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The Long-Term Effects of Charity Nurseries: Evidence From Early 20th Century New York

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The Long-term Effects of Charity Nurseries: Evidence from Early 20th Century New York*

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Abstract

The paper evaluates the long-run impact of charity nurseries for disadvantaged children in early 20th-century New York. Access to charity nurseries with kindergarten instruction raised children's years of education and reduced their likelihood of working in low-skilled jobs later in life. Instead, exposed children were more likely to work in jobs requiring higher cognitive and language skills. The effects were strongest for children from the most disadvantaged immigrant groups at that time. Our findings suggest that kindergarten instruction in charity nurseries helped immigrant children better understand teachers' instructions and learning materials which improved their economic outcomes in adulthood.

Keywords: Age of Mass Migration; Charity Nurseries; Child Care; Disadvantaged Children; Kindergarten Instruction; New York City

JEL Codes: I21, I26, J13, J15, N31

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1 Introduction

Several influential studies emphasize the importance of providing child care and preschool education programs to promote skill development and later life success for children from low-income families (Duncan and Magnuson, 2013; Cascio, 2021; Duncan et al., 2023). In the United States, about 60 percent of children ages 3-5 attend preschool, and attendance rates vary greatly by social background and race.[1] With few exceptions, the programs are targeted, not universal. Given the comparatively low preschool enrollment rates of children from low socioeconomic status families, policymakers have long debated about whether there should be universal child care and preschool education provided free of charge, an extended funding for targeted programs, or whether child care should be outsourced at all.[2]

These conflicted views indeed have a long history. In this paper, we study the long-term effects of a network of hundreds of day nurseries financed by charitable organizations that emerged in the late 19th century to provide center-based care and preschool education for poor children. Charity nurseries opened in response to rapid industrialization, immigration, and increased poverty in American cities, which challenged the traditional role of mothers in low-income families as the primary caregivers of their children, as they often had to work at the same time. There was no government involvement in child care and preschool education. Informal care arrangements (including relatives and neighbors) were the alternative mode of care for wage-earning mothers. Otherwise, children were left unsupervised in the streets (Cahan, 1989; Durst, 2005; Tank, 1980). Did access to charity nurseries benefit poor children in the long term, and were the charity-sponsored center-based care and preschool education cost-effective?

Newly available linked samples based on U.S. Census complete count records allow a long-term follow-up on charity nursery attendees with information on adult labor market outcomes and educational attainment for more than a million children. We show that charity nurseries cost-effectively increased years of schooling of disadvantaged children and improved their labor market

[1] The source for the preschool enrollment rates is the National Center for Education Statistics (2024).
[2] See, for example, the newspaper articles in the New York Times, The Atlantic, and The Economist.

outcomes as adults. Our historical framework and results provide insights into the literature evaluating the long-term effects of early childhood programs in the United States (Currie and Thomas, 1995; Garces et al., 2002; Ludwig and Miller, 2007; Deming, 2009; Gray-Lobe et al., 2023). First, historical data are needed to assess the long-term impact of childcare and early childhood education programs. Second, large-scale census data makes it easier to track the impact on program participants by nativity, race, and parental background and could improve measurement and identification issues. Finally, there are still very few U.S. studies that use large-scale data to evaluate the long-term effects of child care and early childhood education programs (Herbst, 2017; Bailey et al., 2021; Derrington et al., 2021).

Our focus is on New York City, the major immigration hub and center of charitable activities in the United States in the early 20th century. Contemporary social reformers painted a dramatic picture of the living conditions in the tenements of downtown New York City, where the majority of the immigrant population lived (Riis, 1890; Ager et al., 2024). The city population more than doubled from 3.43 million in 1900 to 7.45 million in 1940. At the height of the era of mass migration before WWI, forty percent of New York City's 4.8 million residents were foreign-born; nearly 15 percent of the total foreign-born population in the United States. A disproportionate part of Eastern and Southern European immigrants, who were on average poorer, less educated, and often did not speak English, lived in New York City. Despite increasing social problems and growing anti-immigration sentiments in the early 20th century (Abramitzky and Boustan, 2017; Abramitzky et al., 2023b; Ager et al., 2024), the gap in educational attainment and wages of children of immigrants (first- and second-generation) and children of natives (third generation or higher) narrowed significantly during this period (see Figure 1). We find that the charity nurseries contributed to the closing of this gap.

Our estimation strategy leverages the large-scale roll-out of charity-sponsored day nurseries in Manhattan and Brooklyn in the late 19th century. The empirical analysis draws on a newly constructed database based on the rich information provided by the *New York Charities Directories* for 1883 to 1924. Figure 2 shows the primary source of the variation in our sample: the share

of enumeration districts in Manhattan and Brooklyn with access to charity nurseries increased from approximately 0.05 in 1883 to 0.35 in the early 1920s. We geo-referenced the locations of approximately fifty charity nurseries in the boroughs of Manhattan and Brooklyn (see Figure 3) and combined this information with newly available linked samples based on the U.S. Census complete count records for the years 1900/10/20–1940 (Price et al., 2021; Buckles et al., 2023).[3] The resulting sample contains approximately one million individuals who were born between 1883 and 1910 and grew up in New York City. We follow these individuals to adulthood where we can observe their completed education and labor market outcomes. Information on place of birth and residence, date of birth, and race allows us to identify the targeted population.

We further leverage the age eligibility criteria of charity nurseries and that their access was very local. Since charity nurseries only served young children (ages 0-6), we can compare children living in the same enumeration district (the smallest aggregated census unit and comparable in population size to modern census tracts) who were age-eligible with those who were too old.[4] Children in enumeration districts without access to charity nurseries serve as control units (see Figures 4 and 5). We expect the enumeration-district fixed effects to absorb time-invariant unobservable neighborhood characteristics that can explain systematic differences between control and treated groups. The key identifying assumption is that the relationship between a child's age at the time when a charity nursery started its operation and their outcomes later in life is only driven by the causal effect of charity nurseries. To test whether this is indeed the case, we used an event-study design, where treatment status is assigned to individuals if they were age-eligible and lived in an enumeration district close to a day nursery (within 350 meters) when it first appears. In addition, we performed a series of robustness checks, such as only exploiting variation within families, and conducting placebo experiments, which all confirm our main findings and increase our confidence in the validity of our identification strategy. We also show that treatment effects heterogeneity is not confounding our results (Sun and Abraham, 2021).

[3] In 1910, the population of the boroughs of Manhattan and Brooklyn was nearly four million–more than 80 percent of the city's total population (Source: Total Population New York City.)

[4] See Section 3 for further details regarding age eligibility.

We find that access to charity nurseries affects later life outcomes *but only* if the nurseries provided kindergarten instruction. Children in affected districts achieved 0.14 more years of education, they were 2.7 percent more likely to complete education above the compulsory level, but we don't find that they were more likely to enroll in college. In terms of labor market outcomes, we find that affected children are 1.2 percentage points less likely to work as laborers and they were more likely to work in occupations requiring higher cognitive and language skills.[5] We also find significant effects on wage income, but only for individuals who earned above a certain threshold. These results are not driven by improvements in the mortality environment and substantial declines in fertility. Overall, our results suggest that charities' investments in targeted child-care programs with kindergarten instruction in early 20th century New York paid off. It increased human capital and economic opportunities for disadvantaged children.

Our results also reveal substantial heterogeneity in the effects of charity nurseries across race and immigrant groups. The primary goal of the day nurseries in 19th century New York was to provide daycare and early childhood education for children from disadvantaged families often with immigrant backgrounds (Davis, 1984). Our results indicate that children of immigrants from Southern and Eastern Europe received the largest long-term gains from attending day nurseries. We show that acquiring English language skills by immigrant children played a key role in mediating the impact of day nurseries on educational attainment and occupational choice. This finding relates to work highlighting the importance of immigrants acquiring English skills in historical and modern contexts for faster assimilation into the labor market (Bleakley and Chin, 2004, 2010; Ward, 2020). Overall, our estimates suggest that charity nurseries with kindergarten instruction reduced the gap in educational attainment between children of immigrants and U.S. natives in New York City by around 6 percent.

Moreover, we exploit the fact that some charities provide child care and preschool services exclusively for Black children. Blacks were among the poorest and most discriminated groups in the early 20th century and racial gaps in income and education were substantial (Margo, 2016).

[5]These numbers represent ITT (intent-to-treat) estimates. See Section 5.3 for a detailed discussion of the magnitude of the estimated effects.

Blacks in our sample generally had fewer years of education and worse labor market outcomes. However, access to preschool education for Black children significantly contributed to closing the racial gap. Black children with access to early childhood education stayed in school longer (about 0.8 years) and they performed better in the labor market later in life (about 10 percent less likely to work as laborers). Our findings contribute to a literature that has documented beneficial long-term effects of targeted preschool education programs for black children (e.g., Elango et al., 2015; García et al., 2023). They also relate more broadly to studies that have found positive long-term effects of education programs for Black children in the U.S. South after the Civil War (the Freedmen's schools) and the Rosenwald Rural Schools Initiative at the beginning of the 20th century (Aaronson and Mazumder, 2011; Eriksson, 2020; Jones and Schmick, 2022).

Our findings relate to a large body of literature that evaluates the long-term effects of targeted preschool programs in the United States, such as Head Start, the Perry Preschool, and the Abecedarian programs (e.g., Duncan and Magnuson, 2013; Cascio, 2021; Duncan et al., 2023).[6] Existing evidence on the long-term benefits of these targeted preschool programs comes from programs with few participants (Perry, Abecedarian) and for Head Start, except for Bailey et al. (2021), results are based on small sample sizes of longitudinal surveys (e.g., Johnson and Jackson, 2019; De Haan and Leuven, 2020; Pages et al., 2020). In terms of scale, our study is between the small-scale programs and Head Start. It is based on large linked U.S. Census samples but only includes children exposed to charity nurseries in New York City. We show that when charity nurseries also offered kindergarten instruction they benefited disadvantaged children's long-term development, while mere access to child care had, if anything, a limited impact. These results are consistent with the positive long-term effects found in existing studies on Head Start, and the Perry and Abecedarian programs, and with the limited impact that studies have shown that child-care programs have had on the development of younger children (Duncan et al., 2023).[7]

[6]Perry and Abecedarian are well-known small-scale model preschool programs and included 123 (Perry) and 111 (Abecedarian) children from disadvantaged families (all (Perry) or the majority were African-Americans). Head Start is a large-scale government-sponsored targeted preschool program for children of poor families. It started as an eight-week summer program in 1965 and subsequently expanded to a year-round program. Head Start has served more than 38 million children since 1965 (Office of Head Start).

[7]There is a large body of work, beyond the focus of this article, evaluating the impact of universal preschool

2 Historical Background

Child-care and preschool-education institutions emerged on a large scale in U.S. cities in response to increasing social problems associated with urbanization, immigration, and poverty during the second half of the 19th century. Charitable organizations introduced a variety of activities and programs that targeted primarily destitute mothers and poor immigrant families. Providing child care and preschool education to the poor was one of the charities' core elements of addressing the problems of poverty and lack of social infrastructure in poor neighborhoods. (Tank, 1980; Davis, 1984; Durst, 2005). Approximately 700 day nurseries and over 500 free kindergarten associations operated between 1880 and 1915 (Cahan, 1989; Ager and Cinnirella, 2021).

New York City, a main immigration hub at that time, was one of the main centers of this social reform movement. At the beginning of the 20th century, close to 50 day nurseries and 250 tuition-free kindergartens operated in Manhattan and Brooklyn.[8] Figure 2 shows the evolution in the access to day nurseries sponsored by charitable organizations between 1883 and 1924. The share of enumeration districts with access to these institutions increased to almost 40 percentage points from nearly zero between 1883 and 1924.

Charitable and religious organizations played a major role in sponsoring day nurseries and tuition-free kindergartens in New York City. Contemporaneous social reformers such as Lillian Wald, founder of the Henry Street Settlement, or Josephine Shaw Lowell, a founder of the New York Charity Organization Society, were concerned about the increased number of children of working mothers growing up unattended, in overcrowded neighborhoods surrounded by poverty, unsanitary conditions, and few educational opportunities. Wage-earning mothers faced the challenge of caring for their children and working at the same time. These mothers, often having been widowed or deserted, found themselves in desperate situations, and could not provide

programs mostly outside the US, which generally finds positive effects on child development and long-term outcome. Examples for the U.S. are the studies of Herbst (2017) and Derrington et al. (2021) on the positive long-term effects related to the Lanham Act (a universal child-care program during WWII) and Gray-Lobe et al. (2023) on universal preschools in Boston. For younger children, the evidence on universal child care comes from outside the U.S. and is more mixed. We refer the readers to Duncan et al. (2023) for a recent overview.

[8]The information on kindergartens comes from the 1902 Report of the U.S. Bureau of Education and on day nurseries from the special Census report on benevolent institutions in 1904.

adequate care for their children. The charitable organizations provided some relief to these mothers by offering center-based care for their children (Tank, 1980; Cahan, 1989; Durst, 2005).[9]

The primary purpose of day nurseries was to assist working mothers in desperate situations and prevent their children being sent to correctional facilities or orphanages. Day nurseries were primarily concerned with ensuring the health and safety of children. They provided food and clothing and provided mothers with information about child-rearing, hygiene, and home economics. Some day nurseries also provided employment services for mothers in need of work. Most of them operated daily from 7 A.M. to 7 P.M. Day nurseries varied in size, but it was not uncommon to care for more than 50 children. The charities accepted children between ages 0–6. Some charities charged a small fee of five cents per day (corresponding to one loaf of bread) for each child from those that were able to pay.[10] Information from New York City charities shows that in 1914 about one-quarter of the day-nursery families were headed by widows, close to twenty percent were families headed by deserted women, forty-five percent were families with both parents working, and the remaining families were headed by women whose husbands were sick, drunkards, or otherwise "unable" to work (Durst, 2005).

Several day nurseries started to introduce kindergarten instruction (some charities operated a kindergarten without offering daycare for younger children), since the charity workers believed in its positive influence on children's cognitive and social development (Tank, 1980). In contrast to a modern setting, there was no distinction between preschool and kindergarten. The target group was mainly young immigrant children (ages 3–6) from the poorest neighborhoods. Classroom activities included learning American cultural customs. Teachers instructed children in English language skills, morals, and values to prevent delinquency. Charity workers also reached out to the children's homes with the goal of "Americanizing" and educating mothers about child-rearing practices and hygiene (Klein, 1992; Durst, 2005; Berg, 2004). The assimilation function of kindergartens and day nurseries was an important activity in New York and other large U.S. cities

[9] In New York City, a disproportionate share of working mothers were either African Americans, Jews, or immigrants from Italy and Eastern Europe. Few charities offered these services also exclusively to specific minorities, such as the "Free Kindergarten Association for Colored Children" or the "Hope Day Nursery for Colored Children".

[10] This information is taken from the day nurseries listed in the NYC charities directory in 1902.

that experienced a massive inflow of immigrants from Eastern and Southern Europe, who often arrived without financial means, below-average proficiency in English, and lower socioeconomic status. Overall, charitable organizations familiarized the public with the general principles of child care and preschool education and gained widespread recognition as child-saving institutions (Tank, 1980; Klein, 1992; Durst, 2005).

There was no direct government involvement in sponsoring child care before the 1930s (WPA nursery schools) and the Lanham Act in the 1940s (Cahan, 1989).[11] While day nurseries offered a service that allowed women to work and raise children simultaneously, the general public did not consider incorporating women into the labor force as a desirable goal. The concern was that by assisting poor women the day nurseries undermine the values of a traditional family, where the father is the breadwinner. The introduction of state-specific mother's pension laws—a government-sponsored welfare program for poor families with dependent children—between 1911 and 1931 reflects the common view at the time that dependent mothers should be the primary caretakers of their children and are not expected to be the main breadwinners (Leff, 1973; Cahan, 1989).[12] Heavily opposed by charity organizations, New York introduced a mother's pension program in 1915. Despite the opposition against center-based care, there were still around 500 charity-sponsored day nurseries in the U.S. in the early 1920s (Leff, 1973; Tank, 1980).[13]

3 Data

Our empirical analysis draws on individual-level U.S. Census data and geo-referenced information on the locations of day nurseries in Manhattan and Brooklyn.

Individual-level data: Our individual data are based on the full count of U.S. Census records from IPUMS (Ruggles et al., 2021). The records provide information such as place of birth, current

[11] There were some efforts to regulate the hygiene and health care standards of day nurseries by health or public welfare departments in the 1920s and 1930s (Tank, 1980).

[12] Aizer et al. (2016) show that boys of accepted applicants to the mother's pension program had more years of schooling and higher income later in life.

[13] The global trends measured by the relative frequency of the bigram "Day Nursery" in the corpus of English historical books indicates a rapid growth in nurseries' popularity after 1890 reaching its pick around 1920 (Figure A1).

residence, race, occupation, wages (reported only in 1940), literacy, and educational attainment (reported only in 1940). IPUMS further added a consistent individual-level identifier (HISTID) that allows researchers to uniquely identify individuals within a dataset (but not across censuses).

Individuals are linked across censuses using crosswalks provided by Census Tree Project (CTP). The CTP provides researchers with fully anonymous crosswalks between each pair of historical censuses (1850–1940) that can be merged with the HISTID provided by IPUMS. The linking method of the CTP yields a high match rate of individuals, and it includes systematic links for women over time. The quality of the CTP links is high and they were independently verified (Buckles et al., 2023; Price et al., 2021).[14] We use CTP crosswalks to create a linked sample of males and females to assess the long-term effect of access to day nurseries during childhood.

For every linked individual in our sample, we use the information on place of residence (i.e., the enumeration district of the individual in Manhattan and Brooklyn), race, age, birthplace, school attendance, parental and household characteristics from the censuses of 1900, 1910, and 1920. Information on educational and labor market outcomes is retrieved from the 1940 census. We keep only unique matches in our sample (based on the earliest link).[15] We restrict our sample to individuals born between 1883 and 1910 who completed their education by 1940. We also exclude foreign-born who arrived in the U.S. too late to be eligible for childcare and preschool education.

Data on day nurseries: We digitized information on day nurseries from the charity directories of the Charity Organization Society of the City of New York for the years 1883 (the first published volume) to 1924 (no volumes are available for the years 1884, 1886, 1889, 1891, 1893–94, 1904, and 1908). The charity directories contain detailed information on day nurseries, including their addresses (the exact street and house number), the target group (e.g., infants and young children of poor working mothers), the age range of admitted children, the type of specialization (i.e., whether the organization operated only a day nursery or provided daycare as well as kindergarten instruction), and whether the service was tailored to a specific group (e.g., African Americans).

