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Public childcare, labor market outcomes of caregivers, and child development: experimental evidence from Brazil

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Public Childcare, Labor Market Outcomes of Caregivers, and Child Development: Experimental Evidence from Brazil*

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Abstract

This study examines the impact of publicly provided daycare for children aged 0-3 on outcomes of children and their caregivers over the course of seven years after enrollment into daycare. At the end of 2007, the city of Rio de Janeiro in Brazil used a lottery to assign children to limited public daycare openings. Winning the lottery translated to a 34 percent increase in time in daycare during a child's first four years of life. This allowed caregivers more time to work, resulting in higher incomes for beneficiary households in the first year of daycare attendance and 4 years later (but not after 7 years, by which time all children were eligible for universal schooling). The rise in labor force participation is driven primarily by grandparents and by adolescent siblings residing in the same household as (and possibly caring for) the child, and not by parents, most of whom were already working. Beneficiary children saw sustained gains in height-for-age and weight-for-age, due to better nutritional intake at school and at home. Gains in beneficiary children's cognitive development were observed 4 years after enrolment but not later.

JEL Classification: I21, I28, J22, O15
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1 Introduction

Publicly provided daycare programs for young children (typically ages 0 to 3) living in disadvantaged households have two important goals. First, they offer education, socialization and enriched nutrition opportunities—which they may otherwise may have limited access to—to children during the first years of their lives. Second, they allow caregivers to participate in the labor market. Active labor force participation prevents breaks in the careers of caregivers, potentially increasing their subsequent labor market attachment and boosting household resources during the most critical years for child development.

There is, however, little evidence from low- and middle- income countries on the impact of large-scale public daycare services. Most of the empirical studies to date have focused on home-based interventions for the youngest children or preschool for older children, but not on daycare centers in the early years of life, despite the fact that these form a large and growing part of the childcare sector, especially in middle-income countries.[1]

In this paper, we experimentally study the impact of publicly provided daycare in a large metropolitan area in a middle-income country, taking advantage of the fact that the program was allocated by lottery. We examine the impacts of childcare provision one, four, and seven years after enrollment on several child development outcomes and their determinants, mapping out the trajectory of impacts for far longer than most studies. In addition, we document labor supply responses not only for parents but for all members of the household. Such a broad picture of the household is important because in low and middle income countries there are often multiple generations of the same family living together. As a result, several potential caregivers for the children reside in the household, all of whose labor supply may react to the availability of publicly provided daycare.

The large scale experimental design in this study is possible because, in late 2007, the government of Rio de Janeiro randomly assigned 24,000 applicants age 0-3 to 10,000 available slots for free public daycare centers. Children enrolling in public daycare received 9.5 hours of care on weekdays, and five meals or snacks during the day. Many of the children who did not secure a place in the childcare centers through the lottery in the first year either enrolled the subsequent year or enrolled in private daycare. Nevertheless, the lottery outcome is a strong predictor of enrollment in public daycare.

[1] In Brazil between 2000 and 2010, the proportion of children in daycare nearly doubled from 12 percent to 21 percent. In Ecuador, it increased sevenfold, to 23 percent. Chile and Uruguay also experienced large increases (Berlinski and Schady, 2015).

A random sample of about four thousand children was selected to measure the impacts of the program, and detailed surveys, including measures of child development, were administered to children and parents in 2008, 2012 and 2015.

We identify sizeable impacts of winning the lottery on household income one and four years after the lottery took place. Households in which the child is a lottery winner had between 8 and 10 percent higher income than control households. Strikingly, this result is driven by the fact that employment increased markedly for grandparents residing with the child, who were 20 percentage points more likely to be working (relative to a 50 percent employment rate among grandparents in the control group). Older siblings—aged 15 and above—were also more likely to be employed. Seven years after the lottery, the impacts of the lottery on labor force participation were smaller, which is unsurprising as the children were all of primary school age by that time. With regard to parents, employment rates in our sample are high, and essentially the same between those who did and did not win the lottery.

Therefore, access to public daycare in this context substantially affects household resources, not primarily by increasing the potential for parental employment (the focus of most studies in this literature), but by improving the employment possibilities for other household members of working age. Caregiver stress decreases in the year after the lottery, and both attitudes and interactions between the caregiver and the child improve four years after the lottery. We find some positive impacts on the home environment, such as reading to the child.

There were also important impacts of the lottery on the outcomes of children. Four years after the lottery took place, children who won the lottery were 0.16 standard deviations (SD) taller for their age (height-for-age) and 0.20 SD heavier for their age (weight-for-age) than those who did not win the lottery. Seven years later, these effects were 0.11 and 0.14, respectively. These anthropometric effects were larger for girls. Such increases in height and weight are consistent with the results of nutrition-specific interventions (Bhutta et al., 2008). They illustrate the (potentially large) nutrition benefits of full-time daycare for poor children, which are sometimes understudied in papers more focused on cognitive and socio-emotional development. Full-time daycare is not always seen or labeled as an important nutrition intervention.

We applied various tests of cognitive development and observe moderately positive (statistically significant) gains in our index of cognitive growth (of about 0.07 SD) four years after the lottery, driven principally by gains in vocabulary. Seven years after the lottery, those estimates were still positive but smaller (and no longer statistically significant). We find no impact—positive or negative-—of daycare on children's behav-

ior. Our pattern of results is robust to grouping outcomes into indices (to limit false positives from multiple hypothesis testing). Furthermore, key individual outcomes—impacts on grandparent labor market participation and on children's anthropometric outcomes, among others—are robust to the Romano-Wolf correction for multiple hypothesis testing.

