly.
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., loses focus, side-tracked).
5. Often has trouble organizing tasks and activities.
6. Often avoids, dislikes, or is reluctant to do tasks that require mental effort over a long period of time (such as schoolwork or homework).
7. Often loses things necessary for tasks and activities (e.g. school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).
8. Is often easily distracted.
9. Is often forgetful in daily activities.

Hyperactivity and Impulsivity Symptoms:

1. Often fidgets with or taps hands or feet, or squirms in seat.
2. Often leaves seat in situations when remaining seated is expected.
3. Often runs about or climbs in situations where it is not appropriate (adolescents or adults may be limited to feeling restless).

[1] `https://www.cdc.gov/ncbddd/adhd/diagnosis.html`

4. Often unable to play or take part in leisure activities quietly.
5. Is often "on the go" acting as if "driven by a motor".
6. Often talks excessively.
7. Often blurts out an answer before a question has been completed.
8. Often has trouble waiting their turn.
9. Often interrupts or intrudes on others (e.g., butts into conversations or games).

An ADHD diagnosis is indicated when the following conditions must be met:

- Six or more symptoms of inattention for children up to age 16 years, or five or more symptoms for individuals age 17 years and older.
- Symptoms have been present for at least 6 months to an extent that is disruptive or inappropriate for the person's developmental level.
- Several inattentive or hyperactive-impulsive symptoms were present before age 12 years.
- Several symptoms are present in two or more settings (such as at home, school or work; with friends or relatives; in other activities).
- There is clear evidence that the symptoms interfere with, or reduce the quality of, social, school, or work functioning.
- The symptoms are not better explained by another mental disorder (such as a mood disorder, anxiety disorder, dissociative disorder, or a personality disorder). The symptoms do not happen only during the course of schizophrenia or another psychotic disorder.

B The Healthcare Costs of Spillover Diagnoses

In this section, we calculate the total healthcare costs associated with the spillover ADHD diagnoses. This is the sum of the spillover-induced ADHD treatment costs borne by the public insurer and the spillover-induced private out-of-pocket costs of ADHD treatment.

We follow Deshpande and Mueller-Smith (2022) in using "intensive margin" outcomes when calculating these spillover costs. Appendix Table C17 presents results for impacts on several intensive margin measures of ADHD treatment as outcomes among the younger cousins. We find a spillover effect on the total number of unique ADHD drugs used by younger cousins in the first year following diagnosis of 0.0023 (column (1)).[2] Further, we find spillover effects on the number of mental health-related outpatient visits in the first, second, and third years following the diagnosis of 0.012, 0.0087, and 0.0064, respectively (columns (2)-(4)).

Using an estimate of the total cost of a typical ADHD drug in Sweden of \$852 (in 2019 USD, calculated below), coupled with our sample size of 616,242 unique younger cousins, yields a total cost of the additional drug spending in the first year induced by spillover diagnoses of $0.0023 \times 852 \times 616242$, or \$1.208 million.

Using an estimate of the total cost of one psychotherapy visit in Sweden of \$153 (in 2019 USD, calculated below), coupled with our sample size of 616,242 unique younger cousins, implies a total cost of the additional mental health-related outpatient visits in the first three years induced by spillover diagnoses of $(0.012 + 0.0087 + 0.0064) \times 153 \times 616242$, or \$2.555 million.

This yields a total cost of \$1.208+\$2.555=\$3.763 million. This cost stems from $2,403$ spillover diagnoses,[3] yielding a total healthcare cost per spillover diagnosis of **\$1,565 (in 2019 USD)**. Of this, \$502 is the implied cost of spillover-induced drug consumption in the first year post-diagnosis (\$1.208 million divided by the sample size of $616,242$), and \$1,063 is the implied cost of spillover-induced psychotherapy over the first three years post-diagnosis (\$2.555 million divided by the sample size of $616,242$).

[2] Appendix Table C16 documents a spillover on extensive margin drug consumption in the first year following diagnosis, but no statistically significant spillover on extensive margin drug consumption in subsequent two years. Thus, in Appendix Table C17 we restrict attention to the intensive margin effect on drug consumption in the first year following the diagnosis.

[3] The spillover estimate on the number of diagnoses, reported in Table 2, is 0.0039, which we multiply by the number of younger cousins, $616,242$, to obtain the total number of spillover diagnoses.

We can express this number as a share of the total cost of treatment for an average ADHD patient. The average annual cost of drug treatment, among all patients taking ADHD medication in Sweden, is \$1,078 (see calculations below). Thus, a spillover diagnosis induces drug spending of approximately one-half of a typical ADHD patient in the first year following diagnosis ($\frac{502}{1{,}078} = 0.47$). In the second and third year following diagnosis, the average ADHD drug user's adherence shares (reported in Appendix Table C11) are 0.755 in the second year and 0.594 in the third year. Thus, for the average patient taking ADHD drugs, the total cost of drug treatment in the first three years is given by $(1+0.755+0.594)\times 1,078 = \$2,522$. This means that a spillover diagnosis induces drug spending of approximately one-fifth of a typical ADHD patient in the first three years following diagnosis ($\frac{502}{2{,}522} = 0.20$). We note that these shares represent only drug spending and not spending on psychotherapy. Because spillover diagnoses are associated with significant drug spending only in the first year (and not in the second and third), whereas spillover diagnoses are associated with psychotherapy costs over years two and three as well, calculating the share of the total cost that is associated with a spillover diagnosis from the drug costs alone yields a conservative estimate of the total share of healthcare costs associated with spillover diagnoses.

The total cost of ADHD treatment We calculate the total cost of ADHD treatment in 2019, a year close to the end of our sample period for which we have information about treatment costs in Sweden.

Cost of ADHD drug treatment: The total costs borne by the public insurer (regions) for all ADHD drugs consumed in Sweden in 2019, amounted to 1.026 billion SEK.[4] In the same year, 130,000 individuals received at least one ADHD drug,[5] which yields an average insurer drug cost of $7,892$ SEK per treated patient.

The private out-of-pocket drug cost is $2,300$ SEK per patient (assuming that the patient reaches the maximum out-of-pocket expense in 2019). This yields an average total cost of $7,892 + 2,300 = 10,192$ SEK, or $\$1,078$ USD,[6] per patient treated with ADHD drugs.

[4]See https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/ovrig t/2022-4-7858.pdf, accessed in February 2024.

[5]See https://www.lakemedelsvarlden.se/okad-forskrivning-av-adhd-lakemedel/, accessed in February 2024.

[6]This conversion uses the average SEK USD exchange rate in 2019. See https://www.exchangerates.or g.uk/USD-SEK-spot-exchange-rates-history-2019.html, accessed in February 2024.

Some patients are treated with only one ADHD drug (one ATC code) whereas other patients take more than one unique ADHD drug in a year. The typical patient under the age of 25 who takes ADHD medication takes 1.265 unique drugs per year.[7] This gives an annual total cost per unique ADHD drug of $\frac{1{,}078}{1.265} = \$852$ USD.

Cost of psychotherapy: The public insurer's cost for one pediatric psychotherapy visit is $1,350$ SEK.[8] Assuming a (typical) private co-pay of 100 SEK yields a total cost of $1,450$ SEK, or \$153 USD (using the same exchange rate as above).

