"Rosie's Kids: Pre-School Exposure during WWII & Later-Life Outcomes"

Quentin Brummet (CARRA/US. Census Bureau)
Joseph Ferrie (Northwestern University & NBER)
Claudia Goldin (Harvard University & NBER)
Elizabeth Mokyr Horner (American Institutes for Research)
Claudia Olivetti (Boston College & NBER)
Karen Rolf (University of Nebraska, Omaha)

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Economics and Statistics Administration
U.S. CENSUS BUREAU
census.gov

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“Rosie’s Kids?”



“The hand that holds the pneumatic riveter cannot rock the cradle at the same time.”

G.G. Whetherill (1943)



“Rosie’s Kids”

1. Introduction & Literature Review

- The value of quality pre-school education in promoting better later-life outcomes has been demonstrated in a growing literature
- Better cognitive performance and early-adult incomes (Heckman 2006) and adult health (Campbell *et al.* 2014) are evident from randomized experiments that provided an enhanced learning environment before age five
- Two challenges have arisen in this work:

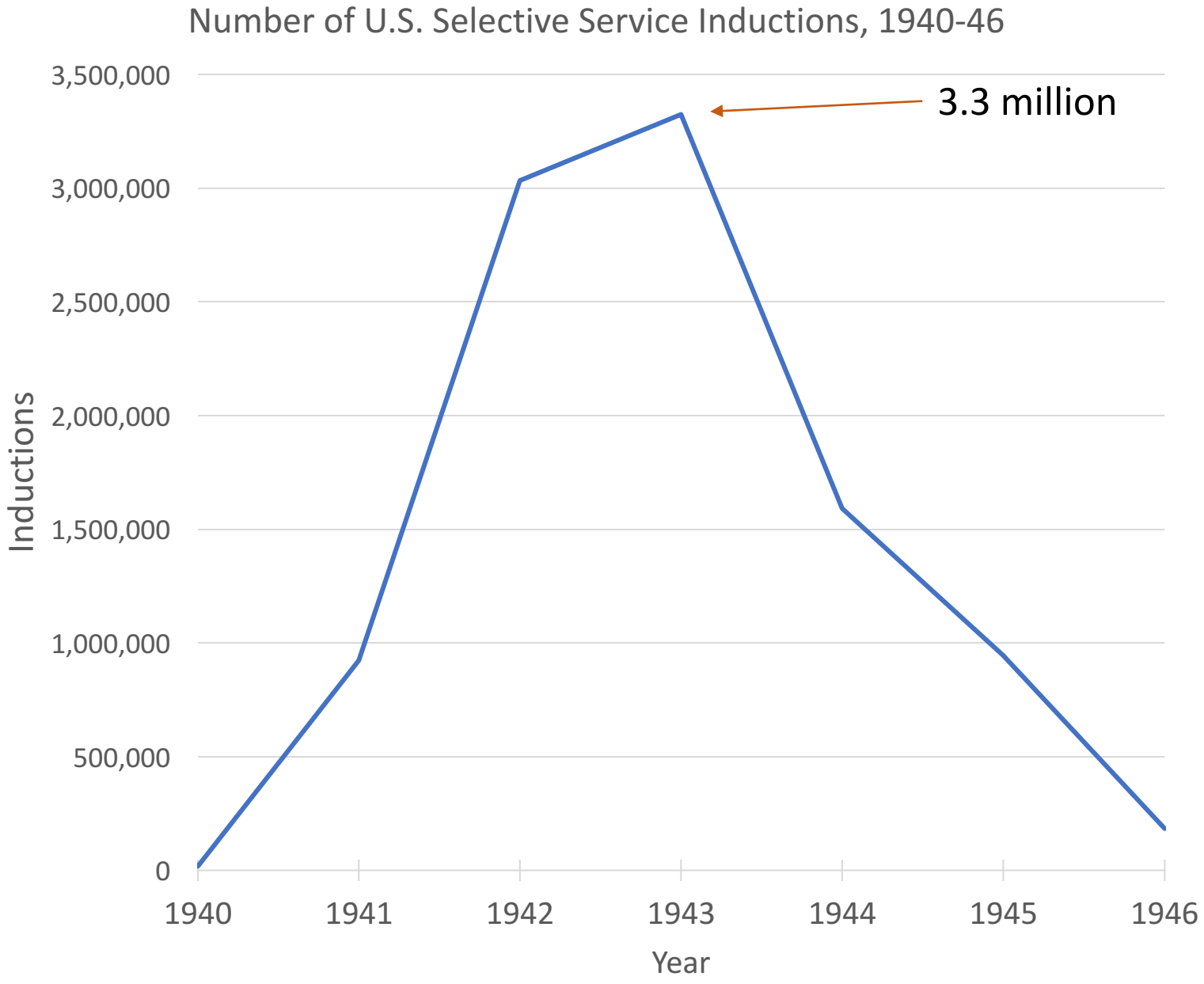
1. small samples → heterogeneous treatment effects hard to discern

2. these experiments are relatively recent (early 1970s), so long-term effects into middle and late adulthood cannot yet be observed