Our results add to a limited collection of studies of the impact of daycare for young children (age 0-3), with three distinctive features. The first is the large scale of the program: with Rio de Janeiro's population of nearly 7 million, this city is of a similar size as several countries in Central and South America, and more than half of US states. The results we present are not from a small pilot implemented directly by researchers or by a nonprofit: they are from a program run by the local government that has now been deployed at scale. The second feature is the fact that this study follows children and families for up to 7 years after they first enrolled in daycare, an unusually long period of analysis for studies of this kind, especially in low- or middle-income countries. The third is its emphasis on outcomes for all household members, as opposed to just parents and children. This is particularly important in settings where multi-generational families reside under the same roof, as is often true in low and middle income countries. Even in the US, it is estimated that 20 percent of individuals live in such settings (Cohn et al., 2022).

In summary, the child development impacts of the program included positive medium and long run impacts on nutritional and health outcomes, together with small impacts on other dimensions of development, including cognition and socioemotional skills. These results should be interpreted in the light of the few available studies in the literature examining the provision of center-based childcare in the first three years of life in low- and middle-income countries.[2] Of these studies, some that analyzed a community-based daycare program in Colombia-–often carried out in the home of a mother-–identify positive impacts on children's anthropometric outcomes and, to an extent, on cognitive development (Attanasio et al., 2013; Bernal and Fernández, 2013). Another study finds that the transition from home-based child care to center-based care had negative impacts on children's cognitive development but positive effects on nutrition in Colombia (Bernal et al., 2019). None of these papers examined impacts on household income or labor force participation. One study finds an improvement in children's personal-social skills and a gain in mothers' labor force participation in Nicaragua (Hojman and López Bóo, 2019). In urban Kenya, offering vouchers to private daycare centers led to

[2]A previous systematic review of early child education interventions included no studies of daycare programs for children aged 0-3 (Leroy et al., 2012).

sizeable gains in mothers' labor force participation (Clark et al., 2019). In Ecuador, daycare provision increases mothers' labor force participation but has no impacts on children's cognitive development (Rosero, 2012). And in Burkina Faso, daycare led to positive impacts for both child development and women's employment outcomes (Ajayi et al., 2022).

The variability of observed impacts of different interventions in different contexts may suggest that the quality of the services provided is of key importance. Moving beyond the simple provision of daycare, a study in Peru shows that higher quality interactions between infants and toddlers and their caregivers results in better child development outcomes (Araujo et al., 2019). Analogously, an evaluation of two different interventions to improve the quality of nurseries in Colombia, one that simply increased the available resources to nurseries (possibly to hire teaching assistants) and one that complemented that with training resulted in very different impacts, with the former having no impact and the latter, only marginally more costly, having positive and sizeable impacts (Attanasio et al., 2018). While we cannot analyze the impact of the quality of the intervention in our context (both for lack of data and of exogenous variation in quality), the existing evidence makes clear that quality matters.

The evidence from high income countries on the provision of daycare is mixed, with positive long-run impacts in some cases and negative impacts in others (Black et al., 2014; Baker et al., 2019). A much larger literature examines the short and long term impact of preschool programs for older children, usually between the ages of 3 and 5 (Bailey et al., 2021; Carneiro and Ginja, 2014; Currie and Thomas, 1995; de Haan and Leuven, 2020; Deming, 2009; Garces et al., 2002; Kline and Walters, 2016; Ludwig and Miller, 2007; Havnes and Mogstad, 2011b; Gilliam and Zigler, 2000; Shager et al., 2013). Again the variability of observed impacts could reflect here difference in quality and, in some cases, in fidelity to the model that was originally developed.

An illustrative example of a negative result comes from Fort et al. (2020), who report a large negative impact of the provision of some nurseries in Italy, especially on children of relatively wealthy families. The authors argue that such impacts can be generated by the reduction of one-on-one interactions with adults that attending a nursery might imply. Given these considerations, even the small positive impacts on child development that we report (together with positive impacts on children's nutritional outcomes and parental investment), could be considered quite positive.

Our paper also contributes to the literature on the impacts of daycare availability on the labor force participation of adults in low- and middle- income countries. A recent review of more than 450 early childhood development interventions in low- and

middle-income countries found that just four percent examine maternal labor force participation, and even fewer report labor force outcomes for other members of the household (Evans et al., 2021). While the relatively few studies that examine maternal labor force participation of daycare provision sometimes find positive impacts (Cascio, 2009; Berlinski et al., 2011; Havnes and Mogstad, 2011a), our findings that impacts on grandparents and older siblings could be as or even more substantial than those for mothers has important implications when considering the returns to public investments in childcare. Finally, this work speaks to the literature on fade-out of effects from early childhood and education interventions (Bailey et al., 2017; Jenkins et al., 2018). The enduring impacts on children's anthropometrics suggest that provision of regular meals through daycare at a crucial growth stage can result in lasting improvements.

The findings reported in this paper demonstrate both the feasibility of implementation and the potential benefits of publicly provided, center-based care in a middle-income country setting. The program shows positive impacts on a range of outcomes for both children and caregivers and a lack of adverse impacts (e.g., on children's behavior) that some studies in high-income countries have found.

The rest of this article is organized as follows. Section 2 describes the context and the services provided by public creches in Rio de Janeiro, Brazil. Section 3 details the evaluation design. Section 4 shows the main impact of the program. Section 5 includes exploratory analysis on mechanisms and robustness checks. Section 6 concludes.