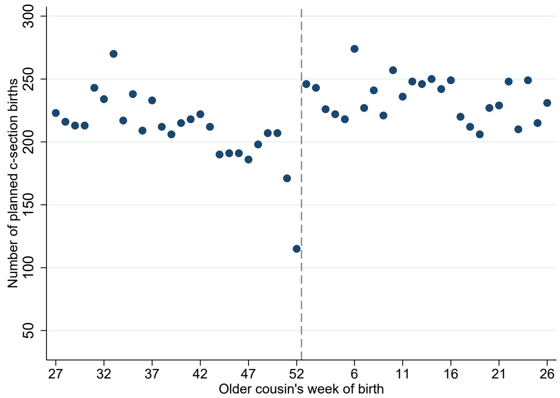
[7]See https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/ovrigt/2018-3-30.pdf, accessed in February 2024, for the share of patients consuming various ADHD drugs, by gender, in the age ranges 5-9, 10-17, and 18-24, respectively. We take the average number of unique ADHD drugs across the six groups, weighted by the number of patients consuming ADHD drugs in each group. Note that this number is for 2017, whereas the cost estimates are from 2019; thus we implicitly assume that the average number of drugs consumed remains constant from 2017 to 2019.

[8]See https://sodrasjukvardsregionen.se/download/regionala-priser-och-ersattningar-for-sodra-sjukvardsregionen-2019/?wpdmdl=10574&refresh=65cd7d3a023b71707965754, accessed in February 2024. The estimate represents the cost in the Southern Hospital Region, which includes the regions of Skåne, Blekinge, Kronoborg, and Halland.

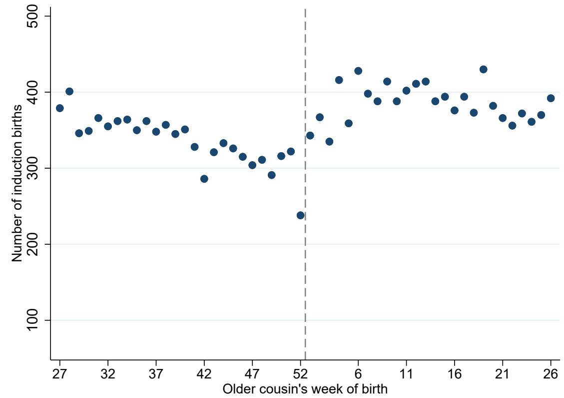
C Additional Results

Figure C1: Number of Births By Week Among Older Cousins Sample: Planned C-Sections, Inductions, and Non-Induced Vaginal Deliveries

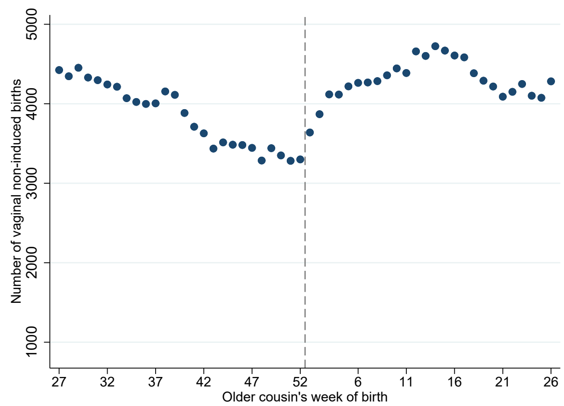
(a) Planned C-Sections



(b) Inductions



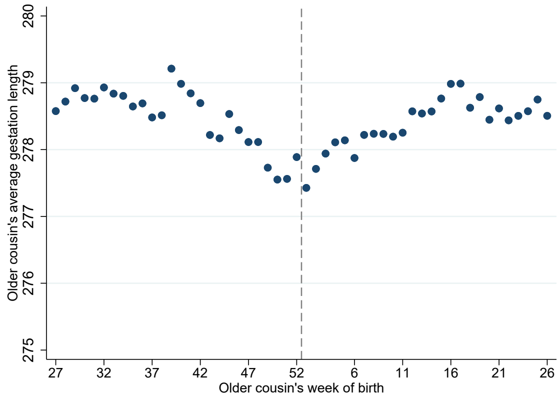
(c) Non-Induced Vaginal Deliveries



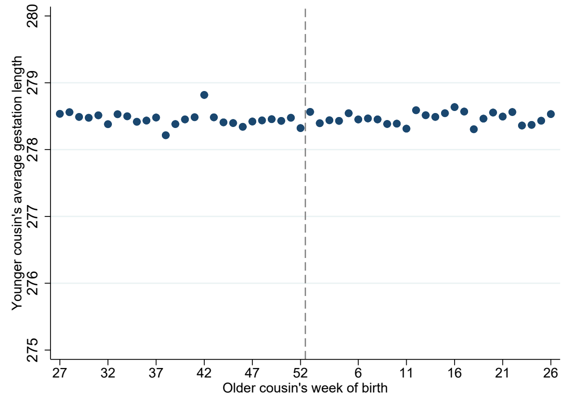
Note: See notes under Figure 3 for more information about the sample of older cousins. Sub-figure (a) plots the number of births by week of the year that were planned cesarian (c-section) deliveries. Sub-figure (b) plots the number of births by week of the year that were induced. Sub-figure (c) plots the number of births by week of the year that were non-induced vaginal deliveries.

Figure C2: Average Gestation Length by Older Cousin's Week of Birth

(a) Gestation Length, Older Cousins

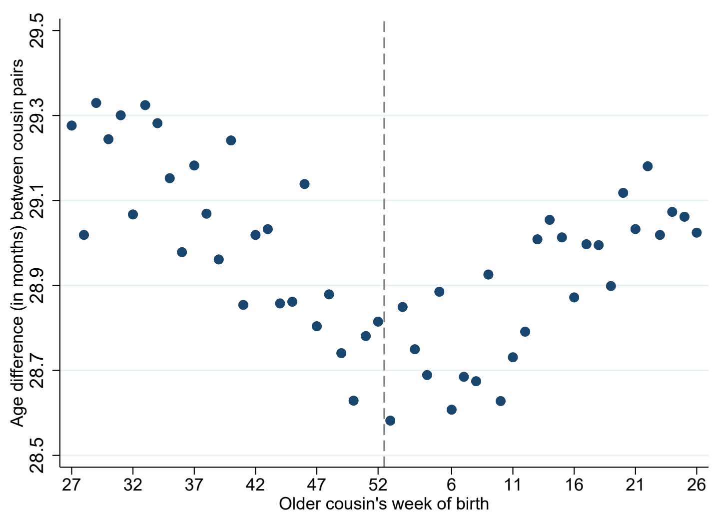


(b) Gestation Length, Younger Cousins



Note: See notes under Figure 3 for more information about the sample. Sub-figure (a) plots the older cousins' average length of gestation in days by their own week of birth. Sub-figure (b) plots the younger cousins' average length of gestation in days by older cousin's week of birth.