- We take advantage of the sudden expansion of pre-school opportunities in the U.S. during World War II, funded by the federal government 1943-46, together with the ability to link several million individuals from their post-2000 outcomes to the likelihood that they were exposed to this “treatment”
- Many of the benefits of this episode have been documented in Herbst (*JOLE* 2017). Using a state-level diff-in-diff approach, he shows that a composite measure of adult incomes is higher for birth cohorts that were exposed to the program
- Herbst (2017) includes all child-care spending under this program – we are able to focus specifically on children age 2-5, and more outcomes

2. The Lanham Program

- There had been an expansion of childcare in the early years of the New Deal, as a scheme to employ out-of-work teachers, nurses, school workers. But these had largely closed by the early 1940s.
- The big push for care of children, especially under age 6, came at the peak of World War II.
- As World War II continued, the number of males withdrawn from civilian employment for military service grew.
- By 1943, with the number of new inductees at its peak and previous inductees now obligated to serve “for the duration of the conflict,” businesses faced severe labor shortages



Source: https://www.sss.gov/About/History-And-Records/Induction-Statistics

- Women's increased LFP was seen as *vital* to the war effort

- But the U.S. recognized that more than a public relations campaign touting "Rosie the Riveter" was needed.

- The Lanham Act of 1940 provided $$$ to communities affected by the war effort. By 1942, this included *nursery schools*.



Claudia Goldin, *AER* 1991.

TABLE 1—LABOR-FORCE PARTICIPATION RATES OF WOMEN (ALL RACES), 1940–1950

Category	Husband	Participation rate (percentage) 1940	1944	1947	1950
Married:					
All ages	present	15.6	21.7	20.0	23.8
	absent, in armed forces		52.5		
25–44 years	present	17.7	24.7	22.4	26.0
	absent, in armed forces		55.0		
45–64 years	present	10.3	20.0	18.4	21.8
	absent, in armed forces		41.7		
All marital statuses:					
14–19 years	—	19.9	41.8	n.a.	22.6

Sources: Married 1940, 1947 (U.S. Bureau of the Census, 1948); married 1944 (U.S. Bureau of the Census, 1952); married 1950 (U.S. Bureau of the Census, 1951). The labor-force data for "all marital statuses" are from Goldin (1990 table 5); the adjusted figure for 1940 was used. The population number for 1944 was derived by extrapolation from census data for 1940 and 1950.

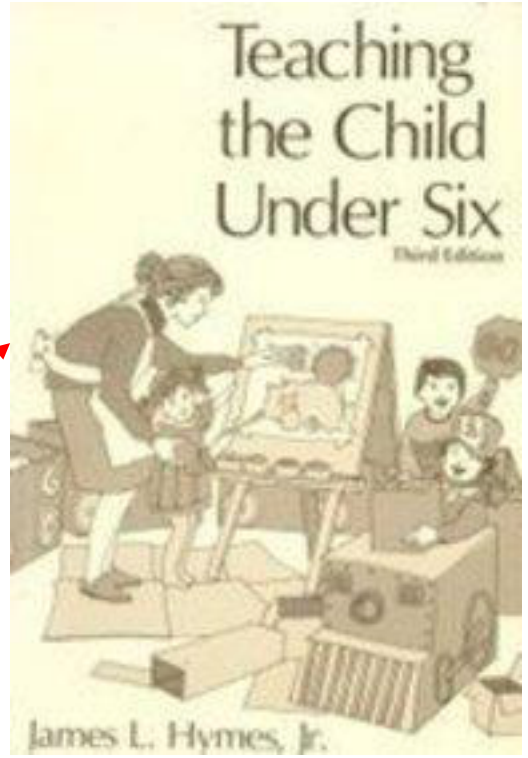
Example:
Kaiser Shipyard
in Richmond, CA

Lanham Pre-School

Kaiser Shipyard



- Under the direction of Henry Kaiser himself, centers were established in CA & OR
- Child development experts from UC Berkeley and Columbia University's Teachers College were recruited to design both the campus & the curriculum
- The director of the Portland OR centers, James L. Hymes, literally *wrote the book* on pre-school education



Dr. Hymes learned his trade when he managed an around-the-clock nursery school program during World War II for the children of women who built Liberty ships in three shifts at shipyards in Oregon. He became a household name in the decades that followed as the author of numerous pamphlets and books advising parents and teachers on the dos and don'ts of child-rearing. *New York Times* obituary, March 30, 1998