2 The Context and the Daycare Program

2.1 The Context

This study takes place in the city of Rio de Janeiro, the second largest city in Brazil. In the year of the intervention (2007), the city's population was around 6 million people, which corresponded to 3.5 percent of Brazil's population. Rio de Janeiro is a relatively high income city within Brazil, accounting for 5 percent of the national GDP. Rio de Janeiro had a higher GDP per capita than the national average in 2007: 11.477 USD as opposed to the 7.374 USD country average. The poorest 10 percent of individuals in the city had a per capita monthly income of 58 USD, substantially higher than the 34 USD in the rest of the country (IBGE, 2019).

In 2007, seven percent of Rio de Janeiro's population were children aged 0-4. Although the Brazilian constitution states that the government will guarantee access to daycare for children up to five years of age (Government of Brazil, 2016), in practice

there are not enough public daycare centers (or creches) to fully meet the demand. Based on School Census data, in 2007, there were 244 public daycare centers in Rio de Janeiro, servicing just 6.8 percent of the city's 0-4 population, and 352 private daycare centers servicing 7.3 percent of the children (MEC, 2007). In the following years, the number of both public and private daycare centers grew progressively up to 358 and 578 respectively in 2019 but, despite the growth, excess demand remained an issue as the existing centers still only serviced around 15 percent of the city´s 0-4 population

Faced with this excess demand, the municipal government agreed to implement a lottery to allocate children to available vacancies for the 2008 academic year.[3] This lottery took place in December of 2007.

2.2 Public Daycare in Rio de Janeiro

Rio de Janeiro's public daycare program provided full-time daycare during weekdays (from 7am to 4:30pm). It included a variety of center-based activities tailored to children in each of four age groups, from the youngest (age 0-11) to the oldest (age 36-47 months). For the youngest children (in *Bercario I* for children aged 0-11 months and *Bercario II* for children aged 12-23 months), centers operated with 5 children per adult. That ratio increased with children's age: it was 8 and 12 students per adult respectively in the groups aged 24-35 months (*Maternal I*) and 36-47 months (*Maternal II*).

In 2008, teachers were hired to work 8 hour shifts through a public-private partnership arrangement with the government. Eligible individuals were at least 16 years old and should have completed at least middle school. The government offered non-compulsory early childhood training developed by the Ministry of Education, which granted participants with a high-school level certificate of early education training.

The creche curriculum included physical play, instructional toys, art, music, story-telling, and rest time, as part of a structured curriculum developed by the municipal education team. While each center was supposed to follow the curriculum, teams had some autonomy in designing the pedagogical plan for each center. They received an annual government transfer to make investments in toys and books according to their pedagogical plan.

Children at the creches had access to five meals or snacks over the course of the day. Meals were planned according to a standardized menu developed by a nutritionist to ensure a balanced diet. The meals included breakfast, a mid-morning snack, lunch, and two afternoon snacks. Examples of creche menus are posted online (Prefeitura da

[3] In later years, the lottery was modified to give higher chances of admission to lower income students, and eventually the admissions became primarily needs based.

Cidade do Rio de Janeiro, 2019). Government health professionals – both medical and dental – also paid frequent visits to each creche to monitor the health status of the children and intervene as needed.

3 Evaluation Design

3.1 Sampling and Randomization

The allocation of available spaces in creches in Rio de Janeiro, up to 2006, was decentralized and assigned under the responsibility of each creche's management. Government guidelines for the allocation of vacancies indicated general criteria, suggesting prioritization of children (i) with special needs, (ii) with any chronic diseases, (iii) living in poor households, (iv) in households with members in conflict with the law, and (v) with parents that needed access to daycare to be able to work. However, as public creches are primarily located in low-income neighborhoods of the city, most children applying to the available spaces met at least one of the criteria, so that the final allocation decision often fell to the discretion of the creche's management.

In 2007, the municipal government decided to implement a lottery to allocate the available spaces in a more structured and transparent way for the upcoming 2008 academic year. For 2008, there were 244 public day care centers spread around mostly low-income neighborhoods of the city. But because not all creches provided services for all four age groups, and children could only enroll in a creche serving their age group, the total number of creche-age group combinations for the 2008 academic year lottery was 847, with a total of 11,640 spaces available. A total of 25,511 children applied for the available spaces.

Children considered high priority (as identified by creche management) and children with special needs, a total of 947 and 660 respectively, were automatically granted a space in a creche without the need to participate in the lottery. Therefore, a lottery was carried out to distribute the remaining 10,033 vacancies among all the other 23,904 applicants, which all met at least one of the vulnerability criteria mentioned above.

Beneficiaries were selected by lotteries specific to each creche-age group. Lotteries were carried out in those groups for which the demand for vacancies exceeded the number of vacancies (there were some age group - creche combinations for which there was no excess demand, and which are not used in our study). Those not selected through the lottery were placed in randomized order on a waiting list and could enter the creche if a space became available.

A sample of 4,350 children in 232 creche-age groups was selected for the impact evaluation among the creche-age groups that participated in the lottery. The number of children selected for the sample in each creche-age group varied between 5, 10, 15 or 20 children from both treatment and control groups, depending on the number of vacancies offered and the size of the waiting list. Creche-age groups with fewer than seven vacancies or fewer than seven children on the waiting list were not included.