[14] As a robustness check, we also apply the links provided by other existing publicly available crosswalks (i.e., the Census Linking Project (Abramitzky et al., 2020) and the links identified by FamilySearch users). We refer the readers to Abramitzky et al. (2021) for further information on methods used to link historical data.

[15] For example, if an individual can be matched to 1940 from 1900 and 1910, we keep only the 1900–1940 match.

Appendix Figure A2 provides an excerpt of a typical entry from one of the volumes.

For the empirical analysis, we focus on day nurseries in the boroughs of Manhattan and Brooklyn. We also digitized information on charity/free kindergartens from the directories (in the historical setting, there was no distinction between preschool and kindergarten). Hence, we can distinguish between three different types of charity organizations:

(i) Day nurseries: organizations admitting children, typically aged 0–6, that provide only daycare for children without kindergarten instruction.

(ii) Day nurseries with kindergarten instruction: organizations admitting children aged 0–6 and providing a combination of daycare for younger children (below 3) and basic education for children aged 3–6.[16]

(iii) Kindergartens: organizations admitting children, typically aged 3–6, providing kindergarten instruction.

We focus on the first two types of institutions in our empirical analysis. This allows us to estimate the daycare effect and the joint effect of daycare and kindergarten instruction. Importantly, we always control for (iii) when evaluating the effects of (i) and (ii) on educational attainment and adult labor market outcomes of exposed children. As a robustness check, we also show the results for access to a charity kindergarten. Appendix Table A1 reports summary statistics.

Treatment assignment: To construct our treatment measure, we geo-referenced all addresses of kindergartens and day nurseries listed in the volumes of the charities directories between 1883 and 1924. To do so, we identify the historical addresses with Google API and map them to the corresponding enumeration district. The whole matching procedure is based on the assumption that the historical addresses of the charity organizations correspond to the current addresses that we geo-located using an automated algorithm.[17] Then, we combined this information with the

[16]We do not have information whether younger and older kids spent time together and participated in joint activities.

[17]We verified the addresses geo-located by Google with the crosswalks between historical and modern NYC street names provided by Steve Morse.

shapefiles of enumeration district boundaries in Manhattan and Brooklyn for the census years 1900, 1910, and 1920.[18] Figure 3 displays the locations of active day nurseries in 1900 for the boroughs of Manhattan and Brooklyn (see also Appendix Figure A3 for 1910 and 1920).

Using the obtained coordinates, we calculated the distances from each district centroid to the nearest day nursery in every year from 1883 to 1924.[19] Therefore, we can measure the distance between the enumeration district centroid and the nearest day nursery for each of these years. Since we only observe an individual as a child either in the census of 1900, 1910, or 1920 (duplicates are excluded), we only need to rely on the enumeration district and its proximity to the nearest day nursery given in that census year. Hence, for the assignment of treatment, we do not require enumeration districts to have stable boundaries over time.

Figure 4 depicts two example districts from our sample, illustrating how the district's distance from the nearest institution can change over time. In 1898, the distance dropped below the 350-meter range, which we consider to be the threshold measure for receiving treatment.[20] Hence, we code the year 1898 as the year of treatment assignment for this district. Individuals residing in the district receive treatment status if they are eligible for treatment. In this example, individuals aged 2 or younger in 1898 would obtain the full education treatment in day nurseries with kindergarten instruction compared to 3 to 6-year-old (partially treated) and 7-year-old or older cohorts (not treated). Figure 5 illustrates our treatment assignment rule.

While we do not have enrollment data for day nurseries, we can validate our measure of treatment exposure by using an indicator of attending educational institutions derived from the census data. We apply a data-driven approach to determine the optimal choice of a distance threshold. We assume that, given the limited capacity of nurseries, the distance should only predict school attendance up to some threshold. Figure 6, Panel (a), shows that the slope of school attendance on distance increases within a radius of 350 meters and then loses its magnitude and

[18] The shapefiles containing the enumeration district boundaries for New York City are from the Urban Transition Historical GIS Project.

[19] We use R spatial tools to construct this measure.

[20] Our choice of the distance threshold is consistent with other studies using a similar approach in defining treatment (e.g., Domènech-Arumí, 2021). Appendix Figure A4 provides a visualization of the 350m distance on a modern map of Manhattan.

significance. This suggests that the day nurseries provided their services only locally.

Furthermore, we regress a school attendance dummy on age dummies interacted with the distance from the nearest day nursery. If capacity constraints are important and access to day nurseries is local, then we would expect distance to matter only within a radius of 350 meters but not for children that live further away. Reassuringly, Figure 6, Panel (b)–(c), demonstrates that the distance measure predicts attendance only for individuals of specific age group eligible to attend nurseries with kindergarten instruction.[21] Crucially, one can observe this link only for individuals residing within a radius of 350 meters from the nearest nursery; for those living further away, the estimated coefficient is statistically insignificant and quantitatively close to zero. This suggests that exposure to treatment affects only children in immediate proximity to a nursery. This finding resonates with Ager and Cinnirella (2021), who show that kindergarten exposure is confined to households living near kindergartens.

4 Empirical strategy

This section describes our identification strategy to estimate the long-term effects of children obtaining access to day nurseries. The outcomes of interest include educational attainment and labor market outcomes as adults. We exploit variation in access to day nurseries at the enumeration district level across different birth cohorts. More specifically, treatment is assigned to eligible individuals residing in an enumeration district within 350 meters of any active day nursery. In our analysis, we distinguish between nurseries with and without kindergarten instruction.

We run the following event-study model using data from individuals born between 1883 and 1910 as outlined by estimating equation (1):

$$y_{idt} = \alpha_d + \alpha_t + \sum_{k}^{T} \beta_k \mathbb{1}\left[t - E_{idt} = k\right] + X'_{idt}\Gamma + \mu_w \times t + \epsilon_{idt}, \tag{1}$$

where y_{idt} is the outcome variable for individual i who belongs to birth cohort t and resides in

[21] Compulsory schooling in New York City did not apply before age 7 in our sample period, and children under 6 were not supposed to be admitted in school except in kindergarten classes (Palmer, 1905; Stambler, 1968).

enumeration district d. The variable E_{idt} refers to the year of the first opening of a day nursery in individual $i's$ enumeration district d (see Figure 5). The variable of interest, $[t - E_{idt} = k]$, is an indicator of an individual's birth year being k years away from treatment. Our reference category refers to individuals who turn age 8 when their enumeration district received treatment.[22] The parameters α_d and α_t are enumeration-district and birth-year fixed effects that account, respectively, for cohort-specific effects and time-invariant neighborhood characteristics. Additionally, we add ward-specific linear trends $\mu_w \times t$ and a vector of individual controls X'_{idt}, including individual birthplace fixed effects, a dummy for race, indicators for family size, gender, years spent in the U.S. (only for foreign-born), and parental characteristics (including indicators of each parent's birthplace and literacy).[23] Standard errors are clustered at the ward level to account for correlations within a ward in a given year and over time.

To estimate equation (1), we combine data from three linked samples: 1900/10/20 to 1940. Accordingly, we interact fixed effects for enumeration districts, birthplace, and birth year with census-year indicators to account for differences between individuals linked from different census years. Since the openings of nurseries and kindergartens are likely to be correlated, we *always* control for individuals' potential access to different types of treatment in our regression analysis. In other words, when we evaluate the effect of access to day nurseries with kindergarten instruction, we control for access to day nurseries without kindergarten instruction and charity kindergartens.[24]

The estimate of β, based on estimating equation (1), measures the impact on children located in enumeration districts with access to day nurseries under the standard parallel trend assumption that the outcomes of children in enumeration districts with and without access would have evolved similarly in the absence of treatment. As a first check in support of our identification strategy, we report baseline enumeration district characteristics by treatment status. We focus on characteristics that were likely important factors for charities to open up a day nursery, such

[22] Our event-study graphs display estimates for relative ages $-10 <= k <= 16$.

[23] We consider a mother (identified by the variable MOMLOC in IPUMS) and all her children residing within one household as one family. If parents are absent, we substitute the missing values of parental characteristics with 0 and include the corresponding indicators of the missing mother and father in the regression specification.

[24] We add dummies if an individual of eligible age lived in an enumeration district with access to day nurseries without kindergarten instruction or charity kindergartens.

as the share of foreign-born, the share of English speakers, the share of Blacks, the mortality environment, average income (measured by the occupation-based income score), the share of white-collar occupations, the share of rented apartments, the share of social welfare workers, and the share of workers in religious institutions.

The balancing test in Appendix Table A2 reports the mean difference of these characteristics between treated and control districts. The treated enumeration districts had, on average, a larger (non-English speaking) immigrant community. The individuals who lived there were, on average, poorer, less literate, and more likely to live in rented apartments (tenements). This is not surprising since the day nurseries aimed to provide their services in the poor districts of the city.[25] One can observe that adding ward fixed effects visibly reduces the magnitude of those differences. In particular, once we account for ward fixed effects, there are no significant differences in the ratio of surviving children between treated and control districts. Note, our econometric model includes a rich set of individual controls and fixed effects for enumeration districts that capture neighborhood-specific (time-invariant) differences across treatment and control units. Moreover, our event-study design allows us to detect violations of the parallel trend assumption. On top of this, we present a placebo test and a series of robustness checks in Section 5.2 that increase the credibility of our identification strategy.

Despite accounting for a wide set of controls and fixed effects for enumeration districts, the treatment effect could be confounded by unobserved family characteristics. For example, poor families with a stronger preference for education might be more inclined to send their children to nurseries providing kindergarten instruction. To address this concern, we estimate the following model with family fixed effects as outlined in estimating equation (2):

$$y_{ij} = \alpha_j + \beta \mathbb{1}[Nursery_{Age<a,ij}] + X_i'\Gamma + \epsilon_{ij}, \tag{2}$$

where outcome y_{ij} is measured for individual i of family j. Importantly, in this specification,

[25] Appendix Figure A5 illustrates living conditions in Lower East End, a densely populated area in South-Eastern Manhattan with a large share of the poor immigrant population. Figure 2 shows that this area was targeted by nurseries.

we can include family fixed effects, α_j, that account for all within-family characteristics such as genetics, cultural norms, and socioeconomic status. We further include a set of individual-level controls, X_i', such as an indicator for an individual's birth year. The variable $Nursery_{Age<a,ij}$ is a binary treatment indicator that is equal to 1 if an individual is below age a at the time when the day nursery appears. This approach allows us to better isolate the impact of day nursery exposure from potential confounding factors. Leveraging within-family variation in treatment comes at a cost, as we have to limit the estimation sample to families with two or more siblings. Essentially, we compare two siblings, with only one of them eligible to attend a day nursery when it first appeared within a 350-meter radius.

5 Empirical results

This section presents the results of our empirical analysis. Our main findings are outlined in Section 5.1. Based on estimating equation (1), we show that access to a day nursery that offered kindergarten instruction increased educational attainment and improved labor market outcomes of treated children as adults. The observed effects are stronger for non-English speaking immigrants and ethnic minorities (Jews and African Americans)—the poorest populations in New York City at that time. In most cases, we find no detectable effects of access to institutions that only offer daycare. In Section 5.2, we validate our empirical findings by estimating the model with family fixed effects and testing the effect of placebo treatment. Additionally, we adopt an alternative estimator proposed by Sun and Abraham (2021) to account for treatment effect heterogeneity. Section 5.3 evaluates the magnitudes of our estimates and relates them to other studies. Section 5.4 discusses potential mechanisms that could drive the results.

5.1 Main Findings

We start our analysis by evaluating the effects of children's exposure to day nurseries on human capital. In the empirical analysis below, we distinguish between two types of exposure: daycare

nurseries with and without kindergarten instruction. The control group includes individuals in enumeration districts without access to these institutions throughout the sample period.

Figure 7 plots the treatment coefficients and the corresponding 95-percent confidence intervals obtained from estimating equation (1) for education outcomes. The treatment coefficients measure the impact of access to day nurseries with kindergarten instruction (left column of Figure 7) and without kindergarten instruction (right column of Figure 7) for different relative age cohorts. Eight-year-old children represent the reference group (omitted category).[26] When a day nursery opened within 350 meters of the enumeration district, we would expect no effect on educational outcomes for children aged 8 and over, since they would have been too old to attend. On the other hand, we expect effects on human capital for boys and girls who were eligible at the time of the opening to receive full exposure to kindergarten instruction (e.g., a child born two years after the first opening of a day nursery is denoted with age "−2" in the event-study graph).

The left column of Figure 7 displays the results for children exposed to day nurseries with kindergarten instruction. There is a positive effect on years of schooling in Panel (a) and educational completion above the compulsory level in Panel (c). The effect appears for children aged 4 or younger.[27] Reassuringly, there is no visible sign of a pre-trend for older cohorts as one might have expected. There is also no evidence that access to kindergarten instruction affected the educational path of girls differently than boys (see Appendix Figure A6).

The right column of Figure 7 shows the results for children exposed to day nurseries without kindergarten instruction. We do not find a significant effect on the years of schooling in Panel (b), but some positive impact of day nurseries without kindergarten instruction on receiving education above the compulsory level in Panel (d). Additionally, there is no significant effect of both types of nurseries on investment in upper-tail human capital (high school and college degrees) as shown in Panels (e) and (f) of Figure 7. This can be explained by limited capacity and the high opportunity

[26]We choose eight-year-old children as a reference group to account for potential fuzziness in age eligibility for treatment. Parents could misreport the age of their children to pass eligibility criteria. Even though our "first-stage" results in Figure 6 do not support it, seven-year-old children could be still affected by treatment.

[27]The 1903 Law in New York required all children aged 8 to 14 to stay in school. The 1909 Law extended the compulsory schooling age to 7 years old (Stambler, 1968).

costs of sending children to high school for poor families in Manhattan and Brooklyn in the early 20th century (Palmer, 1905; Stambler, 1968).

Panels (a)–(f) of Figure 8 show the effects of children's exposure to day nurseries with (left column) and without (right column) kindergarten instruction on adult labor market outcomes. Children exposed to day nurseries with kindergarten instruction received higher wages, but only if they earned wages above the certain threshold ($1350); see Panels (a) and (c).[28] Furthermore, we show that children exposed to day nurseries with kindergarten instruction are more likely to work a job associated with higher cognitive scores and less likely to work as low-skilled laborers as shown by Panels (e) and (g).[29] There is no robust link between adult labor market outcomes and access to day nurseries without kindergarten instruction as a child; see Panels (b), (d), (f), and (h).

The heterogeneous effect on wages may reflect a non-linear link between years of education and wage income. If education represents the main channel of the charity nursery's impact on labor market outcomes this non-linearity may explain why we observe a significant effect only for wage earners above a certain threshold. Indeed, as illustrated by Figure A8, the relationship between education and wage is almost flat until the individuals reach an education above the compulsory level. Also, one can see that the average wage income for workers with education below or equal to the compulsory level is $1350.

Table 1 provides a summary of the "event-study" estimates. The average effect for cohorts receiving access to nurseries with kindergarten instruction is 0.14 additional years of schooling, a 2.7 percentage point increase in the likelihood of completing education above compulsory level, a 0.02 log point increase in wages ($(e^{0.02} - 1) * 100\% \approx 2\%$), and a 1.2 percentage point decrease in having an unskilled occupation (laborer). In Table 1, we also report the estimates for occupation's cognitive score and Duncan's Socioeconomic Index. Furthermore, we do not find significant effects on employment status or number of weeks that individual worked in the previous year. It suggests

[28] Figure A7 shows the effect without splitting the sample between high and low wage earners.

[29] To derive occupation-specific cognitive score, we link occupations in the 1940 U.S. Census to the 1971 Current Population Survey (CPS) based on a sample of 60,441 workers. The survey data contains information on the level of cognitive skills (reasoning, math, and language) associated with each occupation (see details here). For low-skilled laborers, we use the IPUMS occupation classification OCC1950 = 970.

that the positive impact on wages is driven by a selection of individuals to more productive occupations rather than by increased employment and working hours.[30] The numbers reported in Table 1 represent "intent-to-treat" (ITT) and average treatment effect on treated (ATT) which we discuss in detail in Section 5.3.

Day nurseries with kindergarten instruction in New York City targeted children of immigrant families from non-English speaking countries. In Table 2, we present estimates based on a more parsimonious difference-in-differences specification to explore whether there is heterogeneity in day nurseries' long-run effects by immigrants' country of origin. In particular, we replace the dynamic treatment effect in the estimation equation (1) with a binary treatment indicator that switches on for all cohorts exposed to day nurseries with kindergarten instruction (age<3). We interact this variable with birthplace indicators of various immigrant groups (first and second generation) to evaluate the potential heterogeneous effects of day nurseries on educational attainment. Overall, there is a substantively larger impact of day nurseries with kindergarten instruction for first- and second-generation migrants who arrived from Southern and Eastern Europe, particularly for Jews.[31] For these groups, the estimates range between 0.132 to 0.438 additional years of schooling for children exposed to day nurseries with kindergarten instruction. These findings suggest that immigrant children with a lack of English proficiency benefited more from kindergarten instruction. It may have helped them to catch up in language skills and perform better at school. We provide an empirical assessment of this potential channel in Section 5.4.

Next, we explore whether there are heterogeneous effects in access to day nurseries for adult labor market outcomes. Table 3 presents the results for wages according to immigrants' country of origin. Based on our previous results, we restrict the sample to wage earners above the threshold of $1350. As in the case of education, we observe a positive effect on wages mainly among immigrants from non-English-speaking countries (see Panel a). Moreover, Table 3 (Panel b) shows

[30] Note, the wage regressions always include weeks worked the previous year as an additional control.

[31] To identify the individuals of Jewish origin we rely on IPUMS variable *mtongue* (available only in 1910 and 1920 U.S. Censuses) that reports the respondent's mother tongue. Note that in 1910 and 1920 this was asked only of foreign-born persons. Accordingly, we categorize an individual as of Jewish origin if he speaks Yiddish or Jewish as his mother tongue language.

that affected children from non-English speaking were less likely to work as unskilled laborers in adulthood. The impact is most pronounced for Italians, who were a whole percentage point less likely to work as laborers in 1940. The difference in magnitude of the long-term effect of day nurseries can be explained by several factors. First, it may reflect the employment patterns associated with particular ethnic groups, as in the case of Italian immigrants who were over-represented in unskilled occupations (see Appendix Figure A9). Access to day nurseries with kindergarten instruction could have increased their occupational mobility. Second, the impact of day nurseries in early childhood might have been amplified by further investment in education later on. Therefore, the effects may indeed be stronger among groups with stronger preferences for education.[32] Finally, our intent-to-treat estimates might reflect that day nurseries provided educational services in areas with higher concentrations of particular immigrant and religious groups (e.g., Italians and Jews).