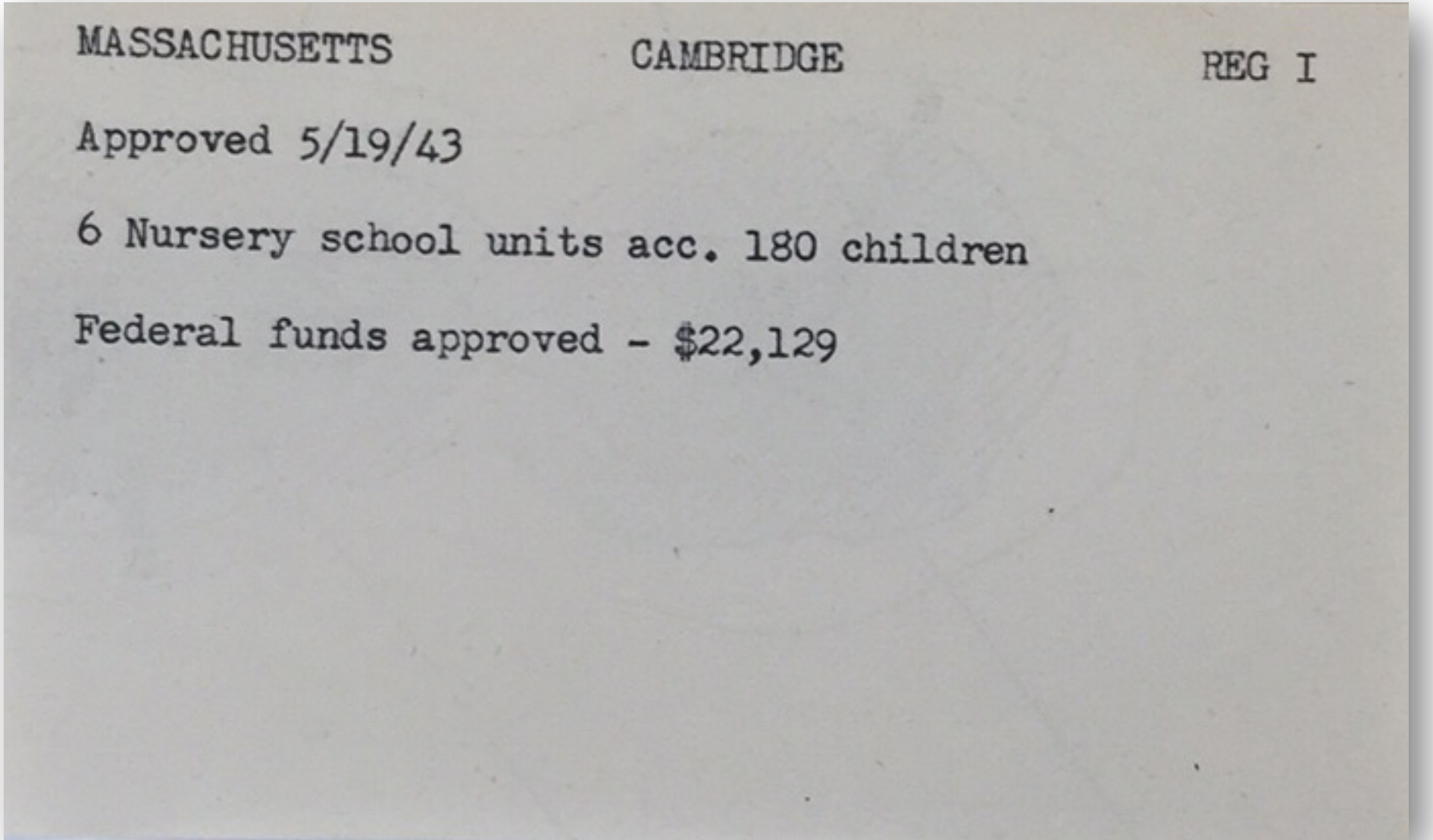
- The pre-schools served children 2-5 in places impacted by wartime labor demand
- Enrollment was not limited to children w/ mothers in war industries
- Fees were minimal -- $0.50/day initially (women earned $30/wk)
- More than 100,000 children in 1,000+ nursery schools at any one time 1942-46



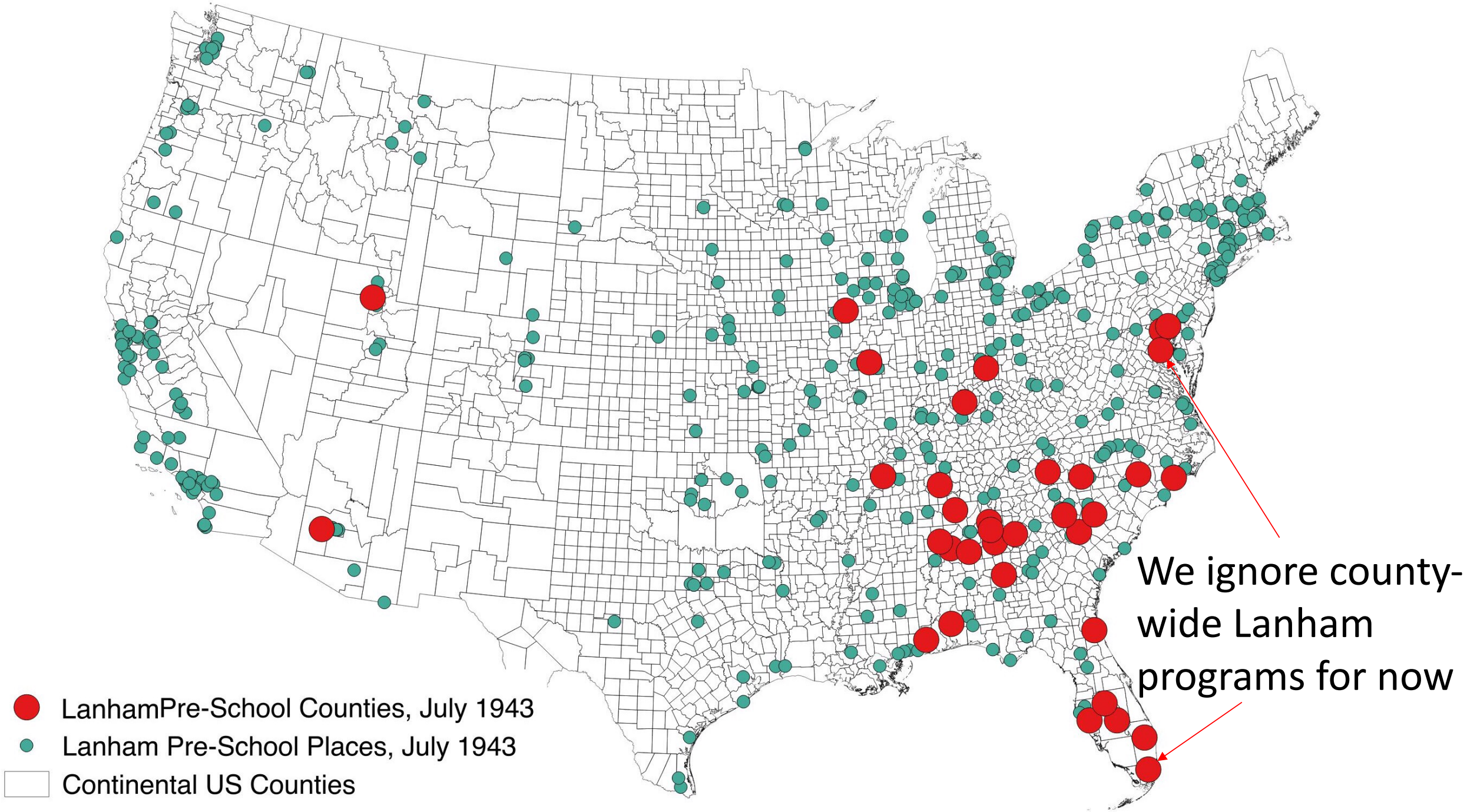
Woman Reading Story to Three Young Children at Child Care Center, New Britain, Connecticut, USA, Gordon Parks for Office of War Information, June 1943