In lotteries of this type, applicants are randomly assigned a rank on a waitlist, and then offered the available slots until they are all accepted. This was also the procedure followed in the setting we studied. However, our data only contains information about the first offer of slots, before any applicant had the chance to accept or reject the offer. In other words, after applicants are ranked, in a lottery with N slots, the first N children in the list are treated, and the remaining ones are control, even if some of the N children initially offered a slot end up refusing it. In addition, our sample only includes children at the top and bottom of the waitlist (those most and least likely to be offered slots), and excludes children in the middle (because there were no resources to survey all children on the waitlists). Therefore, our estimates are not affected by issues caused by imperfect compliance in randomized waitlist designs, raised in Chaisemartin and Behagel (2020).

3.2 Data

In our empirical analysis we use administrative records from the application files to the lottery, combined with three rounds of survey data. When caregivers applied for a space at a creche, they filled out a short questionnaire with basic identifying information – e.g., name, gender, date of birth – and questions related to the vulnerability criteria, including household size, the work status of the person responsible for the child, whether the person depended on daycare to be able to work, whether the child had any chronic disease, whether the child had special needs, whether any member of the family was involved in substance abuse or had ever been imprisoned, and whether the family lived in the community. The answers to this questionnaire give us basic pre-lottery information for all applicants.

The first round of survey data was collected between July and December 2008 (6-11 months after the lottery winners were exposed to childcare). This survey includes information on household welfare, including labor market outcomes, time allocation of the child's main caregiver, household income and assets, and stress of the mother. The survey also recorded whether children in the sample were enrolled in a public creche or – if not – any other daycare alternative. No developmental outcomes of children were

assessed in this first-round survey.

The two subsequent survey rounds took place in 2012 and 2015, four and seven years after lottery winners were offered slots in creches. These rounds included follow-up data on households, and in addition, they also measured child development outcomes. By 2012, less than 1 percent of our sample still attended creches, so all impacts measured using these surveys were observed after children were no longer in daycare. The survey implemented in 2012, due to financial constraints, only interviewed part of the original sample, corresponding to lottery participants from 64 creches in 6 of the 10 education districts of the city (as we explain below, this geographical targeting of creches does not introduce differential attrition between lottery winners and losers). The 2015 survey targeted the entire sample.

The socioeconomic questionnaire administered in 2012, answered by the person declaring to have primary responsibility for the child, included information on income and assets, labor market outcomes for all household members, stress of the mother, and home environment characteristics.[4] It also recorded a detailed history of daycare attendance by the child, and included enumerator observations about the interactions of the child's caregiver and the child during the interview.

To measure child development in 2012, data was collected on cognitive function, child behavior, and anthropometrics (the height and weight of the child). Cognitive function was assessed using three batteries:[5]

- The TVIP, a Portuguese-language adaptation of the Peabody Picture Vocabulary Test, which measures vocabulary development (Dunn et al., 1986; Lima, 2007).
- Three measures of executive function, which relate to working memory, mental flexibility, and self-control: (a) the Head Toes Knees Shoulder exercise (Ponitz et al., 2008), (b) the Pencil Tapping Test (Diamond and Taylor, 1996), and (c) the Stroop Test (Stroop, 1935).
- Two batteries of the Woodcock-Johnson-Muñoz tests related to visual-spatial thinking and associative memory: (a) WJ Visual Integration and (b) WJ Memory for Names (Woodcock et al., 2005).

Child behavior was measured based on the Child Behavior Questionnaire (CBQ) (Rothbart et al., 2001), administered to the mother and aimed at providing a detailed

[4]The stress of the mother was measured by a perceived stress scale validated in Brazilian Portuguese by Luft et al. (2007)

[5]All cognitive tests carried out measure factors of the Cattell-Horn-Carroll theory on the structure of human cognitive abilities (McGrew, 2005; Alfonso et al., 2005).

assessment of temperament in children 3 to 7 years old. The CBQ has five subscales: frustration, attention focusing, soothability, impulsivity, and inhibitory control.

In the 2015 round, the same household questionnaire was applied to the entire sample. The child development measures of anthropometrics and child behavior were collected using the same instruments applied in 2012, but cognitive development data in the 2015 survey is assessed using the Wechsler Intelligence Scale for Children-IV (Wechsler, 2003), which is a standard IQ measure. The short version of this scale was used, which has four main components: verbal comprehension, perceptual reasoning, working memory, and processing speed.

Balance and attrition

Rates of attrition in the survey are high, but they are lower than those in many other longitudinal surveys in low- and middle-income countries.[6] Table 1 documents rates of attrition at each stage of the study for lottery winners and losers. There are four main stages to consider: 1) registry (administrative data collected at the time of the application to the lottery), from which the original sample was drawn; 2) first survey round, in 2008; 3) second survey round, in 2012, only targeting about 60 percent of the original universe; and 4) third survey round, in 2015, targeting 100 percent of the original universe.

We regress indicators of whether an individual is in the sample at each stage on lottery indicators and strata fixed effects (where each strata is a creche by age group combination). The first row of Table 1 shows attrition from the pre-lottery administrative data records until the 2008 survey. There are 4,349 observations in the regression, corresponding to the size of the original sample. By 2008, only 85.6 percent of lottery losers were still in the sample, an attrition of almost 15 percent in a little over 6 months (the time elapsed between the collection of application data and the collection of the first survey). Such attrition occurs mainly because administrative lottery records did not always have accurate contact information. Attrition rates are 2.5 percentage points lower among lottery winners, a small difference relative to lottery losers, but nevertheless statistically different from zero.