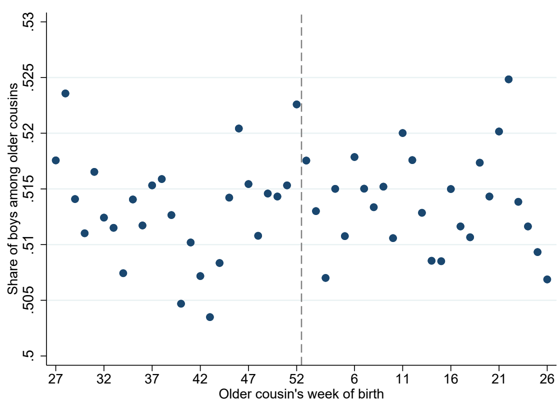
Figure C3: Age Difference Between Cousins by Week of Birth of Older Cousin



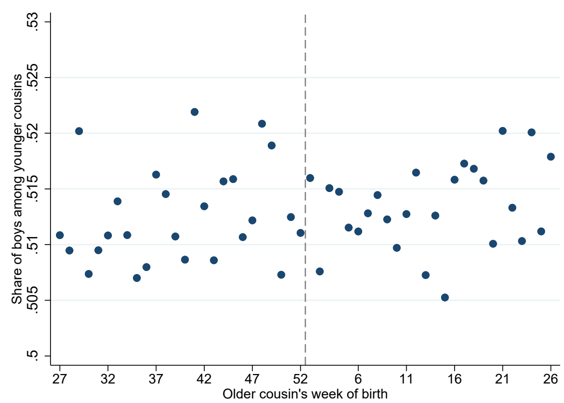
Note: See notes under Figure 3 for more information about the sample. The figure plots the average age difference between cousins (in months) by the birth week of the older cousin.

Figure C4: Cousin Gender Composition by Week of Birth of Older Cousin

(a) Share Boys, Older Cousins



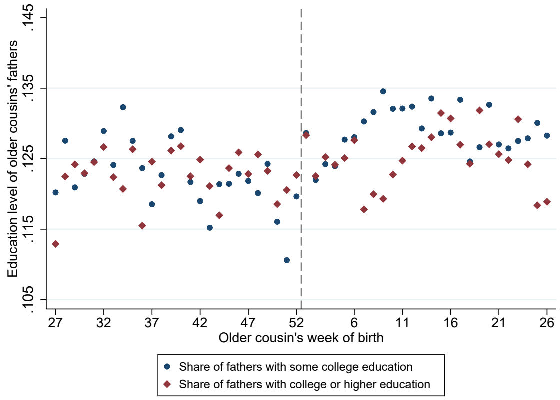
(b) Share Boys, Younger Cousins



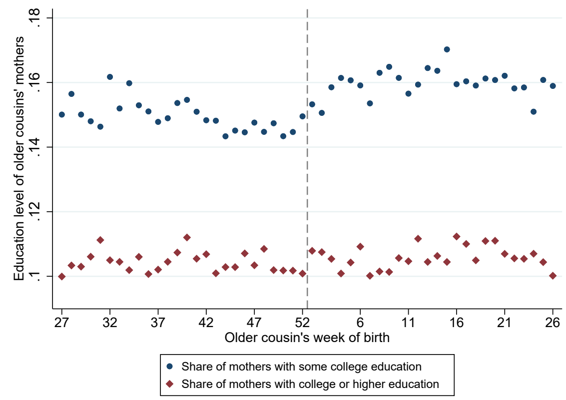
Note: See notes under Figure 3 for more information about the sample. These figures plot the share of boys among older and younger cousins by the birth week of the older cousin. Sub-figure (a) plots the share of boys among older cousins in our main sample of cousin pairs. Sub-figure (b) plots the share of boys among younger cousins in our main sample of cousin pairs.

Figure C5: Older and Younger Cousins' Parental Education Level by Own Week of Birth

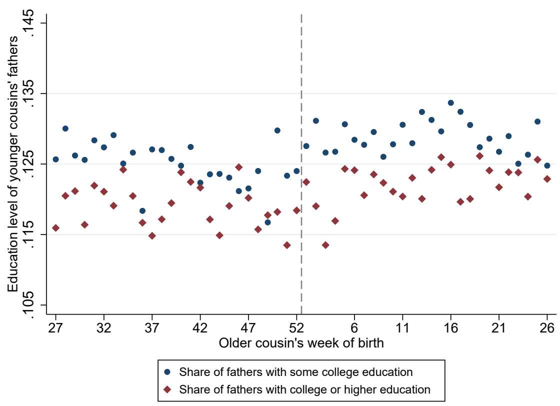
(a) Fathers, Older Cousins



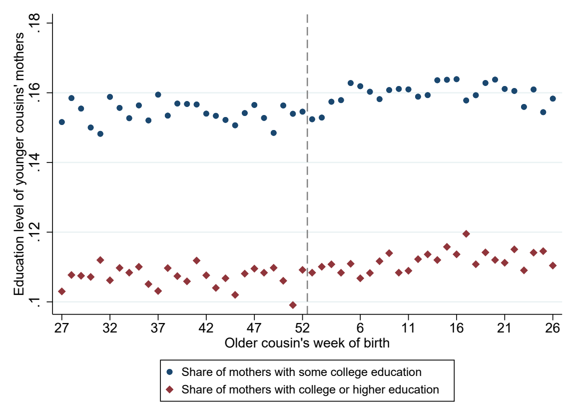
(b) Mothers, Older Cousins



(c) Fathers, Younger Cousins



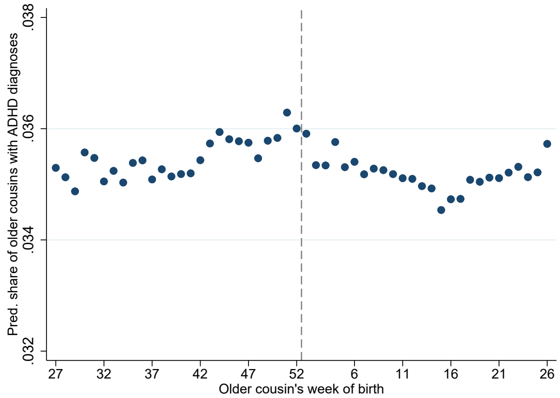
(d) Mothers, Younger Cousins



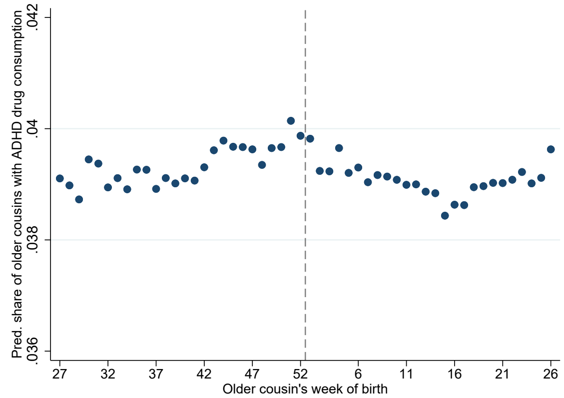
Note: See notes under Figure 3 for more information about the sample. Sub-figure (a) plots the share of older cousins' fathers with some college education (in blue) and the share of older cousins' fathers with college or higher level of education (in red), by the older cousin's week of birth. Sub-figure (b) plots the share of older cousins' mothers with some college education (in blue) and the share of older cousins' mothers with college or higher level of education (in red), by the older cousin's week of birth. Sub-figure (c) plots the share of younger cousins' fathers with some college education (in blue) and the share of younger cousins' fathers with college or higher level of education (in red), by the older cousin's week of birth. Sub-figure (d) plots the share of younger cousins' mothers with some college education (in blue) and the share of younger cousins' mothers with college or higher level of education (in red), by the older cousin's week of birth.