3. Data

- We need three pieces of information to link pre-school exposure to later-life outcomes:
    1. The locations that were “exposed” (*i.e.* got Lanham funds)
    2. Later-life outcomes
    3. A link between (1) locations & (2) outcomes
- The Federal Works Agency’s Lanham Act card file records info (date approved, $$$ amount, students) for each place (city/town) receiving Lanham pre-school funds – NARA RG 162.4
- Later-life outcomes are observed in the 2000 Decennial Census 1-in-6 Long Form and the 2001-2016 American Community Survey (ACS)
- The Census Bureau has attached Protected Identification Keys (PIKs) to these files and has a crosswalk to SSNs.



We thank Blake Heller for this image.


LanhamPre-School Counties, July 1943
Lanham Pre-School Places, July 1943
Continental US Counties
We ignore county-wide Lanham programs for now

- The Social Security Administration (SSA) maintains the NUMIDENT file which records all applications for entry into the system (Form SS-5)
- Each application reports name, exact date of birth, detailed place of birth (city/town), and the full names of both parents, as well as the individual's SSN
- SSA also records date of death for individuals who had begun drawing Social Security benefits (reasonably complete for deaths age 65+)
- These records can be converted to PIKs and linked to the Census data (2000 LF, 2001-16 ACS).

5028

Form SS-5
TREASURY DEPARTMENT
INTERNAL REVENUE SERVICE
(Revised 7-60)

APPLICATION FOR SOCIAL SECURITY ACCOUNT NUMBER

REQUIRED UNDER THE FEDERAL INSURANCE CONTRIBUTIONS ACT
READ INSTRUCTIONS ON BACK BEFORE FILLING IN FORM

409-52-2002
DO NOT WRITE IN THE ABOVE SPACE

FILL IN EACH ITEM. PRINT IN BLACK OR DARK BLUE INK OR USE TYPEWRITER FOR ALL ITEMS EXCEPT SIGNATURE. IF THE INFORMATION CALLED FOR IN ANY ITEM IS NOT KNOWN, WRITE "UNKNOWN."

1 PRINT NAME YOU GIVE YOUR PRESENT EMPLOYER, OR IF UNEMPLOYED, THE NAME YOU WILL USE WHEN EMPLOYED — FIRST NAME: ELVIS; MIDDLE NAME (IF YOU USE NO MIDDLE NAME OR INITIAL, DRAW A LINE —): AARON; LAST NAME: PRESLEY

2 MAILING ADDRESS (NO. AND ST., P. O. BOX, OR RFD) (CITY) (ZONE) (STATE): 185 Winchester-ave, Memphis Tenn

3 PRINT FULL NAME GIVEN YOU AT BIRTH: Elvis aron Presley

4 AGE ON LAST BIRTHDAY: 16

5 DATE OF BIRTH (MONTH) (DAY) (YEAR): Jan 8 1935

6 PLACE OF BIRTH (CITY) (COUNTY) (STATE): Tupelo Lee Miss.

7 FATHER'S FULL NAME, REGARDLESS OF WHETHER LIVING OR DEAD: Vernon ELVIS Presley

8 MOTHER'S FULL NAME BEFORE SHE EVER MARRIED, REGARDLESS OF WHETHER LIVING OR DEAD: Gladys love [redacted] Smith

9 SEX (MARK (X) WHICH): MALE [redacted] FEMALE ☐

10 COLOR OR RACE (MARK (X) WHICH) (IF OTHER, SPECIFY): WHITE [redacted] NEGRO ☐ OTHER ☐

11 HAVE YOU EVER BEFORE APPLIED FOR OR HAD A SOCIAL SECURITY OR RAILROAD RETIREMENT NUMBER? (MARK (X) WHICH): YES ☐ NO [redacted] DON'T KNOW ☐