Between June and October 2008, a sample of 3,776 households were surveyed out of the universe of 4,349 households. Of the 3,776 households successfully interviewed

[6] Molina-Millán and Macours (2021) review randomized controlled trials that were carried out in low- and middle-income countries and that were published in top economics journals between 2009 and 2019. They find a median annual attrition rates of 6.3 percent (with an average of 9.2 percent) for children. Over the course of 7 years, the length of our survey, extrapolating from the median would translate to an attrition rate of 44 percent, much higher than the attrition in our study.

in 2008, due to financial constraints, only 2,124 with valid contact information were approached for interview in 2012. These families correspond to all families residing in 6 out of the 10 education districts in the original sample. Of these 2,124 families, 1,462 were re-interviewed. Therefore, the figures in columns 2 and 3 of the table (control group means) should be interpreted in light of the fact that only 60 percent of the original sample was targeted in the 2012 survey, and this is why only 33 percent of the original sample and 37 percent of the 2008 sample was interviewed on this date, implying apparent attrition rates of 63 percent to 67 percent. Instead, the true attrition rate is between 38 percent (= 1 - 37/60) and 43 percent (= 1 - 33/60) at this stage. Columns (2) and (3) show that attrition is again slightly lower among those who won the lottery than among those who did not.[7]

In 2015, 3,115 households from the entire 2008 sample were re-approached (from all 10 original education districts), for whom contact information was still functioning (although there was also an attempt to find households from the original sample of size 4,349). We have recorded interviews with 2,050 of these households. This means that attrition from the original sample is 44 percent (column 4), and attrition from the 2008 survey is 50 percent, slightly higher among lottery losers than lottery winners. Attrition between 2012 and 2015, for the matching sample, was 25 percent, and again slightly larger among those who did not win the lottery (column 6).

Appendix Table A.1 tests whether, in terms of observable characteristics, there is differential selective attrition between those who did and did not win the lottery. We find no pattern of differential selective attrition, suggesting that attrition likely affects the sample of lottery winners and losers in a similar way.[8]

Even though attrition does not appear to be differentially selective among lottery winners and losers, we also have estimates of our main results which correct for missing data due to attrition using a multiple imputation procedure (Rubin, 2004). For the main variables (labor, income and anthropometrics), the results we obtain after implementing this correction are similar to our original results (Table A.2).

[7]The sample for the 2012 survey was was only based on the geographic location of the creche The average income for the 2015 sample was 1,347 reais, while average income for those contacted in 2012 was 1,437 reais. Since the randomization is within creche-age group the 2012 sample restriction does not hurt the internal validity of the 2012 results, although it may impact the external validity of the sample.

[8]To be specific, we regress variables measured in the pre-lottery registry (or measured in the 2008 survey but concerning variables that predate the study, and therefore are essentially pre-determined) on whether a child or a family won the lottery or not, whether they are still in the sample in the 2012 and the 2015 waves, and the interaction of these two variables. This is analogous to a difference-in-differences model, where the first difference is between being in the sample or not in the later wave, and the second is between winning the lottery or not, thereby capturing differences in selective attrition between treatment and control arms.

Finally, Table 2 shows that child and household characteristics are balanced across treatment arms. These characteristics are measured either in the pre-lottery registry (including a measure of household income per capita), or they are pre-determined characteristics from the 2008 survey. Only two out of 19 variables display significant differences between treatment and control groups with 95 percent confidence, and those two are closely related (whether the caregiver can read and write, and whether the caregiver has at least a basic education). Furthermore, the coefficients on the differences are small. Across all coefficients, we cannot reject the null hypothesis that all coefficients are equal to zero: the p-value of the joint test is equal to 0.128.

3.3 Empirical strategy

We compare children and households who gained access to a slot in a childcare center through the lottery, to those who were placed on waiting lists. Because of the randomized nature of the lottery, lottery winners and lottery losers will be similar on average on both observed and unobserved characteristics, so that any differences in their subsequent outcomes can be attributable to daycare access.

In practice, winning the lottery guaranteed a space in a creche, but individuals did not always take up the offer. Similarly, losing the lottery did not prevent children from reapplying to the lottery in the following year. Therefore, winning the lottery increases the probability of daycare attendance but is not a perfect predictor of enrollment.

We start with intention to treat (ITT) estimates, which reflect the impacts of being offered a slot in a creche (winning the lottery) on our outcomes of interest. The ITT estimates are based on the following regression:

$$y_{igc} = \alpha + \beta_{\text{ITT}} L_{igc} + \Gamma \mathbf{X}_{igc} + \delta_{gc} + \epsilon_{igc} \tag{1}$$

In this equation, y_{igc} is an outcome of interest for individual i, who participated in the lottery for age group g in day care center c, L_{igc} is an indicator variable that takes value 1 if individual i is a lottery winner and 0 otherwise, $\mathbf{X}_{igc}$ are controls for the race and gender of the child, δ_{gc} is a set of strata fixed effects (for each age group-day care center pair, within which each lottery took place), and ϵ_{igc} is an error term. β_{ITT} is the ITT coefficient, which measures the impact of winning the lottery on the outcome of interest.

Since children not offered a slot in creches in 2008 were eligible to enter the lottery in subsequent years, many of the children who initially lost the lottery eventually did enroll in public creches. Some children also enrolled in alternative daycare arrangements, such

as private daycare centers or community-based daycare centers. This means that the main difference between lottery winners and losers is in the amount of daycare taken-up by each group, not whether any daycare was taken up or not.