Figure C6: Predicted ADHD Outcomes by Week of Birth of Older Cousin

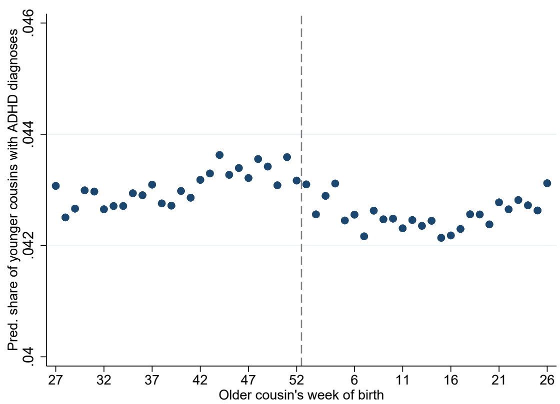
(a) Pred. Diagnoses, Older Cousins



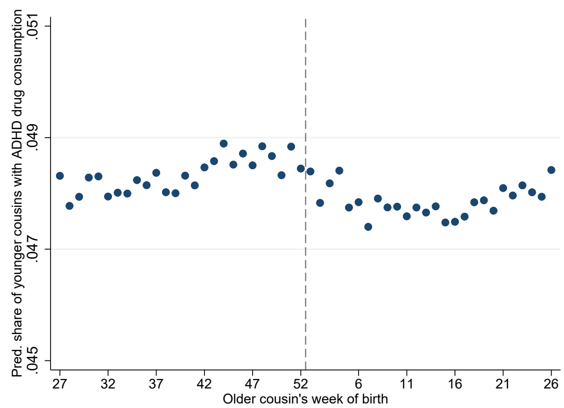
(b) Pred. Drug Treatment, Older Cousins



(c) Pred. Diagnoses, Younger Cousins



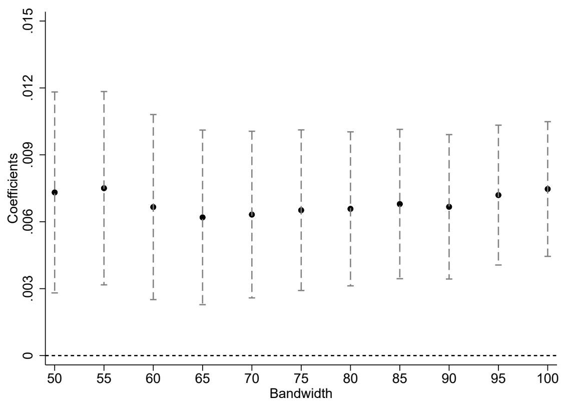
(d) Pred. Drug Treatment, Younger Cousins



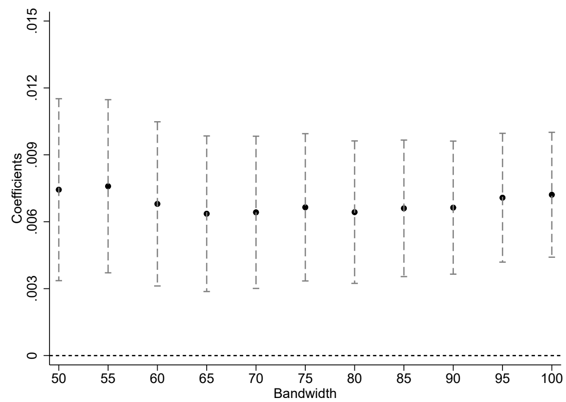
Note: See notes under Figure 3 for more information about the sample. These graphs plot predicted ADHD-related outcomes for the older cousins and younger cousins, respectively, by the birth week of the older cousin. The predicted outcomes of older and younger cousins are constructed by regressing each ADHD outcome on birth spacing between the cousin pair (in months), indicators for whether the older and younger cousin is male, number of cousins in the family, indicator for whether each parent of the cousin pair is foreign-born, indicator for each parent's education categories in the year of the child's birth (high school only, some college, college degree or more), and the log household income averaged over the year of the child's birth and the following two years.

Figure C7: Effect of Older Cousin Being Born Before Cutoff on Own and Younger Cousin's ADHD Diagnoses and Drug Treatment, with Varying Bandwidth

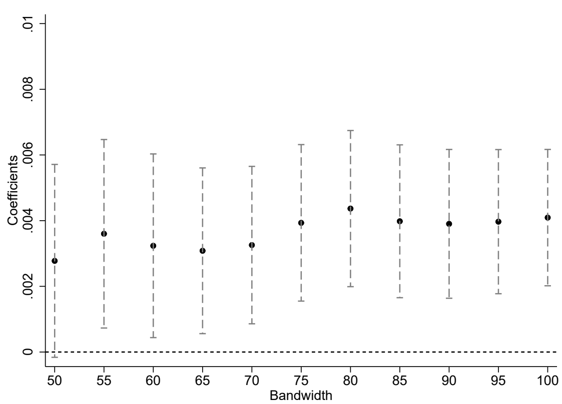
(a) Diagnoses, Older Cousins



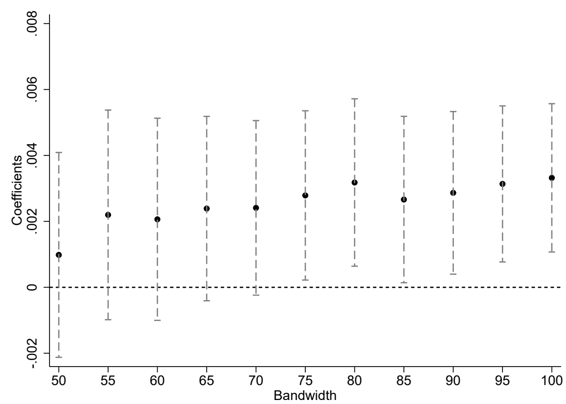
(b) Drug Treatment, Older Cousins



(c) Diagnoses, Younger Cousins

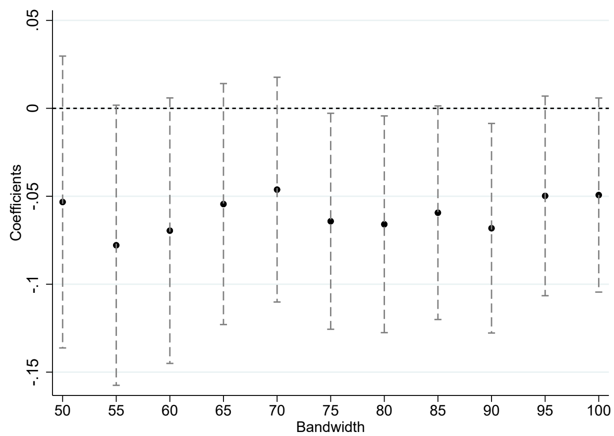


(d) Drug Treatment, Younger Cousins



Note: These figures plot regression coefficients and 95% confidence intervals when we include the same full set of control variables but vary the bandwidth from 50 days to 100 days. See notes under Table 2 for more details about the sample, specifications, control variables, and outcomes. The outcome variable in sub-figure (a) is whether the older cousin has an ADHD diagnosis in the outpatient data, and the outcome variable in sub-figure (b) is whether the older cousin has at least one ADHD drug claim in the prescription drug data. The outcome variable in sub-figure (c) is whether the younger cousin has an ADHD diagnosis in the outpatient data, and the outcome variable in sub-figure (d) is whether the younger cousin has at least one ADHD drug claim in the prescription drug data.