IF ANSWER IS "YES" PRINT THE STATE IN WHICH YOU FILED APPLIED AND WHEN — STATE: ; DATE:

ALSO PRINT YOUR ACCOUNT NUMBER IF YOU KNOW IT — ACCOUNT NUMBER:

12 BUSINESS NAME OF EMPLOYER. IF UNEMPLOYED, WRITE "UNEMPLOYED": [redacted] Memphis

EMPLOYER'S ADDRESS (R.F.D. OR STREET) (CITY) (ZONE) (STATE): [redacted] State-Theatre-Memphis

13 DATE SIGNED: [redacted] OCT. 31 1950

14 WRITE YOUR NAME AS USUALLY WRITTEN (DO NOT PRINT): Elvis Presley

RETURN COMPLETED APPLICATION TO NEAREST SOCIAL SECURITY ADMINISTRATION FIELD OFFICE

4. Analysis

- Two questions: (1) what is the “experiment,” and (2) what is the best “control” group?
- The “experiment”: children of women who worked (because of WWII plants in their communities) and were taken care of in Lanham pre-schools. If not for the schools, they would have been taken care of by relatives or, possibly, their mothers would not have worked.
- We have a variety of possible control groups

- Possible controls:

1. Otherwise identical places (WWII production, daycare for children 2-5) → marginal effect if better standards in Lanham programs
2. Nearly identical (WWII production), but without daycare → marginal effect includes mothers' LFP decision
3. Older & younger children in Lanham places
4. Children who were age-eligible and lived in Lanham places but were too far from Lanham nurseries to participate (as a practical matter)
5. Children who were age-eligible during the Korean War in places that had Lanham programs in WWII → same type of male labor shortages, Congress agreed a Lanham-like program was necessary but never appropriated any $$$

- For now, we use both (3) and places within 25 miles of Lanham places in a diff-in-diff (proximity as a proxy for WWII production)

- Place-level characteristics of Lanham places, nearby (< 25 miles) places, and all places in 1940 Census of Population
- Programs were also awarded to entire counties, but we focus here on 399 towns or cities that received them

Table 1. Characteristic of Lanham & Non-Lanham Places

	Un-Weighted			Population Weighted		
	Lanham	Non-Lanham	Difference	Lanham	Non-Lanham	Difference
Income (Median)	886.88	782.15	104.73***	971.27	992.10	-20.83
Education (Mean)	9.52	9.48	0.04	9.58	9.32	0.26*
Adult Immigrants (Pct.)	9.02	5.87	3.15***	12.69	18.01	-5.31
Manufacturing (Pct.)	19.76	16.00	3.76***	21.39	21.84	-0.45
Occ. Farming (Pct.)	2.96	6.16	-3.21***	0.67	1.26	-0.59
Working with Child 0-2 (Pct.)	9.06	6.36	2.70***	7.35	6.67	0.68
Working with Child 3-4 (Pct.)	12.44	8.74	3.69***	10.26	9.01	1.25*
Working with Child 5-6 (Pct.)	14.75	10.10	4.66***	12.23	10.36	1.87**
Population	79,959	5,488	74,471***	755,416	2,170,000	-1,420,000
Black (Pct.)	9.62	6.17	3.45***	10.17	6.63	3.54**
Spending on Facilities ($000s)	1,202.79	716.98	485.81***	3,403.95	1,773.41	1,630.54
War Supply Contracts ($000s)	13,544.69	7,310.70	6,233.99***	40,190.63	19,171.29	21,019.34
N	399	5,117		399	5,117	

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- Empirical Strategy (Older & Younger Children & Proximate Places as Controls):

1. Examine adult outcomes (educ attainment, income, disability, longevity) Y_{ij} where *i* indexes individuals & *j* indexes locations
2. "Treatment" (*i.e.* potential exposure to pre-school education) is an interaction between (a) place exposure (born in a city or town that received a Lanham pre-school) and (b) age exposure (age 2-5 between July 1943 & March 1946)
3. "Age Exposure" is a continuous variable: number of years age 2-5 7/43-3/46

- $Y_{ij} = \alpha + \beta_1 * (Lanham)_j + \beta_2 * (Age\ 2\text{-}5)_i + \beta_3 * (Lanham)_j * (Age\ 2\text{-}5)_i + \varepsilon_{ij}$

where Y_{ij} = an adult outcome for individual *i* born in place j

$(Lanham)_j$ = 1 if birthplace *j* had a Lanham pre-school

$(Age\ 2\text{-}5)_i$ = number of years age 2-5 7/43-3/46 (e.g. born 7/41 2 ½ years potential exposure)

$(Lanham)_j * (\overrightarrow{Age\ 2\text{-}5})_i$ = potential exposure in a Lanham place