Therefore, to go beyond the intent-to-treat estimates and measure the actual effect of attending creches on our main outcomes of interest, in results presented in the Appendix and briefly discussed in the main text, we use an instrumental variables (IV) strategy, where the lottery status serves as an instrument for creche attendance. Our measure of creche attendance is a variable that reflects years of daycare attendance, ranging from zero to four, so we estimate the impact of an additional year in childcare (when the child was 0 to 3) on child and household outcomes. This measure is constructed using self-reported data collected during the various survey waves.[9]

IV estimates are based on the following equation:

$$y_{igc} = \alpha + \beta_{\texttt{IV}} T_{igc} + \Gamma \mathbf{X}_{igc} + \delta_{gc} + \epsilon_{igc} \tag{2}$$

Here y_{igc} is an outcome of interest for individual i, L_{igc} remains an indicator variable for lottery status and in this case serves as the instrumental variable for predicting years in *creche* T_{igc}, $\mathbf{X}_{igc}$ is a set of baseline individual level controls, δ_{gc} is a set of fixed effects for each age group-daycare center pair, and ϵ_{igc} is an error term. $\beta_{\texttt{IV}}$ is the IV estimate of the effect on household and child outcomes of attending daycare for an additional year.

Because we study a wide array of outcomes, for our main results we construct summary indices of outcomes (to avoid the possibility of false positives driving our results), using the procedure proposed in Anderson (2008). We consider two household level indices, one measuring labor market outcomes (employment and earnings of different household members) and the other measuring income and assets (including income, assets, food expenditures, access to a bank account, and access to credit). We then construct two indices for children's outcomes: one for anthropometrics and one for cognitive measures. Finally, we include a fifth index measuring the quality of the home learning environment (e.g., parental stress, number of books in the home, frequency with which a child is read to). All indices are standardized to have mean zero and standard deviation one in the sample. They have a different composition in each wave, since the available variables differ across waves. In our appendix, we also include p-values corrected using

[9]The surveys collected detailed data on the history of daycare attendance, including which center–if any–the child attended in each semester. The variable *years in creche* takes the value 0 if a child never attended daycare, 1 if a child attended 1 or 2 semesters, 2 if a child attended 3 or 4 semesters, 3 if a child attended 5 or 6 semesters, and 4 if child attended more than 6 semesters, between the ages of 0 and 3.

the Romano-Wolf multiple hypothesis correction (Clarke et al., 2020) and estimates for major outcomes using a strictly balanced panel.

In the next section, we present both ITT and IV estimates for summary indices of various classes of outcomes—household outcomes (labor market participation, income, and the home environment), and child development outcomes (anthropometrics, cognitive function, and child behavior)—and then we provide more detailed ITT estimates, with more IV estimates in the appendix.

4 Main Results

We begin by showing that winning the lottery has a strong impact on participation in daycare. In Table 3 we examine differences in years in daycare between those who did and did not win the lottery.[10] In the first column we present estimates from a regression of the number of years in daycare on an indicator for winning the lottery, age and gender, and strata fixed effects. In the remaining columns we run a similar regression with a different dependent variable: indicators for having attended at least 1, 2, 3, and 4 years of daycare (in columns 2-5, respectively).

Looking at the first column we see that, on average, children who do not win the lottery (control group mean) attend daycare for 1.9 years (out of a maximum possible 4 years), while those who win the lottery attend day care for an additional 0.64 years during their first four years of life (a 30 percent increase). The remaining columns of the table document that the likelihood of spending at least one, two, three or even four years in daycare are all higher for lottery winners than for lottery losers: lottery winners were roughly twenty percentage points more likely to have spent at least one or two years in daycare, and they were seven percentage points more likely to have spent at least four years in daycare (see also Figure A.1 in the Appendix). All these differences are statistically different from zero.

Having established that winning the lottery is a very strong predictor of attending daycare, we now turn to estimating impacts of winning the lottery on outcomes. Table 4 shows ITT estimates from equation 1, using as outcomes each of our five indices (one in each column). The table has three sets of rows, for outcomes measured in 2008 (for which there are no measures of anthropometrics or cognitive development of children), 2012 and 2015. There are large positive impacts on all three (household) indices in 2008. The 2008 survey was conducted six months after lottery results were known, and

[10] To construct time in daycare for each child we blend reports of education histories from the 2012 and 2015 surveys.

lottery winners had the opportunity to enrol their children in free full-day care for about half a year. These results indicate that access to full-time care enabled caregivers to participate more intensely in the labor market and to generate additional resources for the household.

Impacts on labor market outcomes remain positive in 2012 and 2015, after children have left day care, suggesting that lottery winners were able to benefit from sustained gains in labor market attachment driven by their additional early experience in the labor market. We also see important impacts of winning the lottery on income and assets in 2012, although they fall by 2015. There are no detectable impacts on the home environment by 2015.

There is a fade-out in labor market impacts over time, which is natural. As children enter elementary school age, child care ceases to be a preoccupation for carers during the day, since there is universal access to full day public school. Therefore, carers in families who won the lottery no longer have more time available to work than carers in families who did not win.

Children's outcomes were not collected in 2008, so they are only observed in 2012 and 2015. There are large and sustained impacts of winning the lottery on anthropometrics in both years. Children who win the lottery benefit from better nutrition than those who do not win the lottery, either because they have better access to nutritious meals in daycare centres, or because the increase in household resources enables parents to buy better food. There are also impacts on children's cognitive development in 2012, although these are smaller and no longer statistically significant by 2015.[11]

As discussed above, the magnitude of the ITT estimates is hard to interpret, given that both lottery winners and losers took up some daycare. Therefore, our main IV estimates are shown in table 5, and correspond to the impact of an additional year in daycare on the indices reported in table 4.