We also explore whether access to child care and preschool education benefited further disadvantaged children from ethnic minorities. Our focus here will be on African Americans, as charities provided specific services to Black communities in New York City. At the turn of the 20th century, most of them lived clustered in enclaves, such as San Juan Hill (a historical community in the Upper West Side of Manhattan) or Harlem. These were among the poorest neighborhoods of the city at that time, and it was left entirely to the charity organizations to provide child care and preschool education to young children in Black neighborhoods. Since the charity directories do mention whether a charity organization exclusively targeted Black children, we can investigate if access to these institutions improved the educational attainment of Black children.[33]

Table 4 summarizes the results of access to charity institutions exclusively for Black children.[34] Since only a few organizations were targeting Black children, we grouped them into one broad category: black charity institutions (including both nurseries and kindergartens). Columns (1)–(3)

[32]Appendix Figure A9 demonstrates that educational progress was particularly strong among Jewish immigrants.

[33]For example, the *Free Kindergarten Association for Colored Children* on 202 West 63rd Street offered free education for black children under 6 years of age.

[34]We classify Blacks based on the IPUMS *race* variable. The share of Blacks in our linked sample equals 2% and corresponds to 22,726 individuals.

show the effect on the years of schooling and a binary indicator of whether an individual completed schooling above the compulsory level/11th grade. The estimation equation includes the same set of controls as in Tables 1-3. The results are striking: Black children who had access to a charity institution completed 0.8 additional years of schooling; they were 13 percentage points more likely to stay in school above the compulsory level; and they had a 7.5 percentage points higher likelihood of completing high school (12th grade). While Black children exposed to a charity institution were 10 percent less likely to end up in unskilled occupations as adults (column (6)), we find no significant wage gains or that they were more likely to work in occupations with higher cognitive skills (see columns (4)–(5)). Reassuringly, access to these race-specific charity institutions mostly affected the targeted Black children but not children from other races. This suggests that our results are not just capturing some omitting factors that could be spatially and temporally correlated with our treatment effect; otherwise, we would observe a statistically significant impact also for children from other races (this was not the case except in column (5)).

Overall, our results resonate with other sociologists' observations that immigrants in New York City indeed moved upward economically and socially (e.g., Glazer and Moynihan, 1970; Berrol, 1976). The work of the charity organizations helped poor immigrant children to achieve better labor market outcomes as adults. For Blacks, on the other hand, discrimination in the labor market coupled with increased segregation limited the economic opportunities to materialize their gains from higher educational attainment (Lieberson, 1980; Sundstrom, 1994; Logan et al., 2015).

5.2 Robustness

In this subsection, we perform a series of robustness checks. In particular, we deal with potential threats to identification by (i) estimating a family fixed effects model to account for parental selection into treatment, (ii) implementing a robust estimator to address the issue of potential treatment heterogeneity when using a staggered adoption design, and (iii) implementing a placebo test that substantiates the credibility of our estimation strategy.

Appendix Table A3 reports the estimates of the family fixed effects model. This specification

allows us to compare siblings with and without access to day nurseries. Hence, we effectively net out all parental characteristics that could affect selection into treatment and the child's educational and labor market outcomes. The estimates generally confirm our previous findings, as we observe the positive impact of day nurseries with kindergarten instruction on educational attainment and occupational choice as shown by columns (1)–(2) and (5)–(6). Importantly, these results are not driven by the changes in sample composition. We do not observe significant effects on wages, but, in such cases, we cannot determine whether it is explained by family fixed effects or changes in the sample (see column 4 in Panels (a) and (b)).

Next, we address concerns about using event-study designs when units are treated at different times (see, e.g., Baker et al. (2022) for a detailed survey of the recent econometrics literature). To address the issue of potential heterogeneous treatment effects, we implement an alternative estimator, proposed by Sun and Abraham (2021), that restricts the control group to never-treated units. For this robustness check, we aggregate outcomes to the enumeration district, the unit to which treatment is assigned.[35] Appendix Figure A10 shows that the results based on the alternative estimator of Sun and Abraham (2021) are consistent with our results using the standard event-study design with individual-level data.

In Appendix Figure A11, we assign a placebo treatment for eligible individuals who lived outside the 350 meters threshold when the first day nursery appeared. As shown by Figure 6, the day nurseries with kindergarten instruction that are too far away from the enumeration districts of eligible children do not affect their attendance. Therefore, we expect the placebo treatment to produce no effect on educational attainment and occupational choice. Reassuringly, the estimated coefficients for this placebo event study reveal no statistically significant pre- and post-treatment trends for both variables of interest. This suggests that the treatment effects are indeed localized around day nurseries. It mitigates concerns regarding the confounding impact of other education and health interventions implemented by the city authorities that may have coincided with an expansion of the child care and kindergarten services provided by charitable organizations.

[35]We use units (enumeration districts) that never receive treatment as a control group. All computations are performed using the STATA command *eventstudyinteract*.

We also report estimates for all types of charity institutions combined in one regression equation. These estimates, presented in Appendix Figure A12, suggest that there is a positive effect of the institutions providing kindergarten instruction. Importantly, the estimates for kindergartens and day nurseries with kindergarten instruction are very similar. We interpret these findings as the absence of dynamic complementarity between daycare in early childhood (below age 3) and subsequent educational treatment (age 3–6).[36] In other words, the observed benefits in education and occupational choice stem solely from the educational component of treatment. Finally, Appendix Figure A13 demonstrates that our results are not sensitive to the automated methods used to link individuals from 1900/1910/1920 to the 1940 U.S. Census.

5.3 Magnitudes and Discussion

It is important to understand our findings in the context of general educational trends in New York City. In Figure 1, we compare children of U.S. natives (3rd generation or higher) with children of immigrants (first- and second-generation). Children born abroad were only included if they arrived young enough to be exposed to educational institutions in the United States. Panel (a) of Figure 1 shows that the initial educational gap between children of U.S. natives and immigrants (approximately 2.5 years of schooling for cohorts born before 1889) had been largely eliminated by 1910. This impressive pattern suggests that the city education policies and the efforts of charity institutions efficiently eliminated the disparities with the U.S.-born population in New York City.[37] The estimates reported in Figure 7 and Table 1 suggest that the charities' efforts to offer kindergarten instruction for immigrant children contributed roughly to a 6% reduction in the educational gap between immigrants and natives in New York City.[38]

[36] Investments at different stages of a child's skill development process could have synergy effects, in the worst case they could be redundant (i.e., these investments are either dynamic complements or dynamic substitutes). See Cunha and Heckman (2007) and Bailey et al. (2020) for more details on the concept of dynamic complementary and dynamic substitutes. For empirical evidence on the existence of dynamic complementarities and dynamic substitutability, see, e.g., Johnson and Jackson (2019) and Rossin-Slater and Wüst (2020).

[37] It should also be taken into account that the change in the composition of the immigrant population in the late 19th and early 20th centuries, namely the shift towards less educated and poorer immigrants from Southern and Eastern Europe, made integration into the education system more challenging (Abramitzky and Boustan, 2017).

[38] This calculation is based on taking the ratio of the average treatment effect estimate reported in Figure 7 (0.14) and the difference between the initial and remaining educational gap (9.5–7)–(10.88–10.66).

We observe a quite different pattern when comparing the evolution of the Black-white gap in schooling in Panel (a) of Figure A14. The initial moderate gap of 0.3–0.5 years of schooling widened to more than 1 year around 1900, but after the introduction of Black charities (in 1902) the gap slowly narrowed by 1910. Undoubtedly, the rise of residential segregation and racist institutions limited the convergence. While our estimates reported in Table 4 suggest that access to Black charity institutions reduced the Black-white gap in schooling, the few tailored charity institutions for Black children that we do observe in New York City were not enough to close the racial gap in schooling observed in Figure A14. Importantly, Panel (b) of Figure A14 shows a considerable wage gap between Blacks and whites. The observed reduction in the wage gap over time does not correspond to educational trends shown in Panel (a). It indicates that other factors than education may have indeed contributed to the wage penalty for Blacks.

Next, we calculate the average treatment effect on treated (TOT). Since we do not observe whether treated individuals attend a day nursery, our estimates represent intent-to-treat (ITT) effects. Figure 7 and Appendix Table A3 show the magnitude of the treatment effect of an increase in 0.11–0.14 years of schooling. Our estimates are similar to Bailey et al. (2021) and Rossin-Slater and Wüst (2020) but somewhat larger than Havnes and Mogstad (2011), reflecting that the charity organizations targeted poor children who likely benefited the most from access to kindergarten instruction.

To obtain the estimate of the treatment effect on the treated (TOT), we derive data on the capacity of day nurseries with kindergarten instruction from the *New York Charities Directories* (50 pupils per day nursery). We assume that this number is a relevant proxy of the number of children receiving kindergarten instruction in New York City's day nurseries. Then, we calculate the average population size of the target group (children aged 3–6) across enumeration districts in Manhattan and Brooklyn using U.S. Census data from 1900, 1910, and 1920 (340 children per district). Hence, we can obtain a "first-stage" estimate of the access to day nurseries on enrollment rates (50/340 = 0.15). This estimate corresponds approximately to the share of children (aged 3–6) attending educational organizations in New York City based on the 1900 U.S. Census (0.161).

To get the TOT estimates, we divide our estimates by 0.15. Accordingly, our ITT estimates of 0.11–0.14 years of schooling translate to an increase of 0.73–0.93 years in schooling per average individual who attended day nursery with kindergarten instruction.

These estimates lie between the effects of Head Start (0.53 additional years of schooling; see Bailey et al. (2021)) in the United States and the mid-20th-century targeted preschool program for poor children in Denmark (about a one-year increase in highest grade attainment; see Rossin-Slater and Wüst (2020)). Importantly, our estimates are sufficiently larger for the most disadvantaged population groups (Blacks, Jews, and Italians). Those might be compared with the estimates of programs specifically targeting ethnic minorities. For example, studies of the Carolina Abecedarian Project reveal large benefits for poor (predominantly African-American) children (1.8–2 additional years of schooling for exposed individuals; see García et al. (2017)). Regarding labor market outcomes, our estimates suggest that exposure to nurseries with kindergarten instruction increases wages by 14% and socioeconomic status by 10% relative to the mean (TOT).[39]

Finally, we provide an approximate estimate of the treatment efficiency. We take the daily cost per pupil reported by Halsey Day Nursery in 1901, 1905, and 1910. These amounted to 15, 20, and 25 cents, respectively.[40] Taking the average costs per pupil (20 cents), we obtain an estimate of the yearly per pupil cost as 0.2*365 = \$73.[41] Converting these estimates to current U.S. dollars gives us an estimate of \$2,683.[42] Our estimate approximately corresponds to \$2,268–3,129 per slot cost of attending preschool in Denmark in the period of 1949–1950 (Rossin-Slater and Wüst, 2020). Compared to modern targeted preschool programs (e.g., Perry Preschool and Abecedarian) our cost estimates are substantially lower; see Duncan et al. (2023). Accordingly, we conclude that the

[39]We obtain this estimate by converting ITT effect reported in Figure 8, Panel (c) to TOT and then expressing it in percentages relative to the pre-treatment mean: (0.591/0.15)/38.65 = 0.102 (Table 1). Note that the effect on wages is driven by high-wage earners (above the 1350\$ threshold).

[40]We selected the Halsey Day Nursery, which was established in 1897 and operated at 227 East 59th St, because they reported the operational costs instead of the fees paid by enrolled families. It provided daycare and kindergarten instruction to children under 6 years of age of working mothers. The average daily attendance was 45 pupils (Source: Charities Directory of the City of New York, various years).

[41]For comparison, yearly expenditures for public kindergartens were \$27 (in 1914) per pupil in Boston and \$39.77 (in 1915) in Cambridge, Massachusetts (Lazerson, 1971).

[42]This is likely an upwardly biased estimate given that the nursery operated less than 365 days within a year. For the conversion, we use the purchasing power calculator from Measuring Worth.

efficiency of charity kindergartens might even outweigh those of modern programs. The obtained estimates can provide an appropriate benchmark for the evaluation of similar charity child-care programs in developing countries.

5.4 Mechanism

In this section, we ask what could explain the positive impact of access to day nurseries with kindergarten instruction on educational attainment and adult labor market outcomes for immigrant children. We consider three mechanisms that could drive our findings: (i) a decline in fertility and an increase in parental investment in the human capital of children, (ii) the role of acquiring English proficiency, and (iii) improvements in nutrition and health.

As for the fertility mechanism, we rely on recent work by Ager and Cinnirella (2021), who show in a *quantity-quality trade-off* model with two types of potentially complementary investments, preschool and other investments in human capital (e.g., formal schooling), that access to preschool education can lead to a reduction in fertility if complementarities between preschool education and formal schooling exist. We provide evidence in support of this theoretical prediction. In Panel (a) of Figure 9, we apply our main event-study specification to the sample of women aged 16–35 in the corresponding census. Our estimates reveal a negative impact on fertility for day nurseries with an educational component (# of children below age 5). Crucially, we do not observe the negative effect on fertility for nurseries that provide only daycare (Panel (b) of Figure 9).[43] This finding supports the idea that access to kindergarten instruction induced parents to invest more in the education of their children and reduce fertility.

As for the English language skills mechanism, we refer to existing studies that demonstrate that early childhood is a critical period for acquiring the language of the host country (Isphording, 2015; Abramitzky et al., 2023a).[44] There was substantial variation in the ability to speak English across immigrant groups, reflecting, among other things, differences in linguistic distance, ethnic

[43] Our results are robust for applying the total number of children as an outcome (see Appendix Figure A15).

[44] The economic gains of acquiring English skills in the United States today are well documented (e.g. Bleakley and Chin, 2004; Chiswick and Miller, 2015; Isphording, 2015). However, recent evidence cast doubt whether the returns to English fluency were as high historically (Ward, 2020).

segregation, literacy levels, or high cost of language acquisition. In particular, English illiteracy among immigrant households from Eastern and Southern Europe was still relatively high at the turn of the 20th century. Accordingly, we hypothesize that attending a day nursery with kindergarten instruction would have helped immigrant children to learn English more efficiently than their counterparts who were mostly exposed to their native language within the family and neighborhood.[45] Hence, immigrant children with exposure to kindergarten instruction would have had an advantage when they entered a public school.

To test this hypothesis, we construct a sample of 10–18-year-old first- and second-generation immigrants from the U.S. Census of 1900, 1910, and 1920. We estimate an event-study model as outlined in Section 4. Panel (a) of Figure 10 shows that exposure to day nurseries with kindergarten instruction leads to substantial improvements in English proficiency among children from immigrant families. The results are striking: While we observe no significant differences in English illiteracy of immigrant children between treated and non-treated enumeration districts when they were too old (above age 8), children in the relevant age (i.e., age 6 or younger when they obtained access to kindergarten instruction) are substantially less likely to be illiterate in English. Our ITT estimates reveal that, on average, individuals who received treatment at age 3 had an English literacy rate 2 percentage points higher compared to older cohorts. Finally, Panel (b) of Figure 10 reveals that there is *no effect* of exposure to day nurseries without kindergarten instruction on acquiring English language skills.

Exploring the role of language skills further in Table 5, we demonstrate the positive impact of nurseries with kindergarten instruction on later having an occupation with a higher cognitive skills score (decomposed into reasoning, math, and language). Importantly, this link holds for immigrants from non-English speaking countries. These findings suggest a key role of acquiring language skills as the main channel of the day nurseries' long-lasting impact. Day nurseries with kindergarten instruction effectively prepared children from non-English-speaking households to better comprehend teachers' instructions and learning materials, thereby improving their school

[45] See Ager and Cinnirella (2021) for more details on the importance of kindergarten teaching for improving the English skills of immigrant children in the United States at the turn of the 20th century.

performance and occupational choice.

Finally, the third potential mechanism is about improved nutrition and health of exposed children to day nurseries. Immigrants lived in the city's poorest, most overcrowded, and unsanitary neighborhoods, where infant and child mortality were highest. The living conditions in parts of Manhattan and Brooklyn and other large U.S. cities were in the 19th century abysmal (Duffy, 1974; Meckel, 1998; Ager et al., 2024). Access to day nurseries might have improved the health status of the target population. To test the importance of the health channel, we use U.S. Census data on the number of children ever born and the number of surviving children for each woman ever married to compute the child survival ratio per married woman residing in Manhattan and Brooklyn in 1900 and 1910.[46] The results are displayed in Figure 11. Mothers' access to day nurseries (with and without kindergarten instruction) had no significant impact on their children's chances of survival. These findings should be taken with caution due to the possibility of strong spillover effects from treated children to their older siblings, parents, relatives, and even neighbors. This scenario is plausible because providing hygiene instructions to parents was one of the priorities for day nurseries; see Durst (2005) and the notes to Appendix Figures A4 and A16. Therefore, due to the broad scope of the nurseries' activities, we cannot completely rule out improvements in health as a potential channel.

6 Conclusion

Charities are, today and even more so in the past, an important provider of social services to the urban poor in the United States. The need for center-based care and preschool education emerged in the late 19th century as industrialization, immigration, and increased poverty in cities challenged mothers' traditional role as primary caregivers of their children. Poor women with children often had to work to support their families and were therefore unable to care for their children during the day. One main goal of charities was to assist these mothers and prevent

[46] Data on the number of children born and surviving children were only asked in the Census of 1900 and 1910. This information is also only available for married women.

their children from being sent to correctional facilities or orphanages. The charity-sponsored day nurseries served as general "child-saving agencies" that provided children with a safe place, food, and care. Some nurseries also offered kindergarten education in the hope of promoting the development of cognitive and social skills of disadvantaged children. We show that disadvantaged children exposed to day nurseries with kindergarten instruction performed better later in life.

