Testing for Nature vs. Nurture

1

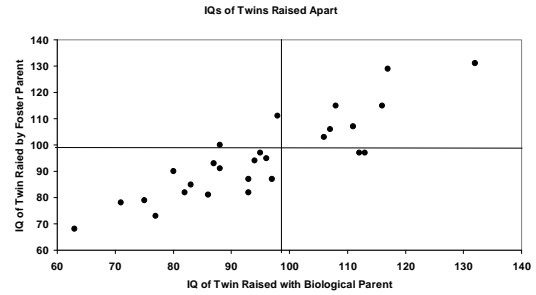IQs of Twins Raised Apart

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- The same person tested twice: 87
- Identical twins raised together: 86
- Identical twins raised apart: 76
- Fraternal twins raised together: 55
- Biological siblings: 47
- Parents and children living together: 40
- Parents and children living apart: 31
- Unrelated people living apart: 0

3

Barbara Herbert/Daphne Goodship

- Born to Finnish single mom who killed herself soon after their birth
- Adopted by separate families living outside of London
- Both left school at 14
- Fell down stairs at 15
- Worked in local government
- Met their future husbands at town hall dance at age 16

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- Tinted hair auburn when younger
- Squeamish about heights and blood and drank coffee cold
- Miscarried in same month
- Both gave birth to 2 boys and a girl
- Both pushed their nose with the palm of their hand – both called it squidging
- When reunited, both wore cream colored dresses and velvet jackets

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Oscar Stohr/Jake Yufe

- Born to Jewish F/Christian M in Trinidad in 1930
- Oscar – raised by Catholic family in Nazi Germany
- Jake – raised by Jewish family in Trinidad and Israel
- When they met, both wore wire rimmed glasses and mustache. Wore 2 pocket shirt with epaulets.

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- they like spicy foods and sweet liqueurs, are absentminded, have a habit of falling asleep in front of the television, think it's funny to sneeze in a crowd of strangers, flush the toilet before using it, store rubber bands on their wrists, read magazines from back to front, dip buttered toast in their coffee. Oskar is domineering toward women and yells at his wife, which Jack did before he was separated. [Holden, 1980]

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James Arthur Springer/ James Edward Lewis

- Reunited at age 39 after being given up by their mother and separately adopted as 1-month-olds.
- Each married and divorced a woman named Linda and remarried a Betty.
- Shared interests in mechanical drawing and carpentry;
- Favorite school subject had been math, their least favorite, spelling.
- Smoked and drank the same amount and got headaches at the same time of day.

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Intergeneration transmission literature

- Typical model for biological children
- y_i=child outcome (level of education)
- x_i = measure of family background (such as parents' education)
- $y_i=\beta_0 + \beta_1 x_i + \varepsilon_i$

- What does the estimate for β_1 measure, nature or nurture?

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Holt International Adoption Services

- "Holt International Children's Services is dedicated to carrying out God's plan for every child to have a permanent, loving family."
- "…develop and maintain programs overseas to give orphaned, abandoned and vulnerable children safe and nurturing environments in which to develop."

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- Start by Harry and Bertha Holt
- Sought to aid Amer-Asian children in Korean orphanages
- Adopted 8 children themselves
- Had to have special legislation passed

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- Started the agency in 1956
- Largest adoption agency – placing 40K children
- Place 300 kids/year from a variety of countries

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Adoptions process

- Takes 12-18 months
- Application, home study, criminal check, adoption classes, adoptee comes to the US, adopted in family court
- Adoptions covered by US/Korean laws
- Parents must have
  - \>125% of FPL
  - Adoptive parents 25-45 years of age
  - No more than 4 kids in house

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- Holt adoptions are first come, first serve
- Timing of when application completed determines
- Therefore, placement of children into household is quasi random
- Parents cannot specify gender of a child, but families with all boys or girls can request a child of the opposite sex
- After assignment, takes 4.5 months for the child to come home

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Consider the following model

Let y_i be an outcome for a child

Children can be adopted or not

$A_i = 1$ *if the child is adopted*, 0 *otherwise*

$E_i =$ *education of parents*

$w_i =$ *characteristics of kid*

$y_i = \beta_0 + w_i\beta_1 + A_i\beta_2 + (1-A_i)E_i\beta_3 + A_iE_i\beta_4 + \varepsilon_i$