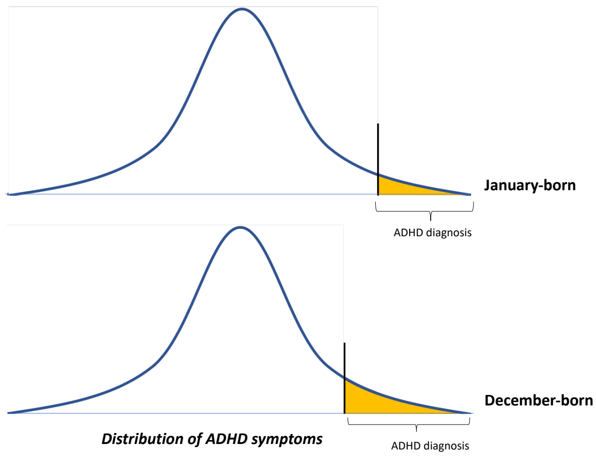
Figure C8: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's High School GPA, with Varying Bandwidth



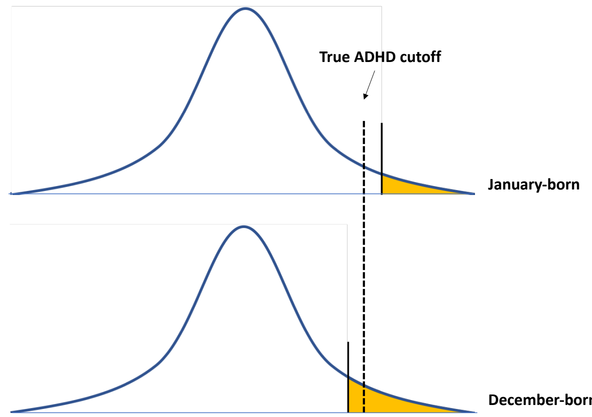
Note: This figure plots regression coefficients and 95% confidence intervals from estimating model (2), varying the bandwidth from 50 days to 100 days. See notes under Table 2 for more details about the sample, specifications, and control variables. The outcome variable is the younger cousin's high school GPA.

Figure C9: Stylized Framework for Interpreting ADHD Gap; Three Possible Interpretations

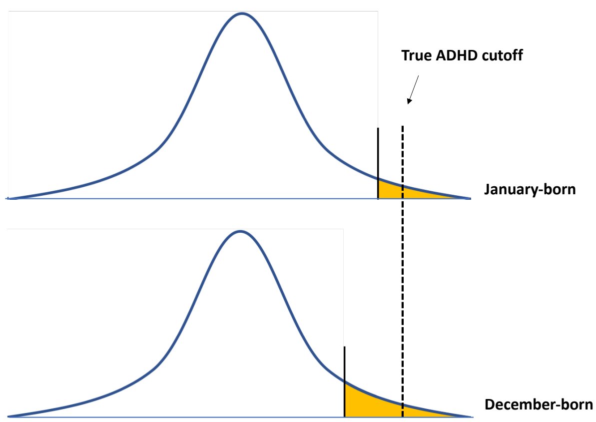
(a) Baseline Framework



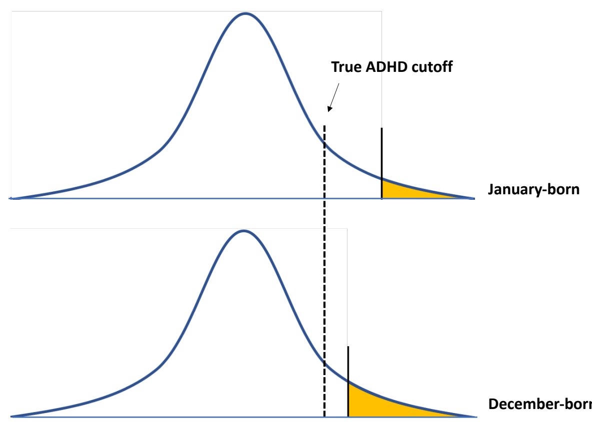
(b) Over-Diagnosis in Dec., Under-Diagnosis in Jan.



(c) More Over-Diagnosis in December than January



(d) Less Under-Diagnosis in December than January



Note: These figures depict a stylized visual framework for interpreting the ADHD gap at the school-entry cutoff. The bell curves represent the distributions of underlying ADHD risk in the populations of children born in December and January, respectively. The yellow areas under each of the curves signify the children who receive a positive ADHD diagnosis. The vertical dashed line in each of sub-figures (b), (c), and (d) represents different assumptions about the underlying "natural rate" of ADHD in the population, which is assumed to be independent of the child's day of birth.

Table C1: Sample Means of Key Variables

Panel A: Older Cousins	Full Sample	Jul-Dec	Jan-Jun
Share w/ ADHD diagnosis	0.036	0.038	0.034
Share w/ ADHD drug use	0.040	0.042	0.039
Father is foreign-born	0.061	0.064	0.059
Mother is foreign-born	0.053	0.056	0.051
Log household income	7.822	7.819	7.825
Father has college degree+	0.124	0.123	0.125
Mother has college degree+	0.105	0.104	0.106
Number of cousins	1.984	1.991	1.978
Observations	575,213	267,996	307,217
Panel B: Younger Cousins	Full Sample	Jul-Dec	Jan-Jun
Share w/ ADHD diagnosis	0.043	0.043	0.042
Share w/ ADHD drug use	0.048	0.049	0.048
Father is foreign-born	0.059	0.061	0.058
Mother is foreign-born	0.053	0.055	0.052
Log household income	7.797	7.788	7.805
Father has college degree+	0.121	0.119	0.122
Mother has college degree+	0.110	0.107	0.112
Birth spacing (in months)	28.965	29.051	28.889
Observations	1,122,747	524,813	597,934

Notes: This table reports sample means of some of the variables in our analysis. The first column uses our full analysis sample of of cousin pairs born in Sweden, where the older cousin is born between July 1985 and June 1996. The second and third columns split the sample into families with older cousins born in July-December and January-June, respectively.

Table C2: Results for Placebo Outcomes

	(1) Gestation length	(2) Share boys	(3) Fathers' educ	(4) Mothers' educ	(5) Birth spacing
Panel A: Older Cousins					
OC born before the cutoff	-0.0830	0.0077*	-0.0014	-0.0019	
	(0.1250)	(0.0044)	(0.0026)	(0.0021)	
Mean(Y)	278.044	0.514	0.123	0.104	
N	221,660	221,660	221,660	221,660	
Panel B: Younger Cousins					
OC born before the cutoff	-0.1483	-0.0001	0.0004	-0.0002	0.1446*
	(0.0982)	(0.0029)	(0.0024)	(0.0021)	(0.0871)
Mean(Y)	278.440	0.513	0.120	0.108	28.788
N	432,903	432,903	432,903	432,903	432,903

Notes: Each column reports results from a separate regression. The sample of analysis is the universe of cousins pairs born in Sweden, where the older cousin is born between July 1985 and June 1996. In Panels (A) and (B), we report the placebo outcomes of the older and younger cousins, respectively. We use a bandwidth of 75 days and include the same full set of control variables as in our main specifications as in Tables 1 and 2, except we omit indicators for the older and younger cousin's gender in column (2) of Panels A and B. We omit the father's education categories in column (3) and the mother's education categories in column (4). We also omit the birth spacing between cousin pairs in column (5). Robust standard errors are clustered on the older cousin's day of birth.

Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C3: Effect of Older Cousin Being Born Before Cutoff on Own Mother's Labor Market Outcomes and Marital Status

	(1) Employed	(2) Work Income	(3) Married
Panel A: No Covariates			
OC born before the cutoff	-0.0101***	-24.5106**	-0.0251***
[Own Relative Age Effect]	(0.0024)	(10.1990)	(0.0034)
Mean(Y)	0.892	1398.085	0.623
N	221,660	220,541	220,465
Panel B: Full Covariates			
OC born before the cutoff	-0.0088***	-16.3277*	-0.0219***
[Own Relative Age Effect]	(0.0022)	(8.7692)	(0.0034)
Mean(Y)	0.892	1398.085	0.623
N	221,660	220,541	220,465

Notes: Each column reports results from separate regressions estimating model (1). See notes under Table 1 for more information on the analysis sample, specifications, and control variables. The dependent variable in column (1) is an indicator equal to one if the older cousin's mother is employed when the older cousin is 7 years old. The dependent variable in column (2) is the older cousin's mother's work income when the older cousin is 7 years old. The dependent variable in column (3) is an indicator equal to one if the older cousin's mother is married when the older cousin is 7 years old. Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C4: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's Mother's Labor Market Outcomes and Marital Status

	(1) Employed	(2) Work Income	(3) Married
Panel A: No Covariates			
OC born before the cutoff	-0.0027	-6.3035	-0.0045
[Spillover Effect]	(0.0028)	(8.3328)	(0.0045)
YC born before the cutoff	-0.0131***	-57.6000***	-0.0245***
[Own Relative Age Effect]	(0.0023)	(7.4991)	(0.0032)
Mean(Y)	0.875	1229.503	0.607
N	432,903	431,286	430,396
Panel B: Full Covariates			
OC born before the cutoff	-0.0020	-3.2626	-0.0020
[Spillover Effect]	(0.0025)	(6.9567)	(0.0043)
YC born before the cutoff	-0.0056**	-20.3772***	-0.0163***
[Own Relative Age Effect]	(0.0022)	(6.1279)	(0.0031)
Mean(Y)	0.875	1229.503	0.607
N	432,903	431,286	430,396

Notes: Each column reports results from a separate regression estimating model (2). See notes under Table 2 for more information on the analysis sample, specifications, and control variables. The dependent variable in column (1) is an indicator equal to one if the younger cousin's mother is employed when the older cousin is 7 years old. The dependent variable in column (2) is the younger cousin's mother's work income when the older cousin is 7 years old. The dependent variable in column (3) is an indicator equal to one if the younger cousin's mother is married when the older cousin is 7 years old. Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C5: Effect of Older Cousin Being Born Before Cutoff on Own and Younger Cousin's ADHD Outcomes, Different Polynomials of the Running Variable

	ADHD Diag			ADHD Drug		
	(1) Linear	(2) Quadratic	(3) Cubic	(4) Linear	(5) Quadratic	(6) Cubic
Panel A: Older Cousins						
OC born before the cutoff	0.0088***	0.0071***	0.0063***	0.0086***	0.0069***	0.0064***
[Own Relative Age Effect]	(0.0011)	(0.0017)	(0.0024)	(0.0011)	(0.0016)	(0.0021)
Mean(Y)	0.036	0.036	0.036	0.040	0.040	0.040
N	575,213	575,213	575,213	575,213	575,213	575,213
Panel B: Younger Cousins						
OC born before the cutoff	0.0041***	0.0038***	0.0031**	0.0038***	0.0027**	0.0013
[Spillover Effect]	(0.0008)	(0.0012)	(0.0015)	(0.0009)	(0.0013)	(0.0016)
YC born before the cutoff	0.0125***	0.0119***	0.0126***	0.0134***	0.0120***	0.0128***
[Own Relative Age Effect]	(0.0008)	(0.0013)	(0.0017)	(0.0009)	(0.0013)	(0.0017)
Mean(Y)	0.043	0.043	0.043	0.048	0.048	0.048
N	1,122,747	1,122,747	1,122,747	1,122,747	1,122,747	1,122,747

Notes: Each column reports results from a separate regression. We use a global bandwidth and include the same set of control variables as in Panel B of Tables 1 and 2. See notes under Tables 1 and 2 for more details about the sample, specifications, control variables, and outcomes. In columns (2) and (4), we include quadratic polynomials of the running variables, and in columns (3) and (6), we include cubic polynomials of the running variables. Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C6: Effect of Older Cousin Being Born Before Cutoff on Own ADHD Diagnosis and Drug Treatment, Non-Induced Vaginal Deliveries Only

	(1) ADHD Diag	(2) ADHD Drug
Panel A: No Covariates		
OC born before the cutoff	0.0128***	0.0129***
[Own Relative Age Effect]	(0.0032)	(0.0031)
Mean(Y)	0.047	0.051
N	81,246	81,246
Panel B: Full Covariates		
OC born before the cutoff	0.0116***	0.0116***
[Own Relative Age Effect]	(0.0032)	(0.0031)
Mean(Y)	0.047	0.051
N	81,246	81,246

Notes: Each column reports results from a separate regression. We use a bandwidth of 75 days and include the same set of control variables as in Panel B of Tables 1 and 2. See notes under Tables 1 and 2 for more details about the sample, specifications, control variables, and outcomes. We only include cousin pairs in which the older cousin was born via a non-induced vaginal delivery. Robust standard errors are clustered on the older cousin's day of birth.

Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C7: Effect of Older Cousin Being Born Before Cutoff on Own and Younger Cousin's ADHD Outcomes, "Doughnut-RD"

	(1) ADHD Diag	(2) ADHD Drug
Panel A: Older Cousins		
OC born before the cutoff	0.0063**	0.0080***
[Own Relative Age Effect]	(0.0027)	(0.0025)
Mean(Y)	0.037	0.041
N	182,972	182,972
Panel B: Younger Cousins		
OC born before the cutoff	0.0057***	0.0054**
[Spillover Effect]	(0.0021)	(0.0023)
YC born before the cutoff	0.0124***	0.0134***
[Own Relative Age Effect]	(0.0014)	(0.0016)
Mean(Y)	0.043	0.048
N	356,614	356,614

Notes: Each column reports results from a separate regression. We use a bandwidth of 75 days and include the same set of control variables as in Panel B of Tables 1 and 2. See notes under Tables 1 and 2 for more details about the sample, specifications, control variables, and outcomes. We additionally exclude all cousins pairs with older cousins born in the two-week bandwidth around the cutoff (January 1st). Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C8: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's ADHD Diagnosis and Drug Treatment, Non-Induced Vaginal Deliveries Only

	(1) ADHD Diag	(2) ADHD Drug
Panel A: No Covariates		
OC born before the cutoff	0.0087***	0.0071**
[Spillover Effect]	(0.0028)	(0.0032)
YC born before the cutoff	0.0203***	0.0247***
[Own Relative Age Effect]	(0.0028)	(0.0029)
Mean(Y)	0.052	0.059
N	125,508	125,508
Panel B: Full Covariates		
OC born before the cutoff	0.0081***	0.0065**
[Spillover Effect]	(0.0028)	(0.0031)
YC born before the cutoff	0.0182***	0.0219***
[Own Relative Age Effect]	(0.0028)	(0.0029)
Mean(Y)	0.052	0.059
N	125,508	125,508

Notes: Each column reports results from a separate regression. We use a bandwidth of 75 days and include the same set of control variables as in Panel B of Tables 1 and 2. See notes under Tables 1 and 2 for more details about the sample, specifications, control variables, and outcomes. We only include cousin pairs in which the older cousin was born via a non-induced vaginal delivery. Robust standard errors are clustered on the older cousin's day of birth.

Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C9: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's ADHD Outcomes, Non-Parametric RD Models

	(1) MSE	(2) MSE-2	(3) MSE-Sum	(4) Min-MSE	(5) Med-MSE	(6) CER	(7) CER-2	(8) CER-Sum	(9) Min-CER	(10) Med-CER
Panel A: ADHD Diagnoses										
OC born before the cutoff	0.0027	0.0026	0.0038*	0.0038*	0.0028	0.0078***	0.0073***	0.0087***	0.0087***	0.0085***
[Spillover Effect]	(0.0018)	(0.0018)	(0.0020)	(0.0020)	(0.0019)	(0.0026)	(0.0026)	(0.0028)	(0.0028)	(0.0027)
Mean(Y)	0.042	0.044	0.042	0.042	0.043	0.042	0.043	0.043	0.043	0.043
N	256,122	273,822	215,296	215,296	232,966	123,700	135,532	106,976	106,976	114,755
Left BW	45.25	32.72	38.18	38.18	38.18	22.55	16.30	19.02	19.02	19.02
Right BW	45.25	68.96	38.18	38.18	45.25	22.55	34.36	19.02	19.02	22.55
Panel B: ADHD Drug Treatment										
OC born before the cutoff	0.0006	0.0015	0.0016	0.0016	0.0010	0.0057**	0.0056**	0.0062**	0.0062**	0.0061**
[Spillover Effect]	(0.0020)	(0.0019)	(0.0021)	(0.0021)	(0.0020)	(0.0028)	(0.0028)	(0.0030)	(0.0030)	(0.0029)
Mean(Y)	0.048	0.049	0.048	0.048	0.048	0.048	0.049	0.049	0.049	0.049
N	238,753	271,197	209,449	209,449	222,159	118,239	132,990	101,505	101,505	109,294
Left BW	42.46	32.76	37.66	37.66	37.66	21.16	16.32	18.77	18.77	18.77
Right BW	42.46	67.86	37.66	37.66	42.46	21.16	33.81	18.77	18.77	21.16

Notes: Each column reports results from a separate regression. The sample and outcomes are the same as in Table 2. Each column shows results from an RD model with local linear polynomials, triangular kernels, and robust bias-corrected inference procedures, using different optimal bandwidth algorithms to select the bandwidths of the number of days used on each side of the cutoff in the older cousin's date of birth relative to the school entry cutoff. Panel A shows results using the younger cousin's ADHD diagnosis as the outcome, while Panel B shows results using the younger cousin's ADHD drug treatment as the outcome. The optimal bandwidth algorithms are: (1) one common mean squared error (MSE)-optimal bandwidth selector for both sides of the cutoff; (2) two different MSE-optimal bandwidth selectors (below and above the cutoff); (3) one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof); (4) minimum of (1) and (3); (5) median of (1), (2), and (3) for each side of the cutoff separately; (6) one common coverage error rate (CER)-optimal bandwidth selector; (7) two different CER-optimal bandwidth selectors (below and above the cutoff); (8) one common CER-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof); (9) minimum of (6) and (8); (10) median of (6), (7), and (8) for each side of the cutoff separately. We use the Stata "rdrobust" command for these analyses (Calonico et al., 2017). We report the number of days used in the left and right-hand bandwidths in each model at the bottom of the table. All regressions control for the same set of controls as in Table 2, as well as a linear spline function of the younger cousin's own date of birth relative to the cutoff. Robust standard errors are reported in parentheses.

Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C10: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's High School GPA, Robustness Checks

	(1) Doughnut-RD	(2) Linear	(3) Quadratic	(4) Cubic	(5) Non-Induced Vaginal
OC born before the cutoff	-0.0780*	-0.0780***	-0.0475	-0.0547	0.0778
[Spillover Effect]	(0.0461)	(0.0211)	(0.0312)	(0.0429)	(0.0650)
YC born before the cutoff	-0.5531***	-0.5077***	-0.4370***	-0.3848***	-0.4074***
[Own Relative Age Effect]	(0.0412)	(0.0227)	(0.0301)	(0.0421)	(0.0565)
Mean(Y)	12.911	12.907	12.907	12.907	13.356
N	285,832	898,820	898,820	898,820	89,050

Notes: Each column reports results from a separate regression. In column (1), we use a bandwidth of 75 days and exclude all cousins pairs with older cousins born in the two-week bandwidth around the cutoff (January 1st). In columns (2), (3), and (4), we use a global bandwidth and include linear, quadratic, and cubic polynomials of the running variable, respectively. In column (5), we use a bandwidth of 75 days and only include cousin pairs in which the older cousin was born via a non-induced vaginal delivery. In all columns, we include the same set of control variables as in Panel B of Tables 1 and 2. Robust standard errors are clustered on the older cousin's day of birth.

Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C11: ADHD Drug Adherence Rates Over Time

	Adherence mean
1st Year	1.000
2nd Year	0.755
3rd Year	0.594
4th Year	0.482
5th Year	0.395
N	15130

Notes: This table reports on ADHD drug adherence over five years following an ADHD diagnosis in our sample. The sub-sample used for these calculations includes all individuals in our baseline sample who receive an ADHD diagnosis after July 2005 and who obtain an ADHD drug within one year of diagnosis. We then report what share of these individuals also have an ADHD drug claim two, three, four, and five years later.

Table C12: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's ADHD Diagnosis and Drug Treatment, Heterogeneity by Gender Composition of Sibling Parents

	(1) ADHD Diag	(2) ADHD Drug
Panel A: Mom-Mom		
OC born before the cutoff	0.0045*	0.0041
[Spillover Effect]	(0.0023)	(0.0027)
YC born before the cutoff	0.0056**	0.0074***
[Own Relative Age Effect]	(0.0026)	(0.0027)
Mean(Y)	0.042	0.048
N	114,130	114,130
Panel B: Mom-Dad		
OC born before the cutoff	0.0065***	0.0048**
[Spillover Effect]	(0.0019)	(0.0020)
YC born before the cutoff	0.0142***	0.0158***
[Own Relative Age Effect]	(0.0019)	(0.0020)
Mean(Y)	0.043	0.048
N	210,202	210,202
Panel C: Dad-Dad		
OC born before the cutoff	-0.0014	-0.0023
[Spillover Effect]	(0.0026)	(0.0027)
YC born before the cutoff	0.0141***	0.0139***
[Own Relative Age Effect]	(0.0026)	(0.0027)
Mean(Y)	0.043	0.048
N	109,173	109,173