Using newly digitized data on the roll-out of charity-sponsored day nurseries in New York City between 1883 and 1924, we find that access to day nurseries with kindergarten instruction raised the years of education of disadvantaged children and reduced their likelihood to work in low-skilled jobs later in life. Such children were more likely to take jobs as adults that required higher cognitive and language skills. The effects were strongest for immigrant children from Eastern and Southern Europe. These were among the most disadvantaged groups at that time and were a prime target of charitable organizations in New York City. Our findings suggest that the kindergarten instruction helped children from non-English speaking families to better comprehend teachers' instructions and learning materials. These children learned English and ended up in occupations with higher levels of cognitive skills, underscoring the importance of preschool education for economically disadvantaged groups. Overall, the educational opportunities offered by charity nurseries significantly contributed to narrowing the gap in educational attainment and wages between children of immigrants and U.S. natives in New York City.

Finally, our findings relate to a discussion on whether public preschool programs crowd out private child-care providers.[47] While we cannot directly test for crowding out, our study shows that long-term benefits for disadvantaged children were achieved cost-effectively, even when child-care operators were completely unregulated and the public sector was not involved in child care (e.g., via subsidies or investments). Our cost estimates suggest that charity day nurseries with kindergarten instruction in the late 19th and early 20th century operated at similar efficiency to comparable publicly funded preschool programs targeting poor children in the mid-20th century

[47]For the modern period, there are only a few empirical studies on this matter. For example, Bassok et al. (2014) finds that universal preschool policy crowded out private child-care providers in Georgia but not in Oklahoma. Brown (2018) shows that New York City's pre-K expansion in 2014 reduced the capacity of private daycare centers. This entire decline in the capacity of private daycare centers occurred in poorer areas of the city.

(Rossin-Slater and Wüst, 2020). While our study on charity-sponsored center-based care is based on historical data, the insights could be relevant in developing countries where the public sector lacks funding and regulatory power to efficiently operate or subsidize targeted preschool programs.

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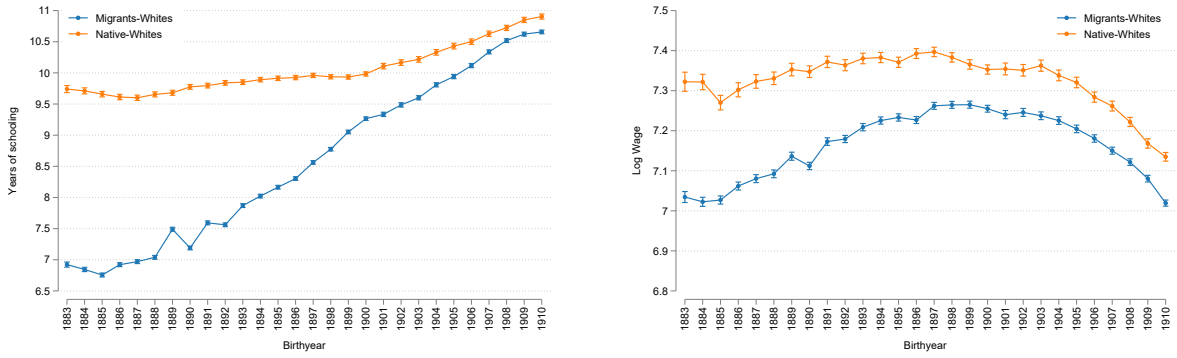
Tables and Figures

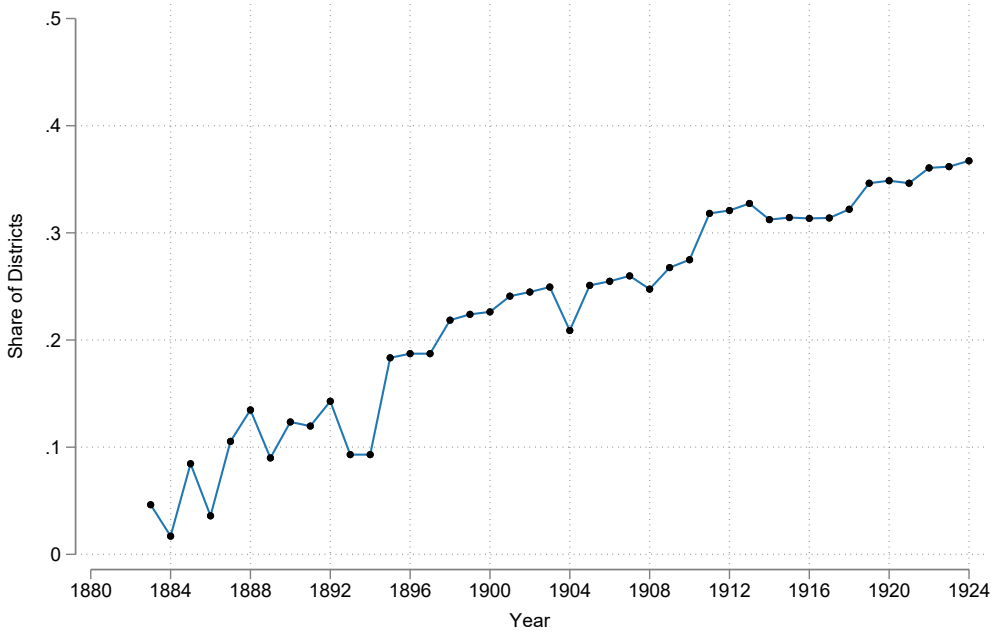
Figure 1: Average Years of Schooling and Wages by Cohort: White Natives vs. White Immigrants



(a) **(b)**

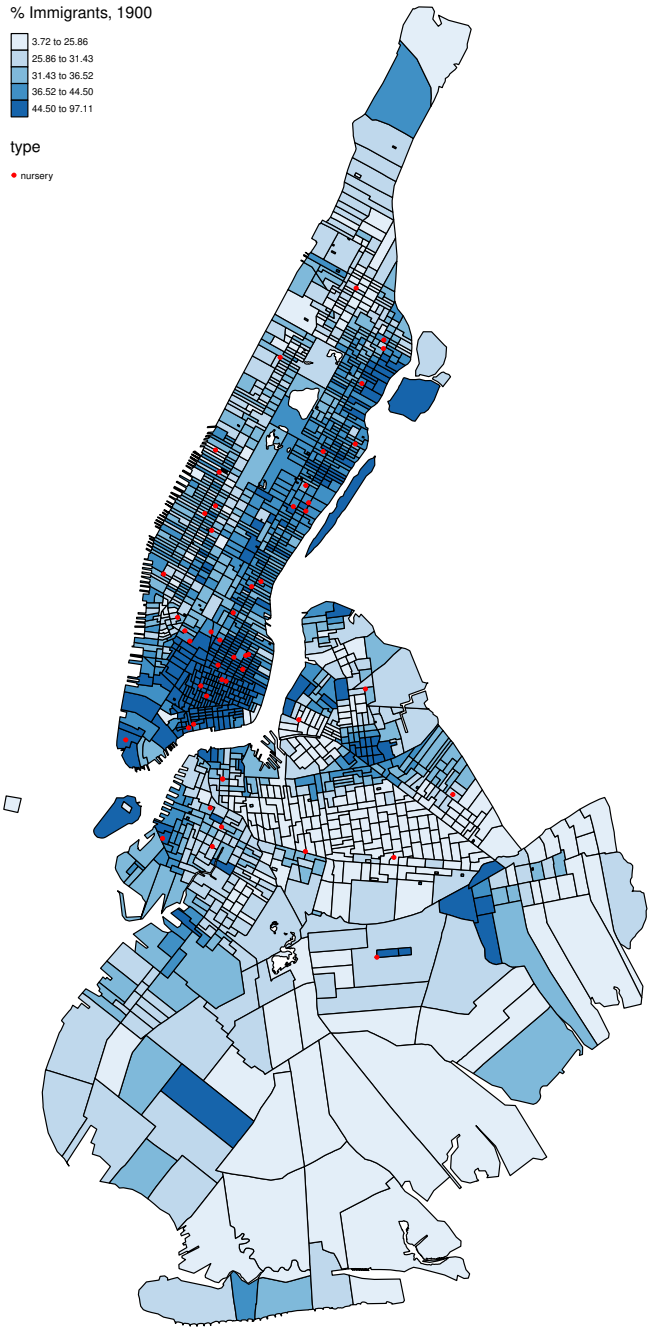
Note.— This figure shows the average years of schooling and wage income for individuals included in the estimation sample (cohorts born in 1883–1910). The series depicts trends for children of U.S. natives (3rd generation or higher) and immigrants (first- and second-generation). Children born abroad (first generation) are only included if they arrived young enough to be exposed to educational institutions in the United States.

Figure 2: Access to Day Nurseries in Brooklyn and Manhattan



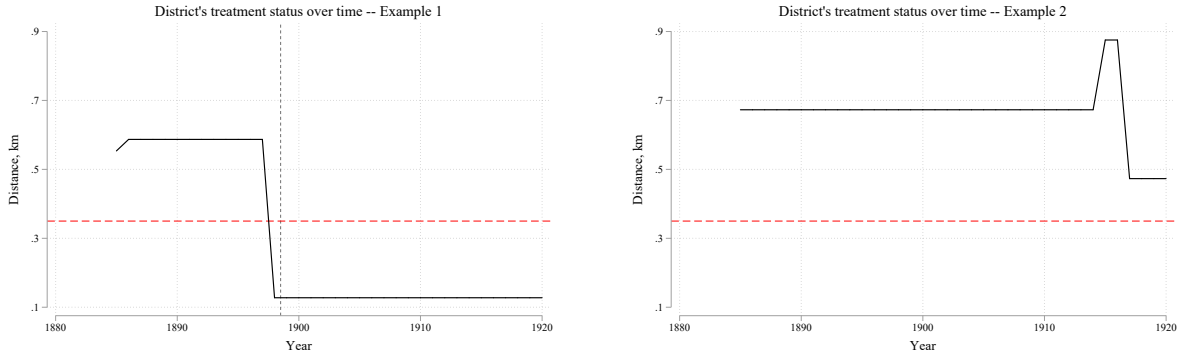
Note.— This figure shows the share of enumeration districts in Manhattan and Brooklyn with a day nursery within 350 meters from their centroid between 1883 and 1924.

Figure 3: Locations of Day Nurseries in Brooklyn and Manhattan (1900)



Note.— This figure plots the location of day nurseries in Manhattan and Brooklyn. The boundaries of enumeration districts correspond to the 1900 census year. The choropleth map visualizes the share of first- and second-generation migrants in the district population.

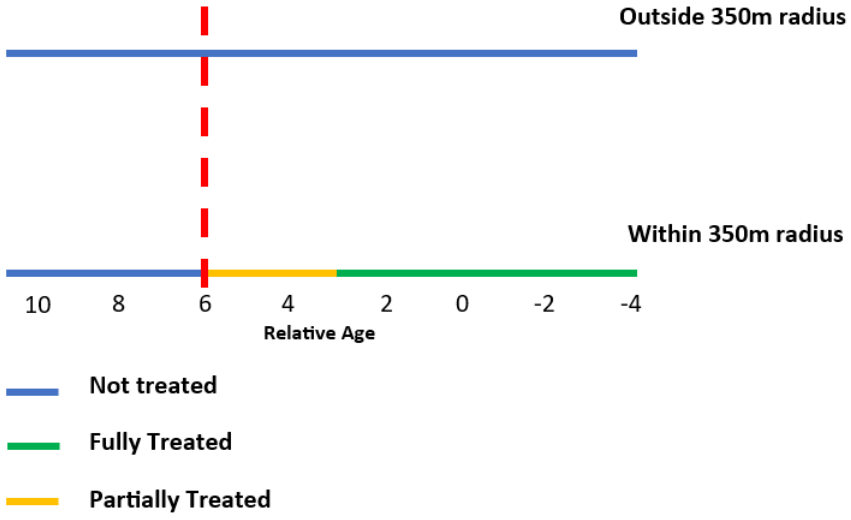
Figure 4: Treatment Status



(a) **(b)**

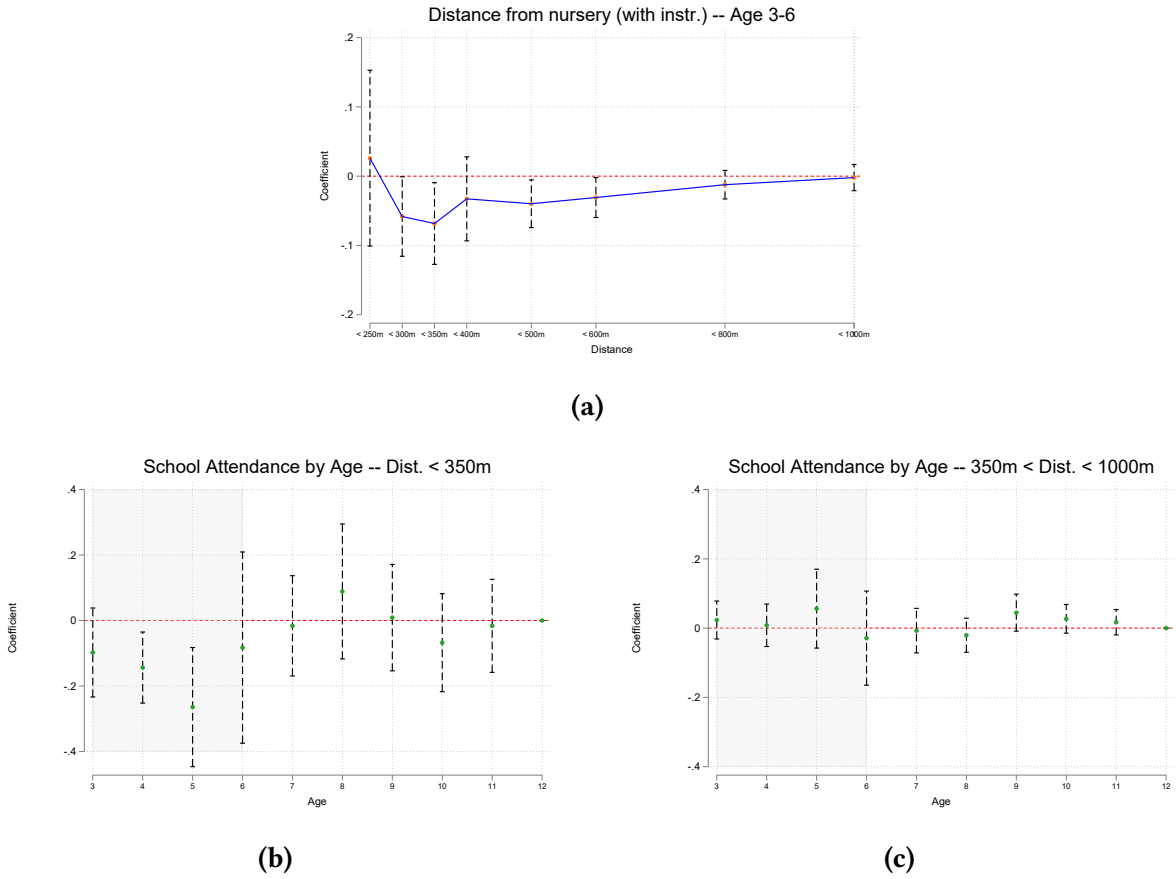
Note.— This figure illustrates the treatment assignment rule by showing how an enumeration district's proximity to the nearest preschool institution can change over time. Our estimation sample combines individuals representing different birth cohorts from three cross-sectional sub-samples (individuals from the 1900, 1910, and 1920 U.S. Census are linked to those of the 1940 census). We obtained the coordinates of day nurseries between 1883 and 1924 from the charity directories. Based on these, we calculated the distances between each enumeration district's centroid and the nearest nursery in those years. In the first example, one can see that the distance dropped below the 350m threshold in 1898. Since then, the district received treatment status for the subsequent periods. The second example illustrates another district whose treatment status remained unchanged over the entire period—individuals listed there belong to a control group (never treated).

Figure 5: Graphical Illustration of the Treatment Assignment



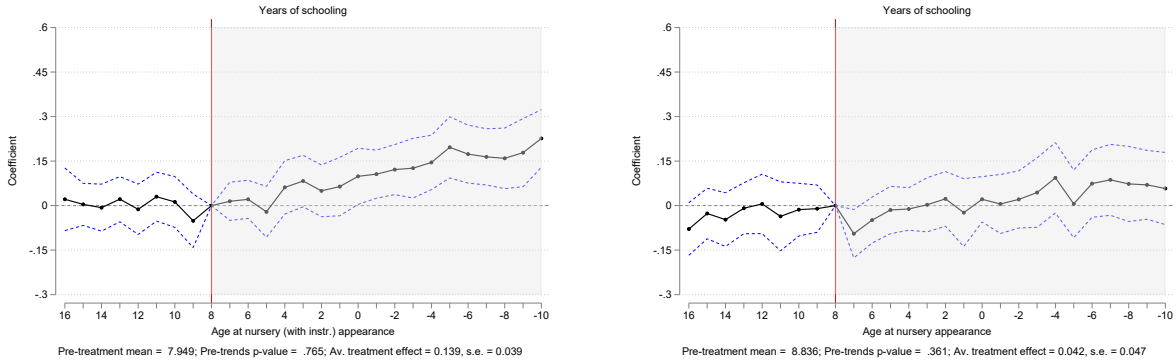
Note.— This figure illustrates the treatment assignment rule at the individual level. To have been treated, the individual needs to have lived in the district within 350m proximity of the nearest nursery and been 6 or younger at the time the nursery opened. Note that individuals below age 3 would have received full exposure to kindergarten instruction, which normally started at age 3 in charity nurseries.

Figure 6: The Effect of Day Nurseries with Kindergarten Instruction on School Attendance (1900, 1910, 1920 pooled sample estimates)



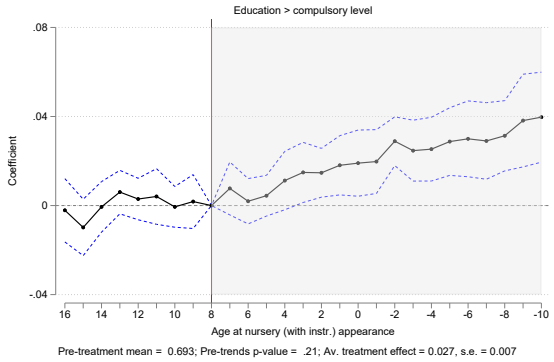
Note.— Panel (a) plots the slope of the school attendance indicator on distance from the nearest nursery for different bins (within 250m, 300m, 350m; 400m, 500m, 600m, 800m, and 1000m). Panels (b)–(c) plot coefficients of the interaction term *Age*Nursery (with instr.) distance*. The outcome variable is a binary indicator of whether an individual attends school. The coefficients plotted in Panel (a) show whether distance to the nursery predicts school attendance in various bins. The coefficients plotted in Panels (b)–(c) show the differential impact of a distance to a day nursery (kg. instr.) on school attendance for different age groups (12 years old is a reference category). The controls include fixed effects for wards in Panel (a) and fixed effects for enumeration districts in Panels (b)–(c). Both specifications further include indicators of birth year, individual and parental birthplace, gender, and race. All individual controls are interacted by census year. Panels (b)–(c) are based on two subsamples: the individuals living within a 350m radius (Panel b) and those living within a radius of 350–1000m (Panel c) from the nearest nursery with kindergarten instruction. Both subsamples include individuals linked between 1900/1910/1920 and 1940. Standard errors are clustered at the ward level.