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$$y_i = \beta_0 + w_i\beta_1 + A_i\beta_2 + (1-A_i)E_i\beta_3 + A_iE_i\beta_4 + \varepsilon_i$$

what if $\beta_4 = \beta_3$

what if $\beta_4 < \beta_3$

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Data

- Survey of children placed by Holt 1964-85
- Data from Holt records and survey conducted 2004/5
- Target of sample were adoptees aged 24-34 but collected data on all adoptees
- Low response rate (34%)
- Relied on parents' responses about outcomes for adult children

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TABLE 1
EVIDENCE OF RANDOM ASSIGNMENT USING ADMINISTRATIVE RECORDS

	(1) Adoptee's age at arrival in US	(2) Weight when entered Holt system (lbs)	(3) Height when entered Holt system (inches)	(4) Adoptee is male	(5) Birth mother was married	(6) Birth mother's age at adoptee's birth	(7) Birth mother highest grade completed
Log family income	0.001 (0.127)	0.310 (0.258)	0.188 (0.225)	0.017 (0.022)	0.060 (0.081)	0.556 (1.784)	0.171 (0.96
Father's years of education	−0.006 (0.010)	0.009 (0.043)	−0.019 (0.036)	0.006 (0.004)	−0.007 (0.015)	0.358 (0.376)	−0.094 (0.15
Mother's years of education	−0.018 (0.015)	−0.037 (0.067)	0.014 (0.040)	0.003 (0.005)	0.001 (0.019)	−0.128 (0.545)	0.159 (0.17
Log (median income in zip code in 1980)	0.145 (0.203)	0.201 (0.285)	0.149 (0.232)	−0.041 (0.029)	0.061 (0.111)	−3.422 (2.523)	−0.119 (1.10
Observations	2158	2156	2157	2161	126	99	81
R-squared	0.143	0.704	0.640			0.232	0.345
F or χ^2 test for parental coeffs = 0	1.10	0.72	0.48	6.47	1.48	0.88	0.23
$p > F; p > \chi^2$	0.354	0.580	0.753	0.166	0.830	0.479	0.920

$y_i = \beta_0 + x_{1i}\,\beta_1 + x_{2i}\,\beta_2 + x_{3i}\,\beta_3 + x_{4i}\,\beta_4 + \varepsilon_i$

x_{1i}=dad's educ x_{3i}=ln(family income)
x_{2i}=mom's educ x_{4i}=ln(med incom in zip)

H_o: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

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5% Critical values of F-Distribution

Degrees of Freedom in numerator

| degrees of freedom in denominator	1	2	3	4	5	6
10	4.96	4.10	3.71	3.48	3.33	3.22
11	4.84	3.98	3.59	3.36	3.20	3.09
12	4.75	3.89	3.49	3.26	3.11	3.00
13	4.67	3.81	3.41	3.18	3.03	2.92
14	4.60	3.74	3.34	3.11	2.96	2.85
15	4.54	3.68	3.29	3.06	2.90	2.79
16	4.49	3.63	3.24	3.01	2.85	2.74
17	4.45	3.59	3.20	2.96	2.81	2.70
18	4.41	3.55	3.16	2.93	2.77	2.66
19	4.38	3.52	3.13	2.90	2.74	2.63
20	4.35	3.49	3.10	2.87	2.71	2.60
21	4.32	3.47	3.07	2.84	2.68	2.57
22	4.30	3.44	3.05	2.82	2.66	2.55
23	4.28	3.42	3.03	2.80	2.64	2.53
24	4.26	3.40	3.01	2.78	2.62	2.51
30	4.17	3.32	2.92	2.69	2.53	2.42
40	4.08	3.23	2.84	2.61	2.45	2.34
60	4.00	3.15	2.76	2.53	2.37	2.25
90	3.95	3.10	2.71	2.47	2.32	2.20
120	3.92	3.07	2.68	2.45	2.29	2.18
infinity	3.84	3.00	2.61	2.37	2.21	2.10