β_3 = "Lanham Pre-School Effect Per Year of Exposure"

The typical Lanham pre-school reached only 10% of eligible students

→ effect of "treatment on the treated" (TOT) > β_3 (= ITT)

- Challenges to identification:

1. The WPA was running some pre-school programs pre-1943 → most had been shutdown by early 1940s, we will identify them

2. We do not know if specific individuals attended schools → think of this as an "intent-to-treat" (ITT) analysis

3. Migration to/from Lanham places after birth but before treatment will weaken the link to "treatment" → attenuation of effect

4. Non-random assignment of places to treated/control → balancing on place characteristics, propensity score matching

5. Some places (NYC) had separate, non-Lanham systems, while some places (CA, NYC, Phila., WA, MA) continued with state funds for at least some time after the war → experiment with dropping these

Table 2. OLS Estimates: Employment & Income (2000 $) Before Age 65

	Employed (0/1)		Wage & Salary Income[a]		ln(Wage & Salary Income)[a]	
	Female	Male	Female	Male	Female	Male
Years Age 2-5 (1943-46)	-0.004	0.004	-158.05	-496.74	0.003	0.002
	(0.003)	(0.003)	(208.81)	(539.22)	(0.008)	(0.009)
Lanham Place	-0.008	-0.009*	-545.51	-1176.76	-0.014	-0.017
	(0.005)	(0.005)	(413.23)	(1013.40)	(0.016)	(0.017)
(Years Age 2-5) x (Lanham Place)	0.001	0.000	120.49	761.99***	0.001	0.007**
	(0.001)	(0.001)	(101.70)	(188.72)	(0.004)	(0.003)
Constant	0.3			36965.09***	9.469***	10.128***
	(0			(755.80)	(0.017)	(0.016)
Observations	831405	772,847	455,800	521,969	417,738	460,735
Adjusted R^2	0.051	0.064	0.020	0.011	0.023	0.017

3 years of Lanham pre-school → income +6.1% (762 x 3 / 36,965) *per annum* in late adulthood

Source: 2000 Census Long Form & 2001-16 ACS, linked to SSA SS-5 & Lanham Act-funded nursery schools.

Note: Robust standard errors (clustered at the place of birth) in parentheses. All columns include fixed effects for year of birth & Census/ACS year. [a] Employed only *<0.10 **<0.05 ***<0.01

Table 3. OLS Estimates: Educational Attainment

	Years of Schooling		High School Graduate		College Graduate	
	Female	Male	Female	Male	Female	Male
Years Age 2-5 (1943-46)	-0.055***	-0.056***	-0.005***	-0.004***	-0.005**	-0.008***
	(0.014)	(0.014)	(0.002)	(0.002)	(0.002)	(0.003)
Lanham Place	0.134***	0.114**	0.006	0.010***	0.017***	0.006
	(0.047)	(0.061)	(0.005)	(0.004)	(0.006)	(0.010)
(Years Age 2-5) x (Lanham Place)	0.023***	0.028***	0.001	0.001	0.003**	0.006***
	(0.009)	(0.008)	(0.			(0.001)
Constant	9.833***	10.431***	0.8			0.304***
	(0.038)	(0.046)	(0.			(0.007)
Observations	1,242,217	1,143,251	1,242,239	1,143,274	1,242,239	1,143,274
Adjusted R^2	0.012	0.009	0.008	0.007	0.005	0.005

3 years of Lanham pre-school → +5.9% (0.006 x 3 / 0.304) more likely to graduate from college

Source: 2000 Census Long Form & 2001-16 ACS, linked to SSA SS-5 & Lanham Act-funded nursery schools.

Note: Robust standard errors (clustered at the place of birth) in parentheses. All columns include fixed effects for year of birth & Census/ACS year. [a] Employed only *<0.10 **<0.05 ***<0.01