Figure 7: The Effect of Day Nurseries on Adult Education

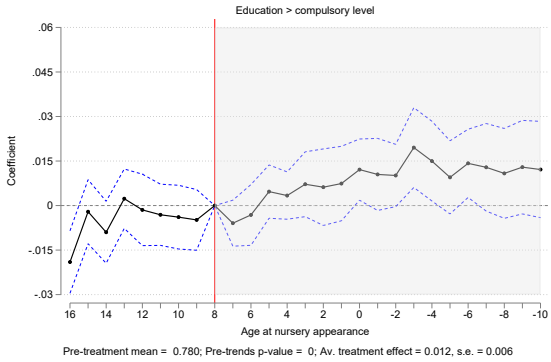


(a)

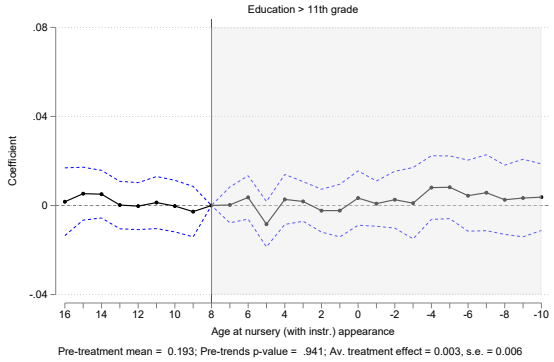
(b)



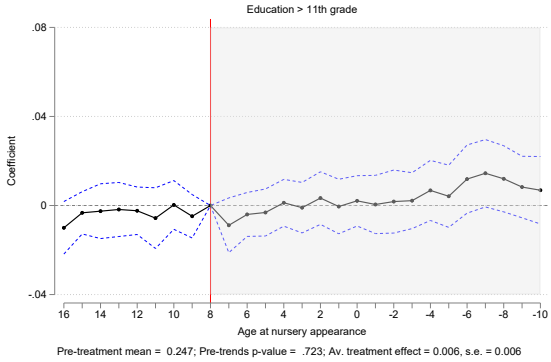
(c)



(d)



(e)

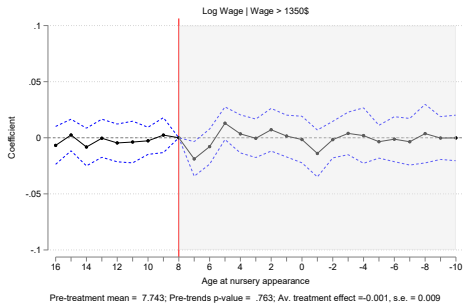


(f)

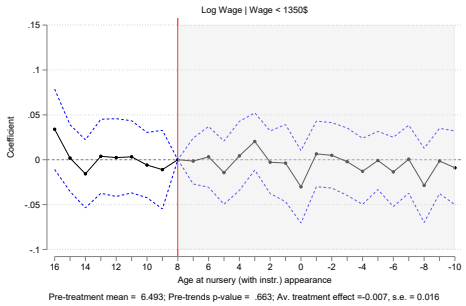
NOTE.— This figure plots the regression coefficients on relative time indicators corresponding to the individual's age when the first day nursery (with and without kindergarten instruction) appeared within 350 meters from the enumeration district centroid. Left/right figures display estimates for day nurseries with/without kindergarten instruction. The vertical line indicates a reference category, individuals of age 8. Plot legend reports p-values for the Wald test of the following hypothesis: $\beta_t = 0, 8 < t <= 16$ (no pre-trends). It also reports the sample outcome mean for the cohort that we use for normalization ($\beta_{t=8} = 0$). Additionally, it reports the average of the post-treatment coefficients: $(\sum_{t=2}^{10} \beta_t)/T$. The sample consists of males born between 1883 and 1910 residing in Manhattan or Brooklyn. We pool data from 1900, 1910, and 1920 U.S. Census and link the individuals to themselves in the 1940 Census. The outcomes include years of schooling, the indicator of having education above compulsory level (above 7th grade), and the indicator of high school completion (above 11th grade). The specification further includes fixed effects for individual and parental country of origin, birth year, enumeration district, race, and family size. Further, we control for parental literacy and the individual's number of years spent in the U.S, All fixed effects are interacted with a census year dummy. We also include ward-specific linear trends. Standard errors are clustered at the ward level.

Figure 8: The Effect of Day Nurseries on Labor Market Outcomes

(a)



(b)



(c)

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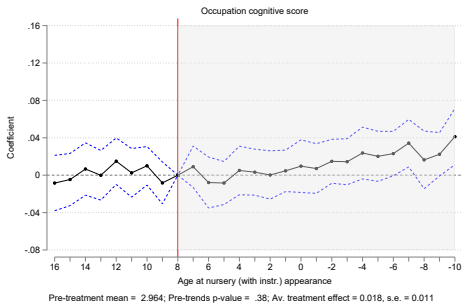
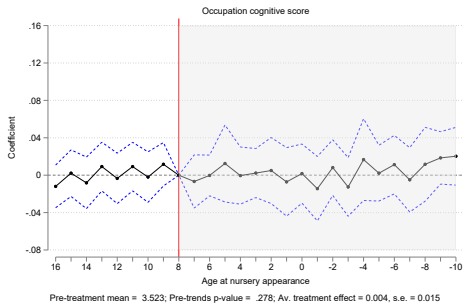
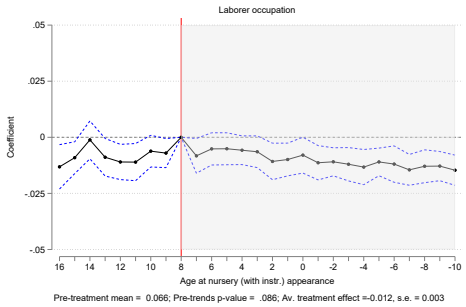


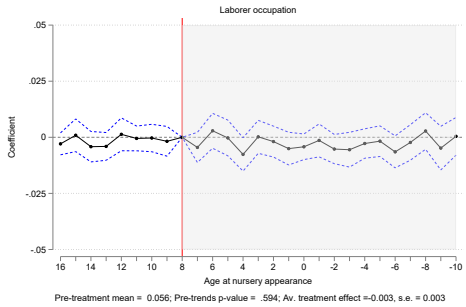
(e)



(f)



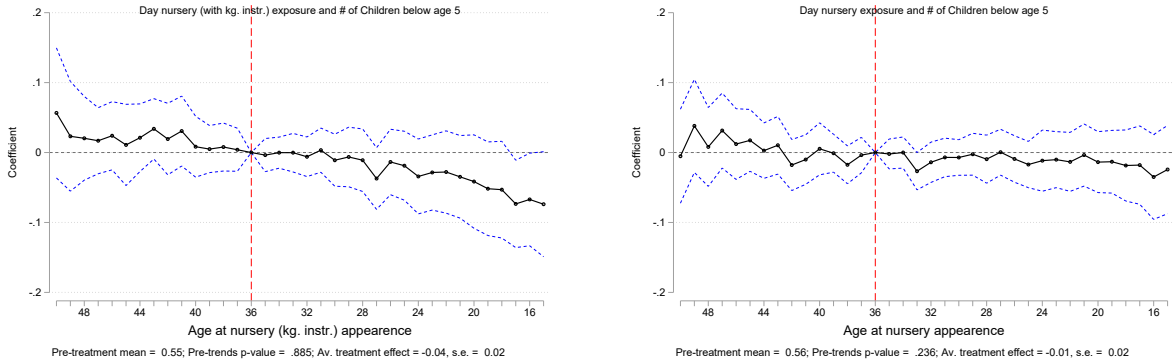
(g)



(h)

NOTE.— This figure plots event-study estimates for labor market outcomes. We estimate wage regressions for two subsamples of individuals: above and below $1350 threshold. Additionally, we exclude individuals with zero wages (not in the labor force or self-employed). The set of controls is the same as in the regressions with educational outcomes. For wage regressions, we include the yearly number of working weeks as an additional control variable. Left/right figures display estimates for day nurseries with/without kindergarten instruction. See Figure 6 note for other details.

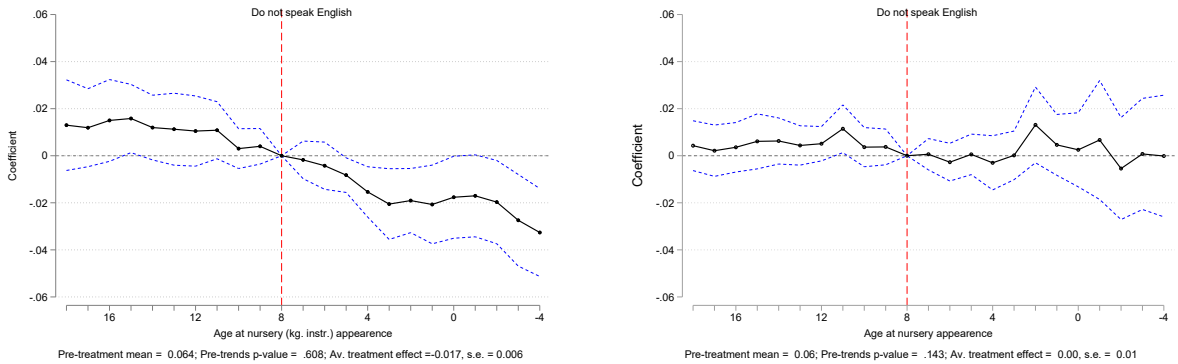
Figure 9: The Effect of Day Nurseries on Fertility (# of children below age 5)



(a) **(b)**

NOTE.— This figure plots regression coefficients on relative time indicators showing the individual's age when the first day nursery (with and without kindergarten instruction) appeared within 350 meters from the district centroid. An outcome is the number of children aged 5 and below residing with an individual. The estimation sample consists of first- and second-generation young immigrant women aged 16–35. The specification further includes fixed effects for individual and parental country of origin, birth year, enumeration district, race, and family size. Further, we control for parental literacy and the individual's number of years spent in the U.S. All fixed effects are interacted with a census year dummy. We also include ward-specific linear trends. Standard errors are clustered at the ward level.

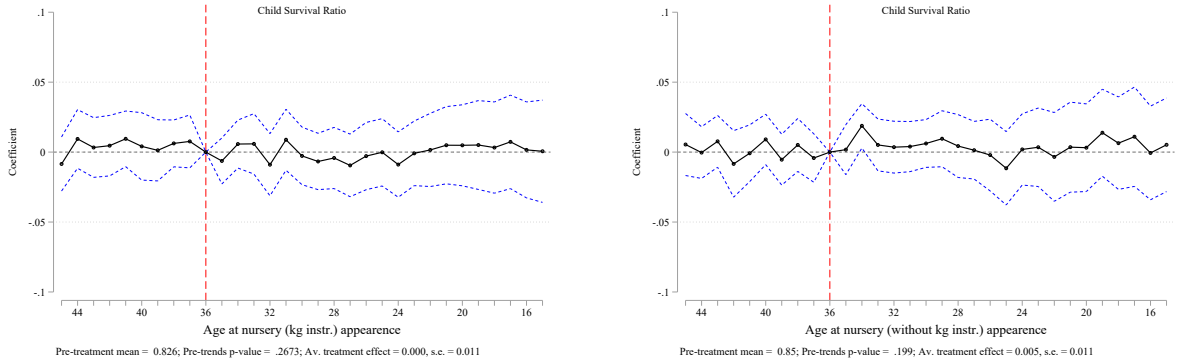
Figure 10: The Effect of Day Nurseries on English Illiteracy



(a) **(b)**

NOTE.—This figure plots regression coefficients on relative time indicators showing the individual's age when the first day nursery (with and without kindergarten instruction) appeared within 350 meters from the district centroid. The outcome is a binary indicator switching on if an individual reports to *"not speak English"*. The sample consists of first- and second-generation migrants aged 10–18. We pool data from 1900, 1910, and 1920 (full-count census data). The specification further includes fixed effects for individual and parental birthplace, birth year, enumeration district, race, and family size. Further, we control for parental literacy and the individual's number of years spent in the U.S. All fixed effects are interacted with a census year dummy. We also include ward-specific linear trends. Standard errors are clustered at the ward level.

Figure 11: Effects of access to day nurseries on survival of children



Note.— This figure plots regression coefficients on relative time indicators showing the individual's age when the first day nursery (with and without kindergarten instruction) appeared within 350 meters from the district centroid. An outcome is the ratio of surviving children. The estimation sample consists of young immigrant women aged 16–35. The regression specification corresponds to 1.

Table 1: Summary of the "Event-Study" Estimates of the Day Nursery Impact

	(1)	(2)	(3)	(4)
Dependent variable	Control Mean	ITT	ATET	ATET % change
	PANEL (a): Day Nurseries with Kindergarten Instruction			
Years of schooling	7.949	0.139	0.927	11.7
		(0.39)		
Educ level > compulsory	0.693	0.027	0.18	26
		(0.007)		
Educ level > 11th grade	0.193	0.003	0.02	10.4
		(0.006)		
Wage $	1625.6	34.93	232.87	14.3
		(16.59)		
Log Wage	7.121	0.006	0.04	
		(0.011)		
Log wage | wage > 1350$	7.730	0.02	0.133	
		(0.008)		
Log wage | wage < 1350$	6.493	-0.007	-0.046	
		(0.019)		
Works as a laborer	0.066	-0.012	-0.08	121
		(0.003)		
Weeks worked last year	29.31	0.079	0.53	1.8
		(0.272)		
Has employment	0.63	0.004	0.026	4.13
		(0.005)		
Duncan Socioeconomic Index	38.654	0.591	3.94	10.2
		(0.295)		
Cognitive score	2.964	0.018	0.12	4.1
		(0.011)		
	PANEL (b): Day Nurseries without Kindergarten Instruction			
Years of schooling	8.836	0.042	0.28	3.2
		(0.047)		
Educ level > compulsory	0.780	0.012	0.08	10.3
		(0.006)		
Educ level > 11th grade	0.247	0.006	0.04	16.2
		(0.006)		
Wage $	1706.76	18.84	125.6	7.4
		(23.5)		
Log Wage	7.182	0.005	0.033	
		(0.013)		
Log wage | wage > 1350$	7.743	-0.001	-0.007	
		(0.009)		
Log wage | wage < 1350$	6.513	-0.019	-0.126	
		(0.014)		
Works as a laborer	0.056	-0.003	-0.02	35.7
		(0.003)		
Weeks worked last year	31.45	-0.148	-0.987	3.14
		(0.219)		
Has employment	0.67	-0.004	-0.027	4
		(0.005)		
Duncan's Socioeconomic Index	40.896	0.038	0.253	0.6
		(0.434)		
Cognitive score	3.523	0.004	0.027	0.8
		(0.015)		

NOTE.— This table provides a summary of event-study estimates of the effect of day nurseries (with and without kindergarten instruction) on educational and labor market outcomes. To calculate the ITT estimate, we take the average of event-study coefficients for the cohorts fully exposed to treatment $-10 <= k <= 2$. To calculate the control mean, we average outcome values across individuals in the relative age group $k = 8$. The ATET estimate in column 3 divides the ITT effect in column 2 by the estimated effect of getting access to a day nursery on school enrollment (0.15, See Section 5.3). Column 4 computes the percentage increase implied by the ATET relative to the control mean (the ratio of column 4 to column 1). The compulsory level of schooling refers to 7th grade. Duncan's Socioeconomic Index represents a weighted sum of occupational education and occupational income. See detailed information in IPUMS description. Laborer refers to occupations that require raw physical labor (see IPUMS occ1950 variable). Standard errors are in parenthesis.