Notes: Each column in each panel reports results from a separate regression estimating model (2). See notes under Table 2 for more information about the sample, specifications, and control variables. Panel A restricts the sample to cousin pairs in which the related parents are both mothers (i.e., sisters); Panel B restricts the sample to cousin pairs in which the related parents are a mother and a father (i.e., a sister and a brother); Panel C restricts the sample to cousin pairs in which the related parents are both fathers (i.e., brothers). Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C13: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's ADHD Diagnosis and Drug Treatment, Heterogeneity by Older Cousin's Household Income

	(1) ADHD Diag	(2) ADHD Drug
Panel A: Below Median Household Income		
OC born before the cutoff	0.0049**	0.0021
[Spillover Effect]	(0.0019)	(0.0022)
YC born before the cutoff	0.0139***	0.0148***
[Own Relative Age Effect]	(0.0020)	(0.0019)
Mean(Y)	0.049	0.055
N	216,562	216,562
Panel B: Above Median Household Income		
OC born before the cutoff	0.0030*	0.0035**
[Spillover Effect]	(0.0016)	(0.0017)
YC born before the cutoff	0.0098***	0.0112***
[Own Relative Age Effect]	(0.0017)	(0.0019)
Mean(Y)	0.036	0.042
N	216,341	216,341

Notes: Each column in each panel reports results from a separate regression estimating model (2). See notes under Table 2 for more information about the sample, specifications, and control variables. To measure household income, we take the average of household income in the year of birth, the year after birth, and the second year after birth. Panel A restricts to cousin pairs in which the older cousin's household income is below the median, while Panel B restricts to cousin pairs in which the older cousin's household income is above the median. Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C14: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's ADHD Diagnosis and Drug Treatment, Heterogeneity by Older Cousin's Mother's Foreign-Born Status

	(1) ADHD Diag	(2) ADHD Drug
Panel A: Foreign-Born		
OC born before the cutoff	0.0006	-0.0013
[Spillover Effect]	(0.0045)	(0.0044)
YC born before the cutoff	0.0113***	0.0165***
[Own Relative Age Effect]	(0.0042)	(0.0043)
Mean(Y)	0.052	0.056
N	42,390	42,390
Panel B: Not Foreign-Born		
OC born before the cutoff	0.0042***	0.0032**
[Spillover Effect]	(0.0012)	(0.0013)
YC born before the cutoff	0.0119***	0.0126***
[Own Relative Age Effect]	(0.0013)	(0.0015)
Mean(Y)	0.042	0.047
N	390,513	390,513

Notes: Each column in each panel reports results from a separate regression estimating model (2). See notes under Table 2 for more information about the sample, specifications, and control variables. Panel A restricts to cousin pairs in which the older cousin's mother is born outside of Sweden, while Panel B restricts to cousin pairs in which the older cousin's mother is Swedish-born. Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C15: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's ADHD Diagnosis and Drug Treatment, Heterogeneity by Older Cousin's Mother's Education

	(1) ADHD Diag	(2) ADHD Drug
Panel A: No College		
OC born before the cutoff	0.0044***	0.0036**
[Spillover Effect]	(0.0014)	(0.0016)
YC born before the cutoff	0.0118***	0.0134***
[Own Relative Age Effect]	(0.0016)	(0.0017)
Mean(Y)	0.047	0.052
N	326,113	326,113
Panel B: Some or Full College		
OC born before the cutoff	0.0025	0.0003
[Spillover Effect]	(0.0024)	(0.0021)
YC born before the cutoff	0.0119***	0.0119***
[Own Relative Age Effect]	(0.0022)	(0.0023)
Mean(Y)	0.030	0.036
N	106,790	106,790

Notes: Each column in each panel reports results from a separate regression estimating model (2). See notes under Table 2 for more information about the sample, specifications, and control variables. Panel A restricts to cousin pairs in which the older cousin's mother has no college education, while Panel B restricts to cousin pairs in which the older cousin's mother has at least some college education. Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C16: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's ADHD Drug Treatment in Years 1–3 Following Diagnosis

	(1) Drug in YR1	(2) Drug in YR2	(3) Drug in YR3	(4) No Drug in 3YRs
Panel A: No Covariates				
OC born before the cutoff	0.0023**	0.0015*	0.0014*	0.0011**
[Spillover Effect]	(0.0010)	(0.0008)	(0.0007)	(0.0004)
YC born before the cutoff	0.0098***	0.0089***	0.0067***	0.0016***
[Own Relative Age Effect]	(0.0009)	(0.0008)	(0.0008)	(0.0005)
Mean(Y)	0.030	0.023	0.018	0.006
N	432,903	432,903	432,903	432,903
Panel B: Full Covariates				
OC born before the cutoff	0.0021**	0.0013	0.0012	0.0010**
[Spillover Effect]	(0.0010)	(0.0008)	(0.0007)	(0.0004)
YC born before the cutoff	0.0080***	0.0075***	0.0057***	0.0014***
[Own Relative Age Effect]	(0.0010)	(0.0008)	(0.0008)	(0.0005)
Mean(Y)	0.030	0.023	0.018	0.006
N	432,903	432,903	432,903	432,903

Notes: Each column in each panel reports results from a separate regression estimating model (2). See notes under Table 2 for more information about the sample, specifications, and control variables. The dependent variables in columns (1), (2), and (3) are indicators equal to one if the younger cousin has an outpatient claim with an ADHD diagnosis and obtains an ADHD drug between 0-11, 12-23, and 24-35 months after diagnosis, respectively. The dependent variable in column (4) is an indicator equal to one if the younger cousin has an outpatient claim with an ADHD diagnosis and does not obtain an ADHD drug between 0-35 months after diagnosis. Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table C17: Effect of Older Cousin Being Born Before Cutoff on Younger Cousin's Number of Unique ADHD Drug Treatments and Mental Health Outpatient Visits in Years 1-3 Following Diagnosis

	(1) Unique Drugs YR1	(2) Outpatient YR1	(3) Outpatient YR2	(4) Outpatient YR3
Panel A: No Covariates				
OC born before the cutoff	0.0027**	0.0129***	0.0091***	0.0069**
[Spillover Effect]	(0.0013)	(0.0048)	(0.0027)	(0.0027)
YC born before the cutoff	0.0116***	0.0374***	0.0199***	0.0153***
[Own Relative Age Effect]	(0.0012)	(0.0051)	(0.0030)	(0.0029)
Mean(Y)	0.036	0.132	0.057	0.044
N	432,903	432,903	432,903	432,903
Panel B: Full Covariates				
OC born before the cutoff	0.0023*	0.0120**	0.0087***	0.0064**
[Spillover Effect]	(0.0013)	(0.0048)	(0.0028)	(0.0026)
YC born before the cutoff	0.0094***	0.0311***	0.0174***	0.0136***
[Own Relative Age Effect]	(0.0012)	(0.0052)	(0.0030)	(0.0028)
Mean(Y)	0.036	0.132	0.057	0.044
N	432,903	432,903	432,903	432,903

Notes: Each column reports results from a separate regression estimating model (2). See notes under Table 2 for more information about the sample, specifications, and control variables. The dependent variable in column (1) is the number of unique ATC codes for ADHD drugs obtained in the first year after diagnosis. The dependent variables in columns (2), (3), and (4) are the number of outpatient visits with ICD codes beginning in "F" taking place 0-11, 12-23, and 24-35 months after diagnosis, respectively. For individuals without a diagnosis, these variables are equal to 0. Robust standard errors are clustered on the older cousin's day of birth.
Significance levels: * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

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