Table 4. OLS Estimates: Marital Status & Disability

No effect

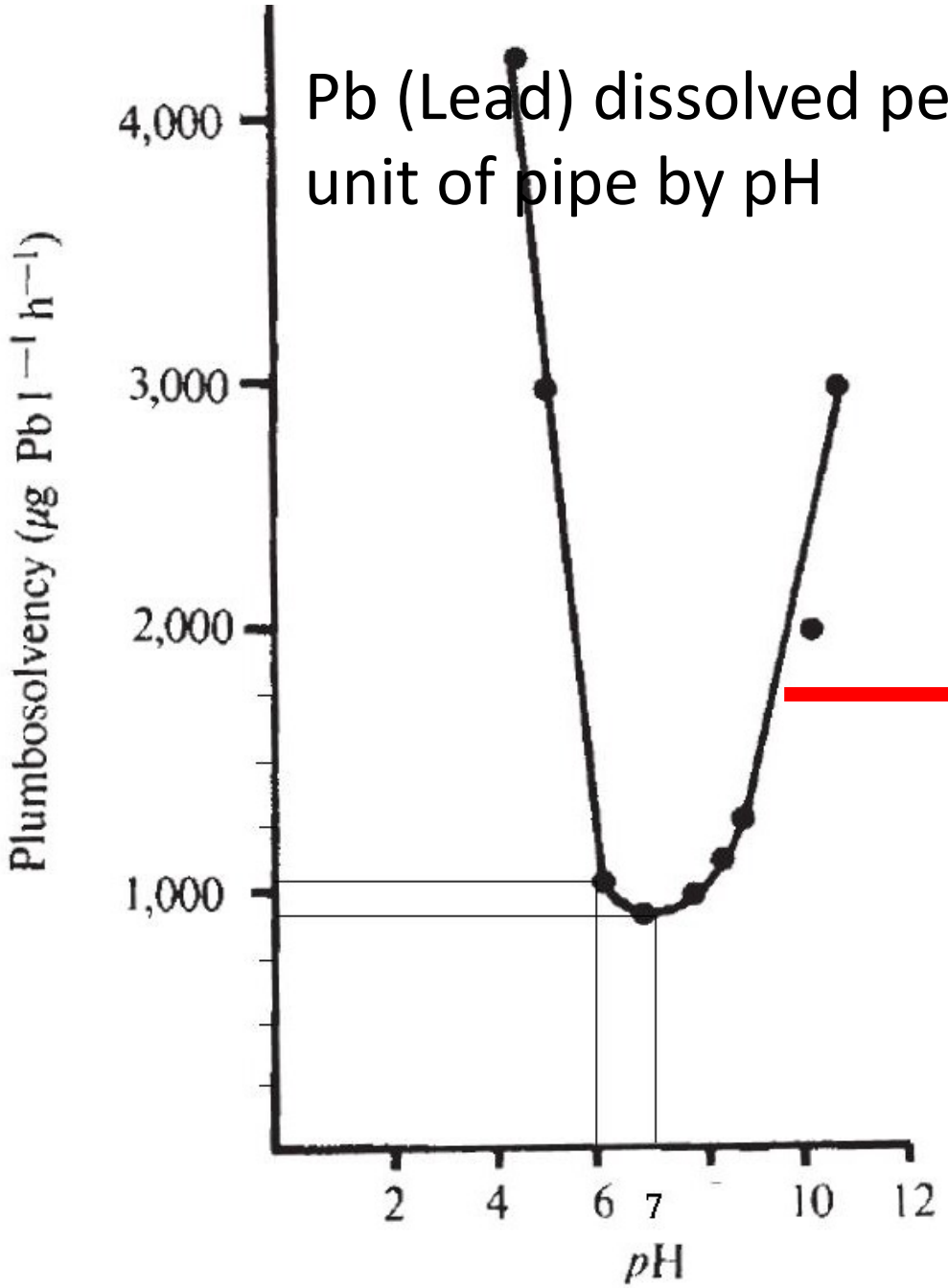
	Married (0/1)		Cognitive Difficulty (0/1)		Work Disability (0/1)[a]	
	Female	Male	Female	Male	Female	Male
Years Age 2-5 (1943-46)	-0.004	-0.001	0.000	0.002	0.001	0.003
	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)
Lanham Place	-0.003	-0.005**	0.003**	0.002**	0.004*	0.002
	(0.005)	(0.003)	(0.001)	(0.001)	(0.003)	(0.003)
(Years Age 2-5) x (Lanham Place)	0.000	0.000	0.000	0.000	-0.002*	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.620***	0.789***	0.045***	0.049***	0.126***	0.140***
	(0.004)	(0.003)	(0.001)	(0.001)	(0.005)	(0.003)
Observations	1,242,239	1,143,274	1,242,194	1,143,227	788,794	733,429
Adjusted R^2	0.009	0.002	0.000	0.000	0.001	0.001