Table 2: The Effect of Day Nurseries on Adult Education by Groups of Migrants

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep var: Years of schooling							
Day Nursery (with instr.)	0.057***	0.066***	0.055***	0.053***	0.041**	0.044**	0.045**	0.048**
	(0.019)	(0.019)	(0.019)	(0.020)	(0.019)	(0.021)	(0.019)	(0.018)
Day Nursery (instr.)#English	-0.036							
	(0.045)							
Day Nursery (instr.)#Irish		-0.097***						
		(0.031)						
Day Nursery (instr.)#Scand			0.034					
			(0.077)					
Day Nursery (instr.)#German				0.027				
				(0.028)				
Day Nursery (instr.)#Eastern EUR					0.091**			
					(0.039)			
Day Nursery (instr.)#Italy						0.088**		
						(0.040)		
Day Nursery (instr.)#Central EUR							0.091**	
							(0.044)	
Day Nursery (instr.)#Jewish								0.381***
								(0.090)
$\beta_1 + \beta_2$	0.02	-0.031	0.09	0.08**	0.132***	0.132***	0.136***	0.438***
	(0.043)	(0.035)	(0.078)	(0.028)	(0.039)	(0.036)	(0.045)	(0.094)
Observations	1,092,155	1,092,155	1,092,155	1,092,155	1,092,155	1,092,155	1,092,155	746,259
R-squared	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.250

Note.— This table shows the heterogeneous effect of day nurseries on educational attainment for different groups of first- and second-generation migrants. Eastern EUR combines migrants from the Russian Empire and Poland. Central EUR includes Hungary and the Balkans. We define migrants based on their mother's birthplace and mother tongue (only in the case of Jews). The specification further includes fixed effects for individual and parental birthplace, birth year, enumeration district, race, and family size. Further, we control for parental literacy and the individual's number of years spent in the U.S. All fixed effects are interacted with a census year dummy. We also include ward-specific linear trends. Standard errors are clustered at the ward level.*** p<0.01, ** p<0.05, * p<0.1

Table 3: The Effect of Day Nurseries on Labor Market Outcomes by Groups of Migrants

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PANEL (a): Dep var – Log(wage) | Wage > 1350$							
Day Nursery (with instr.)	0.011***	0.011***	0.011***	0.009***	0.012***	0.010***	0.010***	0.017***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Day Nursery (instr.)#English	-0.022**							
	(0.010)							
Day Nursery (instr.)#Irish		-0.003						
		(0.004)						
Day Nursery (instr.)#Scand			0.000					
			(0.012)					
Day Nursery (instr.)#German				0.012**				
				(0.005)				
Day Nursery (instr.)#Eastern EUR					-0.009*			
					(0.005)			
Day Nursery (instr.)#Italy						0.010*		
						(0.005)		
Day Nursery (instr.)#Central EUR							0.006	
							(0.004)	
Day Nursery (instr.)#Jewish								0.010
								(0.011)
$\beta_1 + \beta_2$	-0.011	0.008	0.011	0.021***	0.003	0.019***	0.016***	0.027**
	(0.01)	(0.005)	(0.011)	(0.006)	(0.005)	(0.005)	(0.005)	(0.012)
Observations	376,599	376,599	376,599	376,599	376,599	376,599	376,599	243,237
R-squared	0.136	0.136	0.136	0.136	0.136	0.136	0.136	0.163
	PANEL (b): Dep var – Laborer occupation							
Day Nursery (with instr.)	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.003*	-0.004**	-0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Day Nursery (instr.)#English	0.002							
	(0.004)							
Day Nursery (instr.)#Irish		0.001						
		(0.002)						
Day Nursery (instr.)#Scand			0.004					
			(0.005)					
Day Nursery (instr.)#German				-0.003				
				(0.002)				
Day Nursery (instr.)#Eastern EUR					0.000			
					(0.002)			
Day Nursery (instr.)#Italy						-0.007**		
						(0.003)		
Day Nursery (instr.)#Central EUR							0.000	
							(0.001)	
Day Nursery (instr.)#Jewish								-0.001
								(0.004)
$\beta_1 + \beta_2$	-0.002	-0.003	0.000	-0.007**	-0.004**	-0.01***	-0.004**	-0.004
	(0.004)	(0.003)	(0.005)	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)
Observations	820,211	820,211	820,211	820,211	820,211	820,211	820,211	550,254
R-squared	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.060

Note.— This table shows the heterogeneous effect of day nurseries on wages (Panel a) and taking up an unskilled (laborer) occupation (Panel b) for different groups of first- and second-generation migrants. Eastern EUR combines migrants from the Russian Empire and Poland. Central EUR includes Hungary and the Balkans. We define migrants based on their mother's birthplace and mother tongue (only in the case of Jews). In wage regressions, we restrict our sample to wage earners above the $1350 threshold. The specification further includes fixed effects for individual and parental country of origin, birth year, enumeration district, race, and family size. Further, we control for parental literacy and the individual's years spent in the U.S. We include the yearly number of working weeks as an additional control variable. All fixed effects are interacted with a census year dummy. We also include ward-specific linear trends. Standard errors are clustered at the ward level.*** p<0.01, ** p<0.05, * p<0.1

Table 4: The Long-Term Effects of Black Charities

	(1)	(2)	(3)	(4)	(5)	(6)
	Years of sch	Educ > compulsory level	Educ > 11th grade	Cognitive score	Log(wage)	Laborer occupation
Black institution*Black	0.812***	0.130***	0.075***	-0.046	0.070	-0.095***
	(0.102)	(0.041)	(0.012)	(0.070)	(0.058)	(0.010)
Black institution*Non-Black	-0.043	0.007	0.005	-0.011	0.032***	0.001
	(0.065)	(0.009)	(0.005)	(0.007)	(0.008)	(0.008)
Black	-1.530***	-0.169***	-0.151***	-0.390***	-0.554***	0.098***
	(0.089)	(0.008)	(0.010)	(0.014)	(0.015)	(0.005)
t-test p-val	0.000***	0.0145**	0.000***	0.589	0.435	0.000***
Observations	1,092,155	1,092,155	1,092,155	809,119	659,952	820,211
R-squared	0.220	0.143	0.152	0.087	0.394	0.052

Note.— This table shows the impact of Black charities on education and labor market outcomes. Black is a binary indicator switching on if the individual belongs to the corresponding minority. Black institution is a binary indicator switching on if the individual was exposed to a Black kindergarten or nursery. Cognitive is defined as a maximum value of occupation-specific math, reasoning, and language proficiency scores (six-grade scale). p-val reports test statistics on null hypothesis Black preschool*Black = Black preschool*Non-Black. The specification further includes fixed effects for individual and parental country of origin, birth year, enumeration district, and family size. Further, we control for parental literacy and the individual's number of years spent in the U.S, For wage regression, we include the yearly number of working weeks as an additional control variable. All fixed effects are interacted with a census year dummy. We also include ward-specific linear trends. Standard errors are clustered at the ward level.*** p<0.01, ** p<0.05, * p<0.1

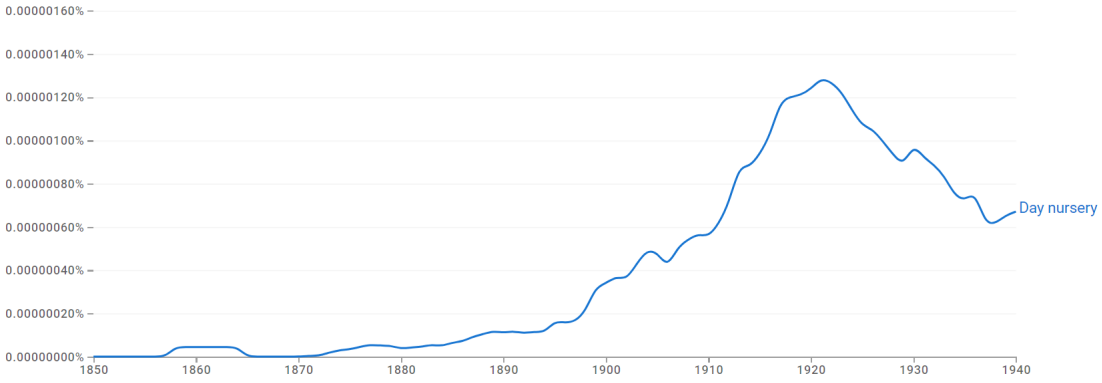
Table 5: The Effect of Day Nurseries on Wages, Occupational Choice and Cognitive Skills: English vs. Non-English Speakers

	(1)	(2)	(3)	(4)	(5)	(6)
	Years schooling	Log(wage) | Wage > 1350$	Laborer	Reasoning	Math	Language
Day Nursery (with instr.) β_1	-0.011	0.007*	-0.003	-0.005	-0.000	-0.005
	(0.025)	(0.004)	(0.002)	(0.008)	(0.008)	(0.009)
Day Nursery (with instr.)#Non-English speak. β_2	0.119***	0.008*	-0.002	0.017**	0.018**	0.020**
	(0.032)	(0.004)	(0.002)	(0.007)	(0.008)	(0.008)
β_1 + β_2	0.109***	0.015***	-0.005**	0.012**	0.018**	0.015**
	(0.024)	(0.0036)	(0.002)	(0.005)	(0.006)	(0.006)
Observations	1,092,155	381,060	820,211	809,119	809,119	809,119
R-squared	0.220	0.114	0.134	0.087	0.094	0.102

Note.— This table shows the effect of day nurseries (with instr.) on occupations-specific cognitive skills for the migrants born in non-English speaking countries vs. the rest of the sample. *Non-English speak.* is a binary indicator that switches on if either the individual or her mother was born in a non-English speaking country. The specification further includes fixed effects for individual and parental country of origin, birth year, enumeration district, race, and family size. Further, we control for parental literacy and the individual's number of years spent in the U.S, All fixed effects are interacted with a census year dummy. We also include ward-specific linear trends. we estimate wage regression by restricting the sample to wage earners above the $1350 threshold and include a number of working weeks as an additional control. Standard errors are clustered at the ward level.*** p<0.01, ** p<0.05, * p<0.1

Supplementary Online Appendix

Figure A1: Frequency of "Day Nursery" in Google N-gram



Note.— This figure shows the relative frequency of the bigram "Day Nursery" in a corpus of digitized books Books Ngram Viewer.

Table A1: Summary Statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Kindergarten / nursery exposure					
Nursery (with instr.) dummy	1136,320	0.239	0.427	0.000	1.000
Nursery dummy	1,136,320	0.222	0.416	0.000	1.000
Natives	1,136,320	0.370	0.483	0.000	1.000
Black	1,136,320	0.020	0.140	0.000	1.000
Linked sample outcomes – all groups					
Years schooling	1,106,885	9.444	3.378	0.000	20.00
Educ > compulsory level (7th Grade)	1,106,885	0.834	0.372	0.000	1.000
Educ > 11th Grade	1,106,885	0.290	0.454	0.000	1.000
Log wage	671,113	7.225	0.826	0.000	8.517
Duncan's Socioeconomic Index	806,107	42.56	22.96	3.000	96.00
Laborer	832,747	0.051	0.221	0.000	1.000
Weeks worked last year	1,136,320	31.36	23.54	0.000	52.00
Has employment	1,136,320	0.659	0.474	0.000	1.000
Cognitive skills (Reasoning)	821,573	3.576	0.789	1.556	6.000
Cognitive skills (Math)	821,573	2.665	0.826	1.000	5.925
Cognitive skills (Language)	821,573	3.039	0.935	1.000	6.000
Natives					
Years schooling	410,877	9.976	3.201	0.000	20.00
Educ > compulsory level (7th Grade)	410,877	0.873	0.334	0.000	1.000
Educ > 11th Grade	410,877	0.345	0.475	0.000	1.000
Log wage	248,166	7.276	0.852	0.000	8.517
Duncan's Socioeconomic Index	287,778	43.52	22.72	3.000	96.00
Laborer	298,172	0.052	0.222	0.000	1.000
Weeks worked last year	420,517	30.74	23.91	0.000	52.00
Has employment	420,517	0.641	0.480	0.000	1.000
Cognitive skills (Reasoning)	294,240	3.615	0.780	1.556	6.000
Cognitive skills (Math)	294,240	2.692	0.834	1.000	5.925
Cognitive skills (Language)	294,240	3.091	0.922	1.000	6.000
Immigrants					
Years schooling	696,008	9.13	3.439	0.000	20.00
Educ > compulsory level (7th Grade)	696,008	0.812	0.391	0.000	1.000
Educ > 11th Grade	696,008	0.258	0.437	0.000	1.000
Log wage	422,947	7.195	0.808	0.000	8.517
Duncan's Socioeconomic Index	518,329	42.02	23.07	3.000	96.00
Laborer	534,575	0.051	0.220	0.000	1.000
Weeks worked last year	715,803	31.73	23.31	0.000	52.00
Has employment	715,803	0.670	0.470	0.000	1.000
Cognitive skills (Reasoning)	527,333	3.554	0.793	1.556	6.000
Cognitive skills (Math)	527,333	2.650	0.821	1.000	5.925
Cognitive skills (Language)	527,333	3.010	0.941	1.000	6.000
Unlinked sample – Immigrants					
Survived children ratio	444,165	0.842	.269	0.000	1.000
# Children below age 5	1,701,710	0.45	0.78	0.000	9.000
Don't speak English	1,060,126	0.053	0.22	0.000	1.000

NOTE.— The sample includes male individuals residing in Manhattan and Brooklyn that are linked from 1900/1910/1920 to the 1940 U.S. Census with excluded duplicate matches. The sample includes only cohorts born in 1883–1910. Note that the information on the following variables: *Survived children ratio*, *Children below age 5*, and *Don't speak English* refers to an unlinked sample of individuals, observed in 1900/1910/1920 U.S. Censuses.

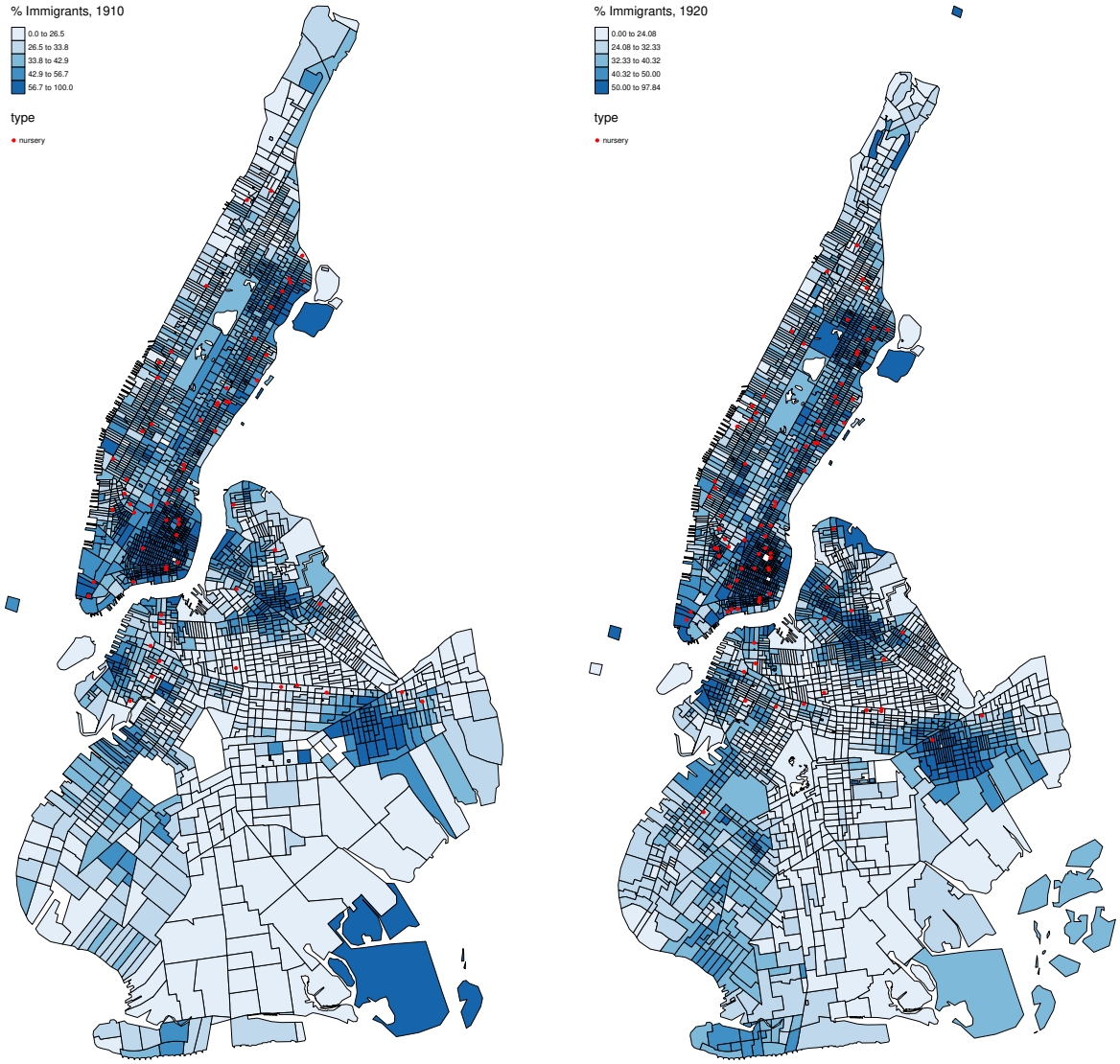
Figure A2: NYC Charity Directories – Example of the Data

Div. 1), formerly at 128 East 10th St., is temporarily closed. For emergency cases of little ones who are well, and whose mothers are in a hospital or dead. Apply to Mrs. L. S. Bainbridge, Supt., Room 401, United Charities Building, 105 East 22d St.

Bethany Day Nursery (The) (org. 1887), 402 East 60th St. Cares for babies and children up to 7 years of age, and provides a refuge after school hours for children whose parents are obliged to be at work away from home during the day. Food, clothing, kindergarten, and instruction in general household-work is provided. Charges are five cents per day. Supported by voluntary donations, and is under the management of the ladies of the Madison Avenue Reformed Church. Open from 7 A.M. to 7 P.M., except Sundays and holidays. Average attendance, 76. Mrs. T. B. Taylor, Pres.; Mrs. Benjamin A. Williams, Vice-Pres.; Mrs. E. M. Miller, Treas., 46 West 76th St.; Mrs. F. H. Morse, Sec.; Mrs. M. R. Snyder, Matron.

Bethlehem Day Nursery of the Church of the Incarnation (Protestant Episcopal) (incorp. 1885), 249 East 30th St. For children, from one week to seven years of age, of working women, who pay five cents a day for each child. Open daily from 7 A.M. to 7 P.M., except Sundays and holidays. Mrs. James McLean, Pres.; Mrs. J. J. Riker, Treas., 298 Lexington Ave.; Mrs. John T. Ijams, Sec.

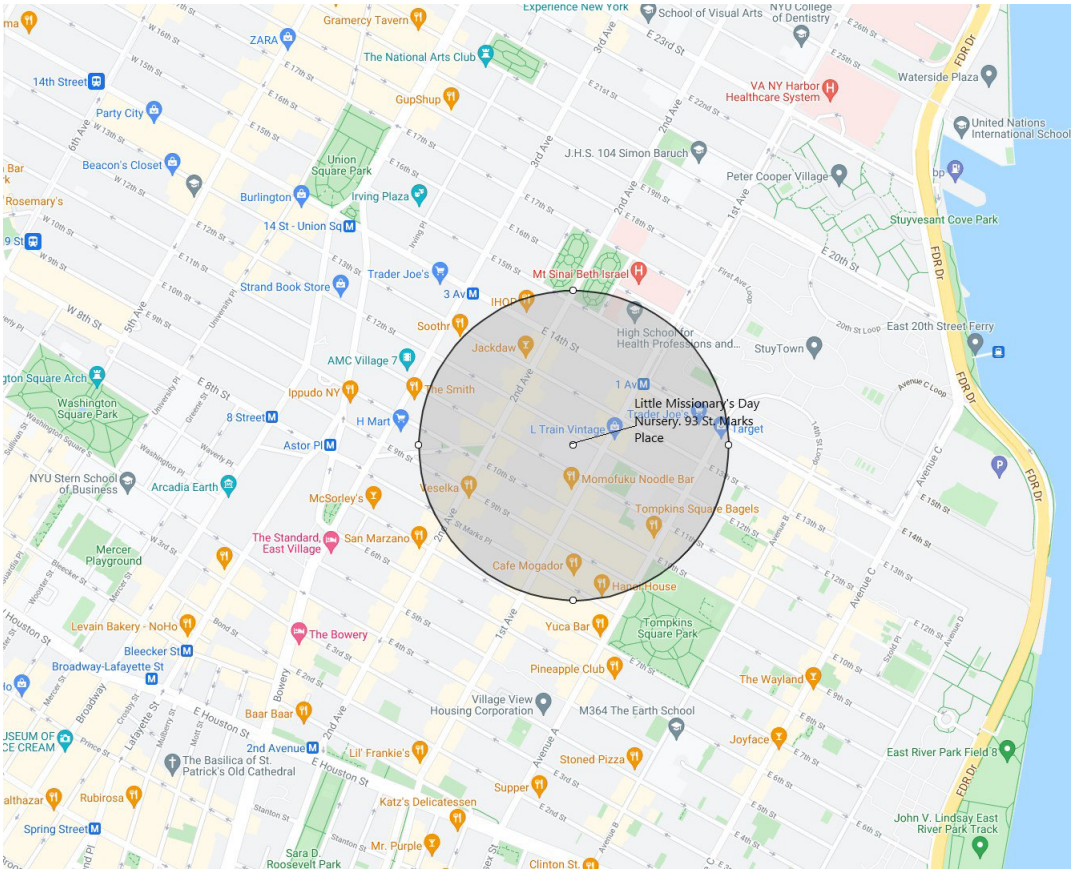
Figure A3: Locations of Day Nurseries in Brooklyn and Manhattan (1910 & 1920)



(a) **(b)**

NOTE.— This figure plots the location of day nurseries in Manhattan and Brooklyn. The boundaries of enumeration districts correspond to the 1910 and 1920 census years. The choropleth map visualizes the share of first- and second-generation migrants in the district population.