We find that each additional year in daycare leads to a 0.12 to 0.15 SD increase in the labor market index, an impact that we observe even in 2015, several years after children have left daycare. These lead to a 0.16 SD increase in the income and assets index in 2008 and 2012, although by 2015 the impact is smaller at 0.05 SD. There is also a small impact on the home environment index that disappears over time.

Regarding the anthropometrics index, which combines height and weight, one additional year in daycare leads to an increase of 0.23 SD in 2012. Extrapolating, this suggests that the difference between full attendance (four years) and no attendance

[11] Previous studies have observed fade-out in cognitive effect but still observed important impacts on later life outcomes (Chetty et al., 2011; Currie and Almond, 2011).

(zero years) of daycare can be close to 1 SD deviation in height and weight, even when children are no longer in daycare. This impact decreases over time, but remains large and statistically different from zero in 2015. Impacts on the cognitive index are much smaller and fade-out more quickly.

Having established that access to daycare impacts the five broad classes of outcomes we consider, we now present an analysis of the components of the indices just described.

4.1 Household outcomes

Labor force participation and income

We start by examining the components of the household level indices. Table 6 reports estimated impacts for employment and income, separately for different groups of household members (aged 15 or above at the time of the survey): parents, grandparents, siblings, and others. Four labor market oucomes are considered: monthly income, employment, weeks worked, and whether the individual contributes to social security (all these variables take value zero if the individual did not work). The labor market index discussed above aggregates across different labor market outcomes (each line in the table), and all household members aged 15 or above (each set of columns in the table).

The 2008 survey only asked this information of the main caregiver of the child, while in the 2012 and 2015 surveys we have available information for each household member, one of whom is then identified as the main caregiver. Therefore, in this table we focus only on impacts in 2012 and 2015.[12]

What is striking about this table is that, looking at different household members, the largest impacts of winning the daycare lottery are on the employment and income (measured in USD) of grandparents and siblings over the age of 15 (Table 6). Note that the majority of cohabiting grandparents in our sample are still of working age. In the 2012 survey, 10 percent of them were 46 or younger. The 25th, 50th and 75th percentiles of their age distribution were 49, 55 and 61 respectively.

The lack of an average impact on the labor market outcomes of parents is probably due to the fact that roughly 70 percent of them were already working and earning even if they were in the group of families who did not win the lottery (surprisingly, these rates are similar for mothers and fathers, as shown in Appendix Table A.4). Therefore,

[12]Impacts in 2008 are documented in Appendix Table A.3. They show that winning the lottery leads to an increase in the employment of the main caregiver (a parent in about 80 percent of cases, as observed in Figure A.2) at the intensive (currently employed) and extensive (weekly hours) margins, as well as on household income. This is also consistent with the 2008 estimates reported in Tables 4 and 5.

publicly provided daycare opened the door to labor force participation for primarily grandmothers and other potential caregivers (for whom employment rates were much lower). Note that treatment does not affect the probability of grandmothers living in the household (which is substantial), as displayed in Appendix Table A.5, so our results are not driven by changes in the composition of households. By 2015, the effects are still positive, but smaller and no longer statistically significant.

The income and employment effects on grandparents and siblings are accompanied by higher social security contributions (a variable only available in 2012 and 2015), which are an indication that these gains are in formal sector employment. The reported impacts for grandparents, but not those for siblings, remain statistically significant even after accounting for the fact that we are testing multiple hypotheses simultaneously, as reported in Table A.6 in the Appendix.[13]

The effects on labor market participation of individuals translate to gains in household resources, as documented in the second column of Tables 4 and 5. This can also be seen in Table 7 where we disaggregate the index in its different components, although only two of the coefficients in this table are statistically different from zero after accounting for multiple hypothesis testing, as shown in Table A.6 in the Appendix (the number of observations varies slightly across variables because of small differences in non-responses). Across survey years, lottery winners had 5 to 10 percent higher total household incomes than lottery losing households. However, these impacts are only statistically different from zero in 2008 and 2012. We observe similarly significant impacts if we restrict our analysis to a balanced panel (Table A.7).

This increase in income, a consequence of stronger labor market attachment by household members, likely led to increases in consumption and assets. In fact, in 2012, monthly food expenditure (measured in USD) is about 5 percent higher in households who won the lottery, although this is no longer true in 2015 (consistent with the decline in the treatment effect on income). In 2012 there is also an impact of winning the lottery of 0.13 SD on a standardized asset index, which fades out by 2015.

Access to a bank account, measured only in 2012 and 2015, shows a substantial increase of 7 percentage points in 2012, reduced to almost 0 in 2015. We do not observe impacts on access to credit in either year. Instrumental variables estimates show large impacts of enrolment in day care on household income and assets, with similar patterns of fade-out (see Table A.8 in the Appendix).

[13]Sample sizes differ, even within the same survey wave, when we consider the outcomes of different household members. This is because not all households have the same composition, and there are multiple households where grandparents or older siblings are not present. There is however no correlation between winning the lottery and household composition.