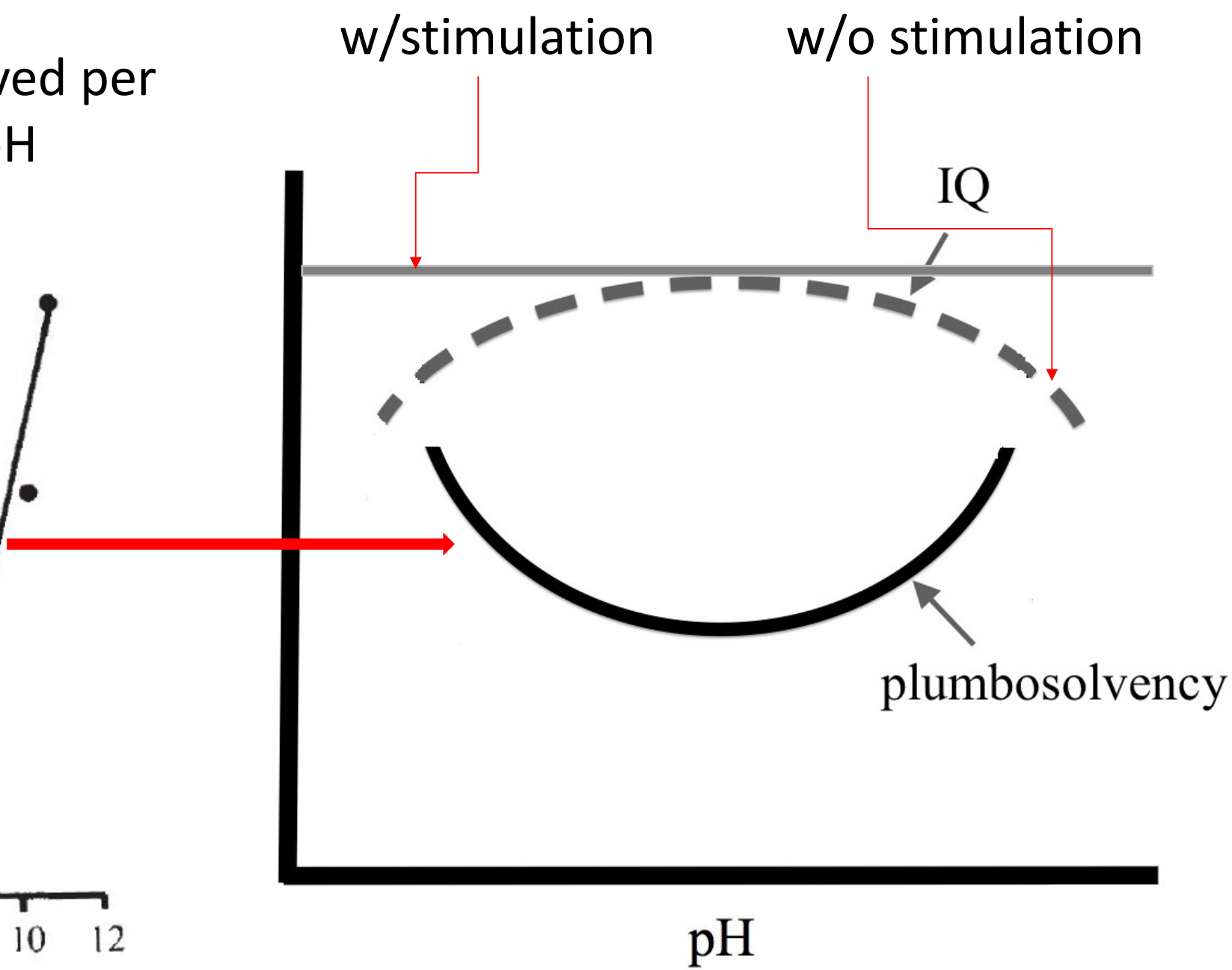
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Note: Robust standard errors (clustered at the place of birth) in parentheses. All columns include fixed effects for year of birth & Census/ACS year. [a] Age < 65, 2000-07 only *<0.10 **<0.05 ***<0.01

- Does exposure to Lanham pre-school have other benefits?
- There is substantial evidence from animal experiments that the negative effects of lead exposure on cognition can be reversed – and even eliminated – with early-life mental stimulation (Schneider et al. *Brain Research* 2001)
- There is no population-level data with which to see if this is true in humans
- This would require info on (1) early-life lead exposure, (2) early-life mental stimulation, and (3) later-life cognitively-sensitive outcomes
- We have (2) & (3), but what about (1)?
- Exploit info on city piping materials, the pH of city water supplies, and the pH-plumbosolvency relationship

Pb (Lead) dissolved per unit of pipe by pH





pH-Income gradient is *less concave* in Lanham places

ome (2000 $)

	Female		Male[a]	
	Non-Lanham	Lanham	Non-Lanham	Lanham
pH	15366.49	-34967.77***	-25762.46	-26365.55
	(22784.51)	(12744.19)	(75409.37)	(2669.43)
pH^2	-1134.44	-2391.42**	1948.87	1748.15
	(1640.69)	(884.71)	(5582.16)	(1836.41)
pH x Pb	74548.05***	28798.53*	219346.30**	52723.31
	(28217.24)	(14642.36)	(93227.12)	(34744.11)
pH^2 x Pb	-5098.58***	-2085.24**	-15203.62**	-3695.40*
	(1980.07)	(1003.56)	(6668.22)	(2357.22)
Observations	20,788	58,701	23,947	68,641
Adjusted R^2	0.012	0.007	0.006	0.004

Source: 2000 Census Long Form & 2001-16 ACS, linked to SSA SS-5 & Lanham Act-funded nursery schools.

Note: Robust standard errors (clustered at the place of birth) in parentheses. All columns include fixed effects for year of birth & Census/ACS year and the main effect for Pb.

[a] Age 2-5, 1943-46 only. *<0.10 **<0.05 ***<0.01

5. Extensions

- Project Talent (1960) has high school IQ & test scores for individuals born 1942-46
- Outcomes earlier in the life-cycle using the CPS March ASEC (1973, 1979, 1981-1999) which have PIKs attached
- Background family characteristics: the 1940 Decennial Census has been PIKed, so individuals can be linked from 2000-16 back to their parents' 1940 characteristics (education, income, occupation →

1. Family fixed effects
2. Heterogeneous treatment effects

- Propensity score weighting by place characteristics to balance treated & control places

6. Conclusions

- Lanham pre-schools had a lasting impact on the children exposed to them: ITT estimates of effects are large and probably substantially underestimate TOT estimates
- All effects were considerably stronger for males than for females
- Male annual wage & salary income at age 60 was 6% greater for every 3 years of Lanham pre-school exposure
- Males were 6% more likely to graduate from college if they were exposed to 3 years of Lanham pre-school
- A given level of early-life exposure to water-borne lead had a less severe effect for children with access to Lanham pre-schools
- Further refinement of the control group and analysis of high school test scores will be crucial in understanding the *mechanisms* generating these effects