Figure A4: Location of the Little Missionary Nursery and Surrounding Area within 350 m Radius



Note.— The Greenwich Village Society for Historic Preservation gives the following background for one such nursery: *"Since 1896, the Little Missionary Day Nursery has been serving the families of the Lower East Side and the East Village, providing care and education for the young children of this area. It was founded by Sara Curry, who dedicated her life to the care of the neighborhood's impoverished children and their families. Sara Curry (c. 1863–1940) was known locally as The Little Missionary due to both her diminutive stature and her work with the impoverished families of the Lower East Side. She came to New York City from Utica New York in 1896. She started her nursery in two rooms she rented at 204 Avenue C, providing local working parents a place to bring their children where they would be fed and looked after. But her work wasn't restricted to just the nursery. She took it upon herself to go into people's homes and help residents improve their living quarters and aid those who were sick. By 1898 she had moved her nursery to 365 East 10th Street, and her work began to receive attention by the press. With that increased awareness by the public, financial assistance came by way of several wealthy philanthropists. With the aid of these philanthropists, Sara was able to incorporate the school and purchase the house at 93 St. Mark's Place as a permanent home for the school. Additionally, one of the benefactors donated his home as a summer retreat for sick mothers and their children. An article in 1908 in Harper's Weekly described the scope of the work of the school and the breadth of services. Here are a few things done during 1907: children received at the nursery, more than 28,000; poor families visited, 16,000; sick persons nursed, 10,000; families provided with Thanksgiving dinners, 624 (which amounted to 3,800 individuals); children and sick mothers received at the summer home at Netherwood, New Jersey, 2,423. There were also nightly meetings for girls, boys, mothers, and fathers. All of these services were conducted with the aim to "restore dejected families to moral and physical health and teach them self-support and self-respect" as described in that same article in Harper's Weekly. Sara retired from the school in 1940 and her adopted daughter, Anna Almasy, took over managing the school. Sara died that same year. Well over a century after its founding, the Little Missionary Day Nursery, still located at 93 St. Mark's Place, continues Sara's tradition of serving the community."* Source

Table A2: Enumeration District Characteristics: Treated vs. Untreated areas

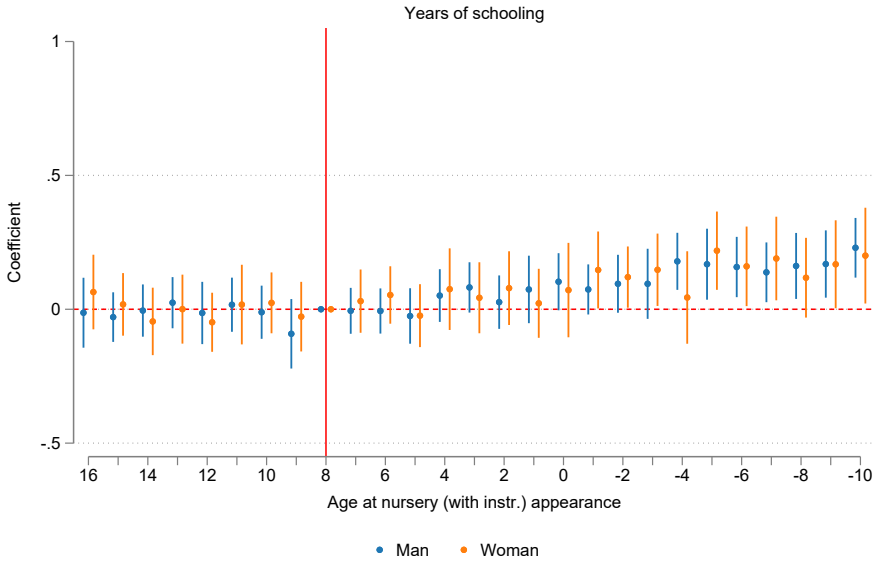
	(1) Mean control districts	(2) Mean treated districts	(3) Diff	(4) Diff (ward fe)
Share first-generation migrants	0.367	0.466	0.100***	0.077***
	(0.137)	(0.156)	(0.005)	(0.005)
Share English speakers	0.904	0.838	-0.067***	-0.045***
	(0.125)	(0.161)	(0.005)	(0.005)
Share Blacks	0.022	0.017	-0.005**	-0.001
	(0.083)	(0.057)	(0.002)	(0.002)
Ratio survived children	0.778	0.772	-0.006***	0.000
	(0.055)	(0.056)	(0.002)	(0.002)
Mean Socioeconomic Index	32.868	29.301	-3.567***	-1.548***
	(8.289)	(5.719)	(0.197)	(0.217)
Mean white-collar occupations	0.370	0.290	-0.080***	-0.035***
	(0.176)	(0.122)	(0.004)	(0.005)
Share rented apartments	0.857	0.934	0.077***	0.058***
	(0.162)	(0.096)	(0.003)	(0.004)
Share workers in poor child institutions	0.004	0.007	0.003	0.006
	(0.061)	(0.084)	(0.004)	(0.005)
Share workers in religious institutions	0.002	0.003	0.001	0.003
	(0.043)	(0.049)	(0.002)	(0.003)
Observations	6,140	1,188	7,328	7,328

Note.— Columns 1–2 show the average values of controls in treated and untreated N.Y.C. enumeration districts. Columns 3–4 show the difference between the two groups. We assign treatment to the enumeration district if it lies within 350 meters of the nearest day nursery. The values of control variables are obtained from the 1900/1910/1920 U.S. Census (individuals of all genders and races at age 25 and older residing in Manhattan and Brooklyn). *** p<0.01, ** p<0.05, * p<0.1.

Figure A5: Early 20th Century New York – Lower East End

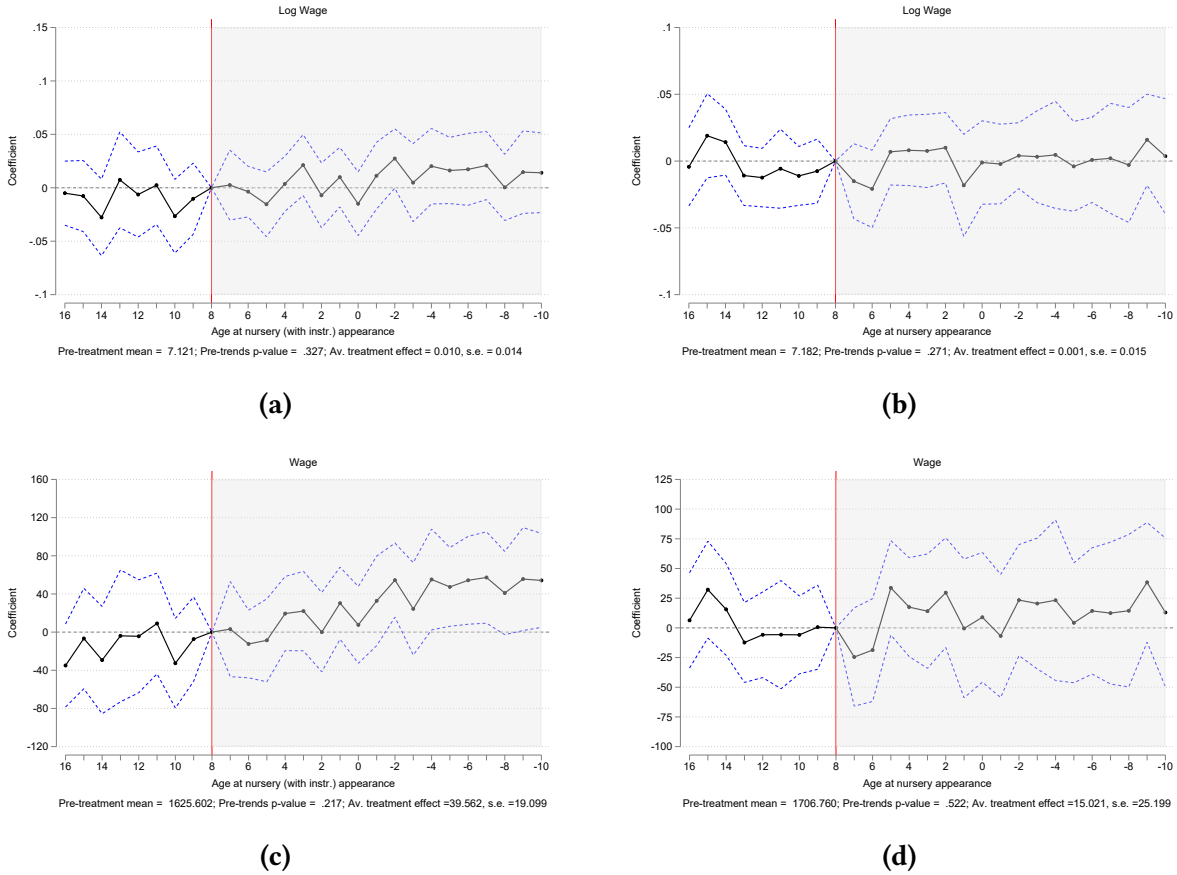
NOTE.— American realist painter George Bellows depicted the Lower East Side as it was in the early 20th century in his 1913 work *Cliff Dwellers*.

Figure A6: The Effect of Day Nurseries on Education by Gender



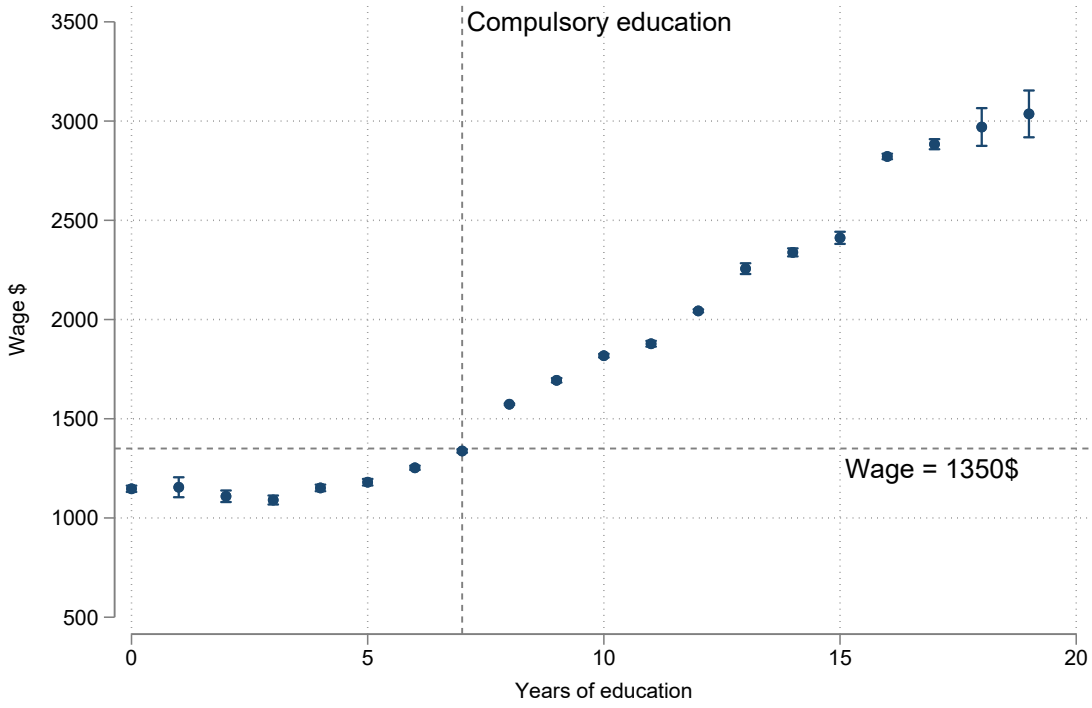
Note.— This figure shows the effect of day nurseries (with instr.) on years of schooling for two samples including either men or women.

Figure A7: The Effect of Day Nurseries on Wages: Full Sample



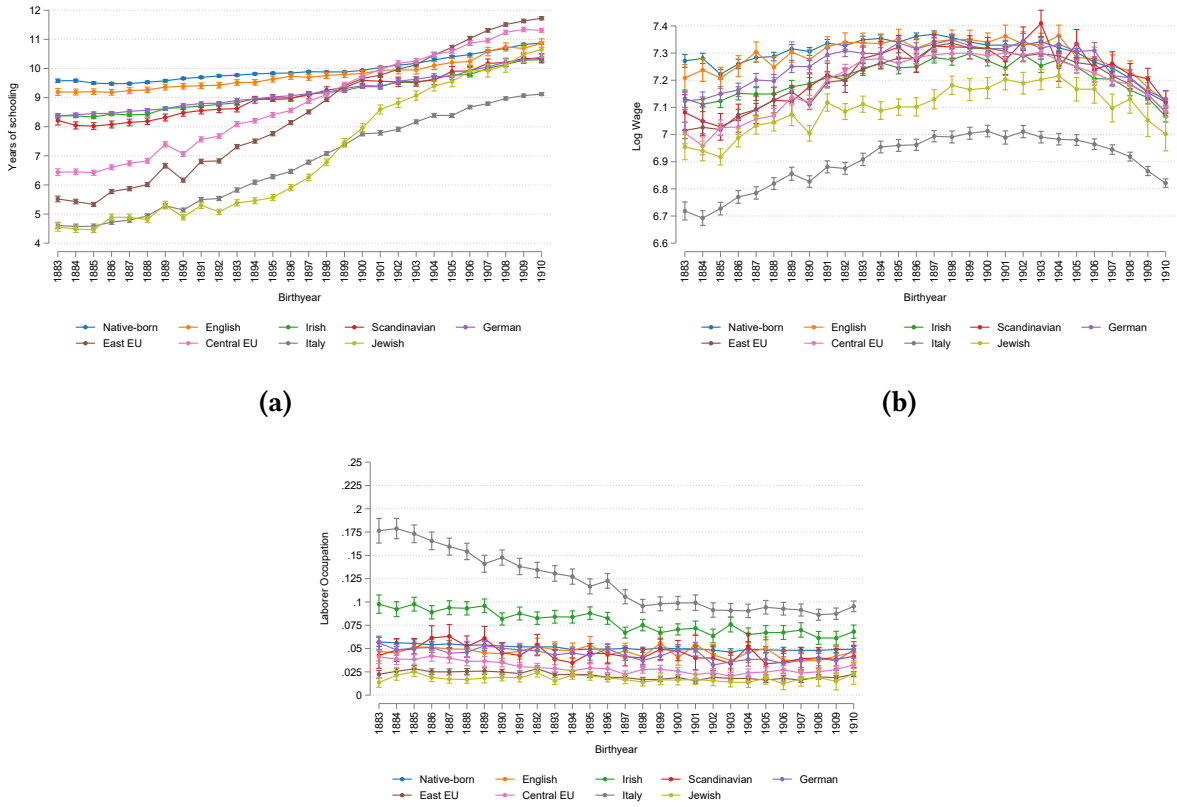
Note.— This figure plots event-study estimates for wages. We report estimates for the whole sample (workers who report positive wages) and the specifications in logarithms (top panel) and levels (bottom panel). See Figure 6 note for other details.

Figure A8: Education and Wages



NOTE.— The binned scatterplot shows average wages for various years of education. The vertical line represents the level of compulsory education in early 20th-century New York.