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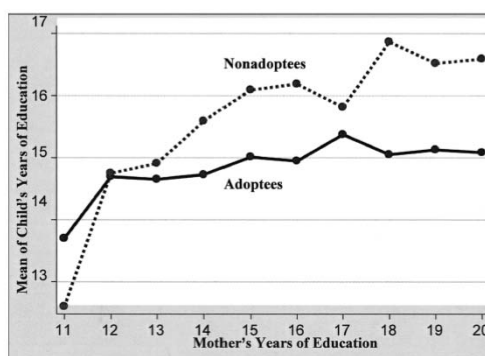
FIGURE II
Mean Child's Years of Education vs. Mother's
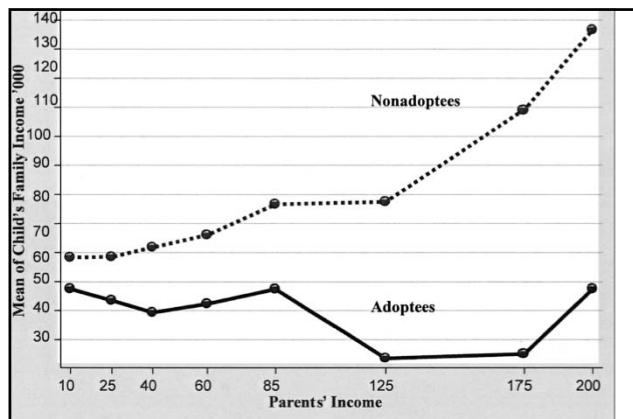Dashed line is for nonadoptees. Solid line is for adoptees.

FIGURE III
Mean of Child's Family Income By Parents' Income at Adoption

TABLE VIII
TRANSMISSION COEFFICIENTS FROM PARENTS TO CHILDREN FOR
ADOPTEES AND NONADOPTEES

|	(1)	(2)
	Adoptees' Transmission coefficient	Nonadoptees' transmission coefficient
Years of education (mother to child)	0.089 (0.029)a**	0.315 (0.038)**
Has 4+ years college (mother to child)	0.102 (0.034)**	0.302 (0.037)**
Log household income (parents to child)	0.186 (0.111)	0.246 (0.080)**
Height inches (mother to child)	−0.004 (0.034)	0.491 (0.049)**
Is obese (mother to child)	0.003 (0.020)	0.108 (0.034)**
Is overweight (mother to child)	−0.026 (0.029)	0.174 (0.037)**
BMI (mother to child)	0.002 (0.025)	0.221 (0.045)**
Smokes (0–1) (mother to child)	0.132 (0.088)	0.108 (0.115)
Drinks (0–1) (mother to child)	0.210 (0.033)**	0.244 (0.038)**

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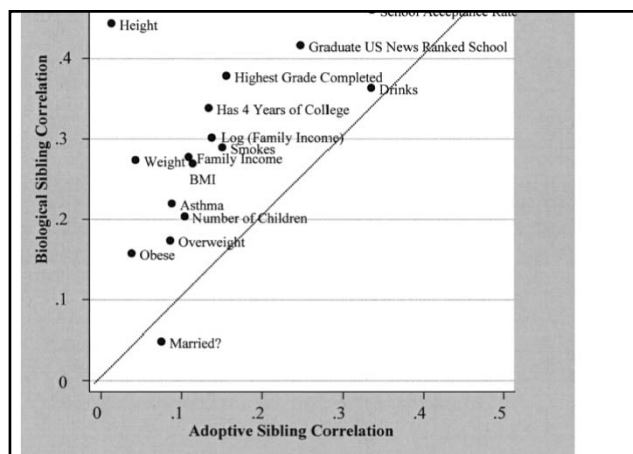
FIGURE IV

TABLE V
PROPORTION OF OUTCOME VARIANCE EXPLAINED BY HERITABILITY, SHARED FAMILY
ENVIRONMENT, AND NON-SHARED ENVIRONMENT USING A SIMPLE BEHAVIORAL
GENETICS MODEL

Outcome	Proportion explained by nurture (shared family environment)	Proportion explained by nature (heritability)	Unexplained portion (non-shared environment)
Has 4 years of college	0.135	0.406	0.459
Highest grade completed	0.157	0.443	0.400
Family income	0.110	0.334	0.556
Log (family income)	0.139	0.324	0.537
Drinks	0.336	0.055	0.609
Smokes	0.152	0.273	0.575
Height	0.014	0.858	0.128
Weight	0.044	0.458	0.498
BMI	0.115	0.308	0.577
Overweight	0.087	0.172	0.741
Attended US News ranked school	0.249	0.335	0.417
Acceptance rate of school	0.337	0.245	0.418
Married	0.076	−0.056	0.979
Number of children	0.105	0.196	0.699

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