Figure A9: Education and Labor Market Outcomes by Cohorts and Ethnic Groups



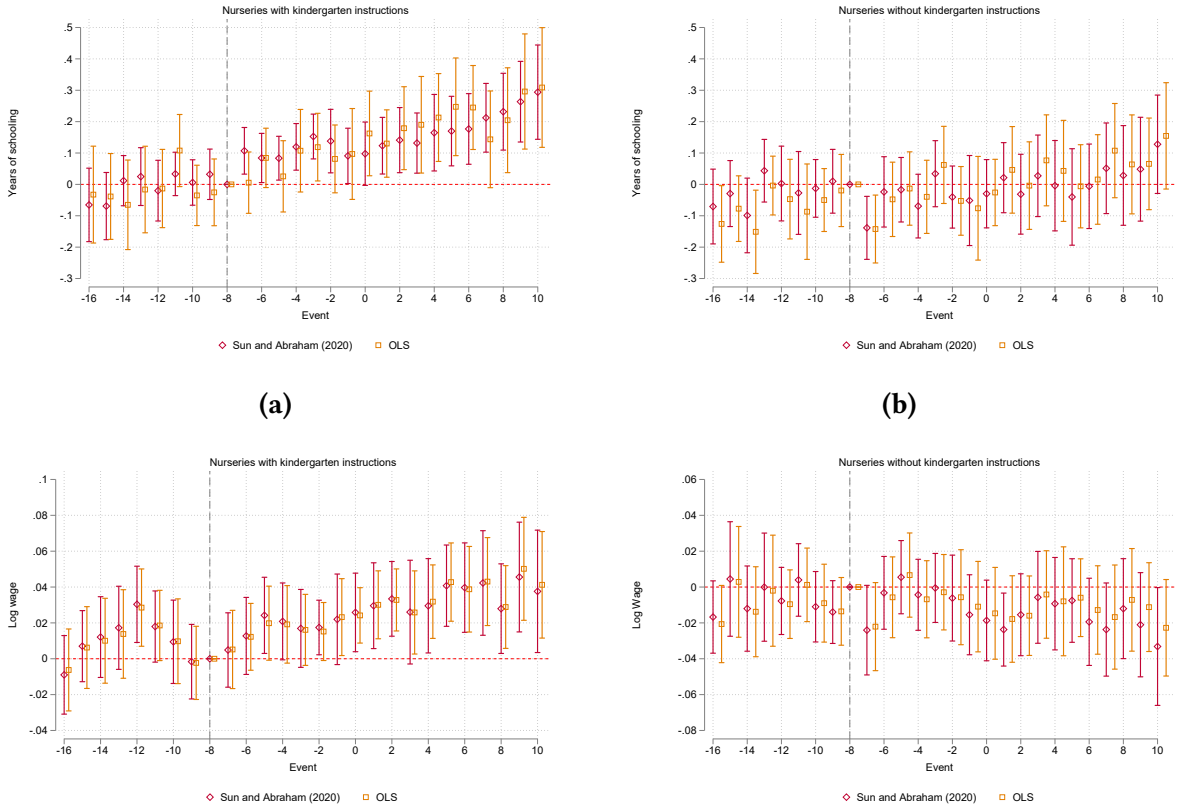
Note.— This figure plots the average years of schooling, wages, and employment share as a laborer by cohort and ethnicity. The observations are from the estimation sample (the individuals are linked from 1900/10/20 to 1940).

Table A3: Regressions with Family FE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Yrs. school	Educ > compulsory	Educ > 11th grade	Log(wage) | Wage > 1350$	Laborer	Cognitive score	SEI
	PANEL (a): Family FE Yes						
Day Nursery (instr.)	0.105*	0.016**	0.005	-0.001	-0.007**	0.017*	0.172
	(0.056)	(0.007)	(0.006)	(0.008)	(0.003)	(0.009)	(0.319)
Day Nursery	0.073**	0.010**	0.006	-0.013	0.003	-0.001	0.308
	(0.036)	(0.005)	(0.004)	(0.010)	(0.002)	(0.010)	(0.364)
Kindergarten	0.080*	0.005	0.003	0.002	0.001	0.008	0.046
	(0.042)	(0.004)	(0.005)	(0.007)	(0.003)	(0.007)	(0.236)
Observations	527,284	527,284	527,284	99,447	351,052	343,253	333,016
R-squared	0.620	0.537	0.593	0.580	0.473	0.517	0.559
	PANEL (b): Family FE No						
Day Nursery (instr.)	0.144**	0.022***	0.005	0.004	-0.004*	0.014	0.036
	(0.064)	(0.007)	(0.006)	(0.007)	(0.002)	(0.010)	(0.301)
Day Nursery	0.073	0.012**	0.006	-0.002	0.001	-0.002	0.297
	(0.045)	(0.005)	(0.004)	(0.008)	(0.002)	(0.008)	(0.214)
Kindergarten	0.074	0.011*	0.003	0.013**	-0.002	0.004	0.139
	(0.056)	(0.006)	(0.005)	(0.005)	(0.002)	(0.007)	(0.179)
Observations	527,284	527,284	527,284	99,447	351,052	343,253	333,016
R-squared	0.150	0.083	0.119	0.155	0.045	0.064	0.096

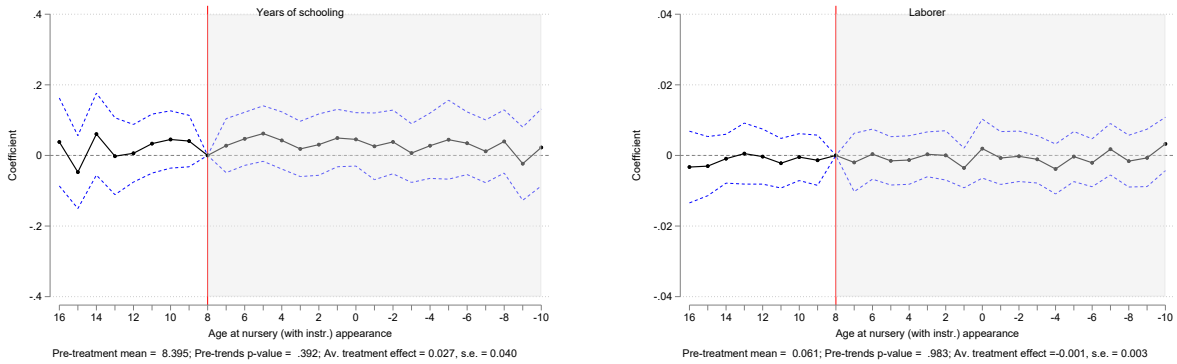
NOTE.— The regression specifications in Panel (a) include the individual's birth year and family indicators. Regression specification in Panel (b) keeps the individuals with siblings and applies the baseline regression specification (Equation 1). For wage regressions, we include a number of working weeks as an additional control Standard errors are clustered at the ward level.*** p<0.01, ** p<0.05, * p<0.1.

Figure A10: Robustness to Alternative Estimator (Sun and Abraham 2021)



Note.— This figure plots the regression coefficients on relative time indicators corresponding to the individual's age when the first day nursery (with and without kindergarten instruction) appeared within 350 meters from the district centroid. The outcomes are the years of schooling and income wage by 1940 aggregated to the enumeration district level. In wage regressions, we restrict the sample to wage earners above the 1350$ threshold. Before aggregating individual data to the enumeration district level, we regress each outcome on individual and family characteristics from equation 1 and enumeration district-by-cohort fixed effects. Accordingly, we obtain conditional mean outcomes for each enumeration district-by-cohort that we then use as dependent variables in our main regressions. Such an approach reduces the computational burden for estimating the model with relative time and cohort indicators. The event-study coefficients are derived following Sun and Abraham 2021 approach described in Section 5.2.

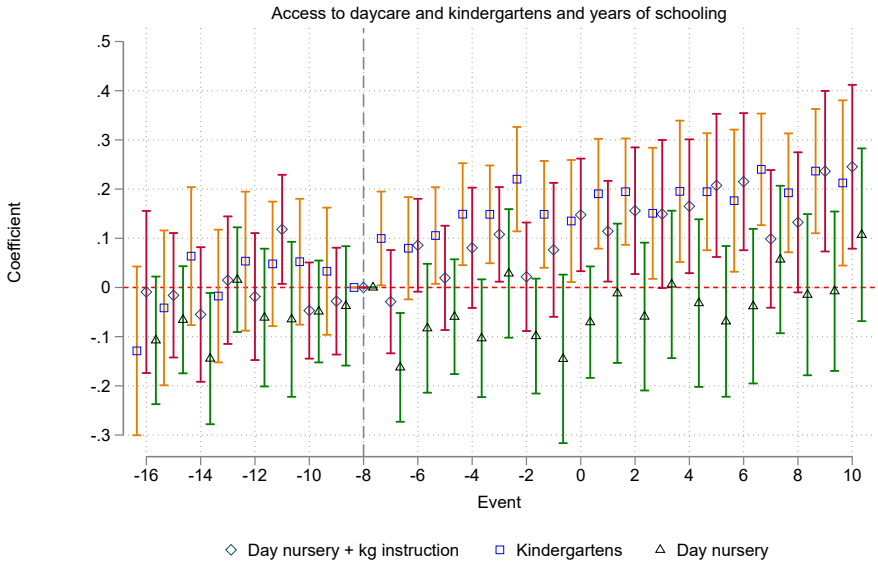
Figure A11: The Effect of Placebo Treatment on Education and Occupational Choice



(a) **(b)**

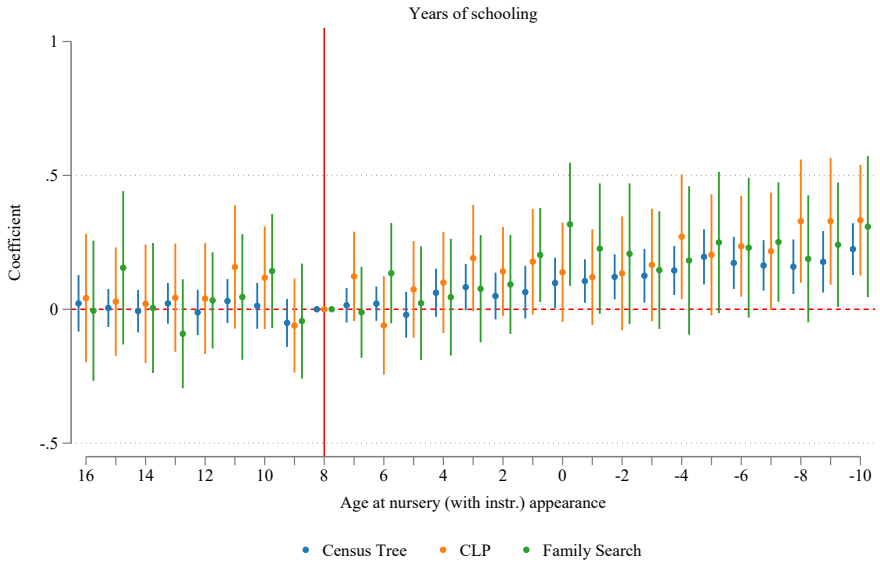
Note.— This figure plots regression coefficients on relative time indicators showing the individual's age when the first day nursery with kindergarten instruction appeared within 500–1000 meters (false treatment) from the district centroid. The specification includes fixed effects for individual and parental birthplace, birth year, enumeration district, race, and family size. Further, we control for parental literacy and the individual's number of years spent in the U.S, All fixed effects are interacted with a census year dummy. We also include ward-specific linear trends. Standard errors are clustered at the ward level.

Figure A12: The Effect of Day Nurseries and Kindergartens on Education



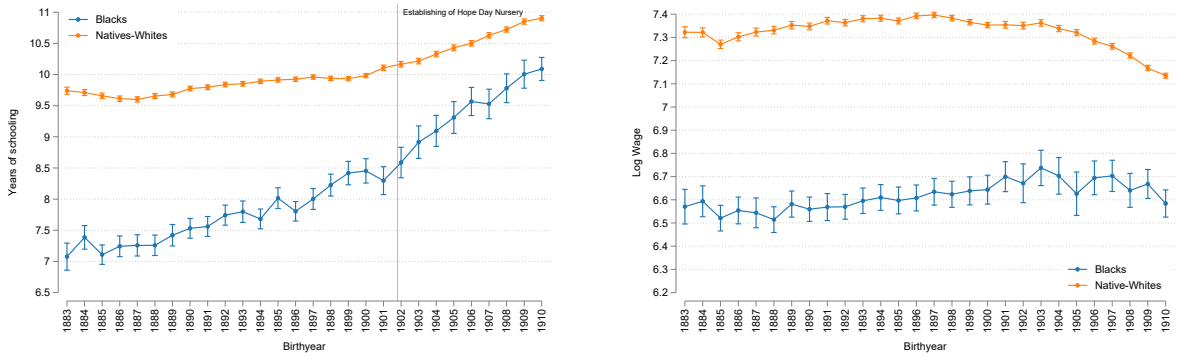
NOTE.— This figure shows the effect of charity preschool institutions (all types) on years of schooling. We run regression on aggregated outcomes obtained as described above (see note section for FigureA10).

Figure A13: Robustness to Different Linking Methods



Note.— This figure shows the effect of day nurseries (with instr.) on years of schooling for three samples based on either Census Linking Project – CLP, Census Tree crosswalk links and links identifies by FamilySearch users.

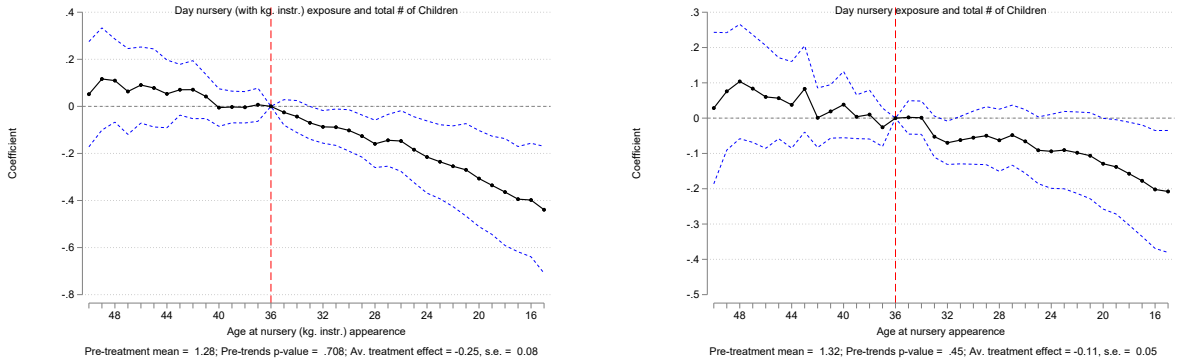
Figure A14: Average Years of Schooling and Wages by Cohorts: Native Whites vs. Blacks



(a) **(b)**

NOTE.— Figure shows the average wage income for individuals included in the estimation (cohorts born in 1883–1910). The series depicts trends for native-born whites (both the individual and his mother were born in the U.S.) and African Americans. The vertical line indicates the date of the establishment of Hope Day Nursery, the first-day nursery in our sample that assisted families of African Americans.

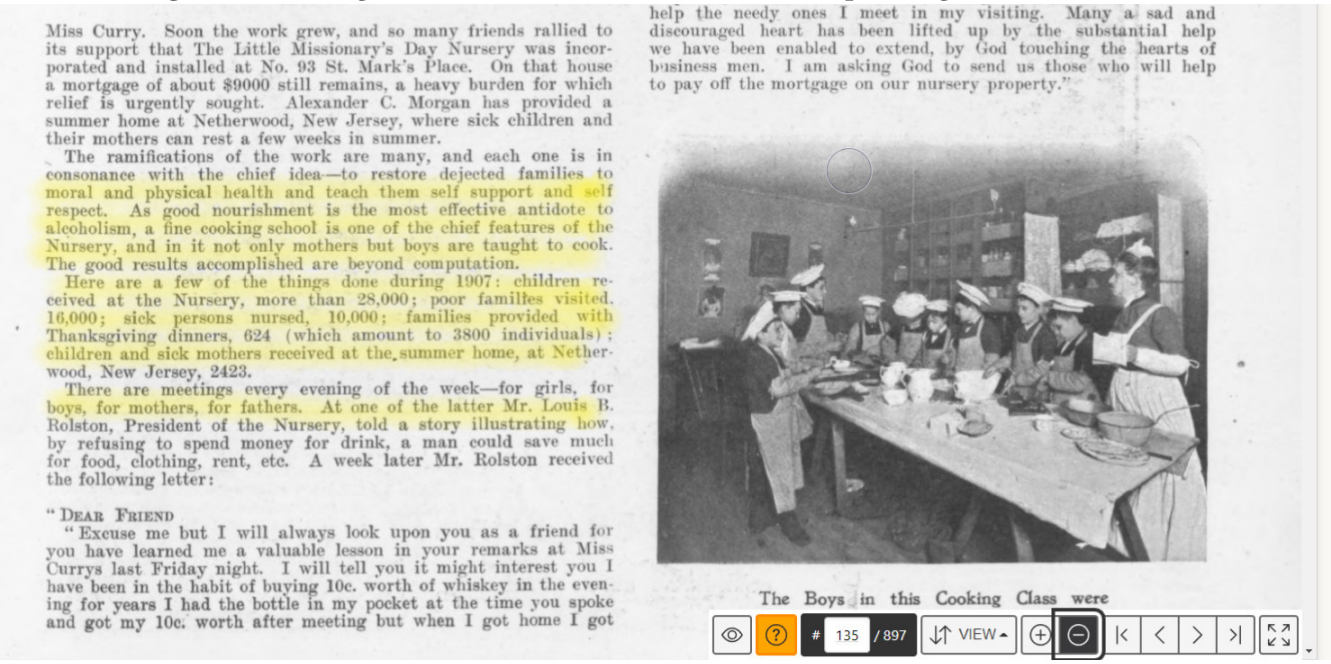
Figure A15: The Effect of Day Nurseries on Fertility (total # of children)



(a) **(b)**

Note.— This figure plots event-study coefficients of the effect of day nurseries on fertility. An outcome variable is the total number of children residing with an individual. See Figure 9 note for estimation details.

Figure A16: Fragment of the Article Published in Harper Magazine (1908)



Miss Curry. Soon the work grew, and so many friends rallied to its support that The Little Missionary's Day Nursery was incorporated and installed at No. 93 St. Mark's Place. On that house a mortgage of about $9000 still remains, a heavy burden for which relief is urgently sought. Alexander C. Morgan has provided a summer home at Netherwood, New Jersey, where sick children and their mothers can rest a few weeks in summer.

The ramifications of the work are many, and each one is in consonance with the chief idea—to restore dejected families to moral and physical health and teach them self support and self respect. As good nourishment is the most effective antidote to alcoholism, a fine cooking school is one of the chief features of the Nursery, and in it not only mothers but boys are taught to cook. The good results accomplished are beyond computation.

Here are a few of the things done during 1907: children received at the Nursery, more than 28,000; poor families visited, 16,000; sick persons nursed, 10,000; families provided with Thanksgiving dinners, 624 (which amount to 3800 individuals); children and sick mothers received at the summer home, at Netherwood, New Jersey, 2423.

There are meetings every evening of the week—for girls, for boys, for mothers, for fathers. At one of the latter Mr. Louis B. Rolston, President of the Nursery, told a story illustrating how, by refusing to spend money for drink, a man could save much for food, clothing, rent, etc. A week later Mr. Rolston received the following letter:

"DEAR FRIEND

"Excuse me but I will always look upon you as a friend for you have learned me a valuable lesson in your remarks at Miss Currys last Friday night. I will tell you it might interest you I have been in the habit of buying 10c. worth of whiskey in the evening for years I had the bottle in my pocket at the time you spoke and got my 10c. worth after meeting but when I got home I got

help the needy ones I meet in my visiting. Many a sad and discouraged heart has been lifted up by the substantial help we have been enabled to extend, by God touching the hearts of business men. I am asking God to send us those who will help to pay off the mortgage on our nursery property."

The Boys in this Cooking Class were