Home environment

We also investigate how access to childcare affects other, non-financial aspects of the home environment. Table 8 documents a short-run negative impact of winning the lottery (in 2008) on the total time the caregiver spends with the child, which is to be expected as childcare is replacing some of the caregiver's time. By 2012 and 2015, that negative effect has dissipated. Across a range of other home environment outcomes – whether the caregiver reads or sings to the child, the number of children's books at home, attitudes towards the child, and stress of the caregiver, we observe mixed results, and none of the coefficients is statistically significant after accounting for multiple hypothesis testing. In 2008 there is a strong and statistically significant impact of winning the lottery on the stress reported by caregivers. This impact is no longer seen in subsequent years, but again this is not entirely surprising because by 2012 (as opposed to 2008) almost no children in the sample remain enrolled in daycare. This same pattern of effects is born out in the IV estimates (Table A.9). Finally, the aggregate home environment improvements shown in Table 4 are concentrated among the boys in our sample (Table A.10).

4.2 Child development outcomes

We now turn to impacts on children. In both 2012 and 2015, we observe large, statistically significant gains in both height-for-age and weight-for-age (Table 9), suggesting a lasting impact of the program on these outcomes. Even by 2015, long after children have left daycare, our IV estimates (in Appendix Table A.11) show that one additional year in full-time daycare leads to gains in height and weight for age of 0.17 SD and 0.21 SD respectively (the program did not result in increases in overweight or obese children).[14] All these impacts remain statistically significant after adjusting the critical values for multiple hypothesis testing (Table A.6) or restricting the sample to a balanced panel (Table A.12). Impacts on anthropometric outcomes appear to be largely driven by girls (Table A.10), although these impacts are not statistically different by gender.

Access to public daycare improved the nutritional intake of these mostly poor children, which may have happened through two channels. The most direct channel is through the provision of nutritious meals in daycare centres, an important feature of the service they provide, as discussed above. There is also an indirect channel operating through an increase in household resources, which led to an increase in food expenditure

[14] Control group means suggest that Brazilian children overall tend to be tall, which is consistent with evidence shown in other studies (Silva et al., 2010).

(documented above), presumably driven by the consumption of more and higher quality food by households who got access to free daycare.

In 2012, we also observe gains in children's cognitive development which are particularly large for a test of receptive vocabulary (the TVIP), and smaller and not statistically different from zero for any of the other measures (Table 10). In 2015, we see statistically significant gains in perceptual reasoning but not in any other outcomes, nor on an aggregate measure of IQ, with similar patterns of significance in our IV estimates (Table A.13). However, none of these coefficients remains statistically different from zero after accounting for multiple hypothesis testing, nor after restricting the sample to a balanced panel (Table A.14).

Impacts on reported child behavior are mostly small and statistically insignificant, as seen in Table 11. This null result on child behavior should be seen in light of a literature arguing that child care can lead to worse behavioral outcomes in children. For example, research from Canada shows that widespread provision of public daycare led to worse child behavioral outcomes in the short run, and that those adverse behavioral outcomes persisted into young adulthood (Baker et al., 2008, 2019). The Rio de Janeiro creche program boosted physical outcomes substantially with no apparent adverse behavioral outcomes.

5 Conclusion

We evaluate the impact of publicly provided childcare for low-income households on child development and employment and earnings of household members, using data from a large urban area in a middle-income country. We find positive impacts of access to daycare on the labor force participation of adults and on household income. These impacts are especially large for grandparents and adolescent siblings, an important finding of our paper. Other studies in this field rarely report any results on employment impacts for individuals other than parents, so early child development evaluations may fail to capture the full range of benefits of formal daycare programs (Evans et al., 2021). We also observe a decline in parenting stress and an improvement in the home environment and attitudes towards the child. Finally, we see some evidence of small impacts on cognitive and socioemotional outcomes for children and positive impacts on nutritional status, as measured by height and weight.

Another distinctive aspect of our paper is that we present results through seven years after initial enrollment. The vast majority of education-related interventions measure outcomes within one year of conclusion of the treatment (McEwan, 2015). Thus, we are

able to map the trajectory of treatment effects. For example, there are initially large but dwindling effects on employment and income over time, as comparator households catch up. This is expected since all children eventually grow too old for daycare, and are able to access full time schooling, which means that time in child care activities becomes less of a constraint for all households. Impacts on child cognition also decline over time. However, we observe enduring impacts of access to daycare on children's anthropometric outcomes, likely linked to the high quality of nutrition these children have access to in daycare centres. We observe no adverse impacts on daycare provision on children or parents. An even later follow-up demonstrates positive impacts on children's subsequent primary school attendance (Carneiro et al., 2021). These results are particularly notable because they come from an intervention that has been deployed at scale via public institutions in a large city.

Our results suggest that daycare provision has impacts that extend far beyond children and even their parents, affecting grandparents and adolescent siblings as well. Publicly provided daycare can improve certain outcomes for children while enabling other members of the household to engage in the labor force and boost household income. As such, daycare is one policy tool for boosting labor market activity for women across generations.

These results do not imply that the intervention considered is perfect: the impacts on some dimensions of child development (such as cognition and socio-emotional skills) are small and fade over time. However, given that moving from home to child care center implies a reduction in one-on-one contact with adults for many children, with the possibility of adverse impacts (Fort et al., 2020), even the limited evidence of a positive impact is a good sign. That being said, the fact that child care interventions that have been evaluated in a variety of contexts give rise to very different outcomes suggests service quality matters beyond mere access to services. Because this program has already been deployed at scale, it can be used as the basis for subsequent interventions to improve its quality.

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Tables

Table 1: Difference in the proportion of non-attriters between lottery winners and lottery losers

	2008 vs registry	2015 vs registry	2015 vs 2012
	(1)	(2)	(3)
Lottery winner	0.025***	0.032**	0.023
	(0.009)	(0.015)	(0.023)
Control group mean	.856	.456	.750
N	4,349	4,349	1,486

Notes: This table shows attrition results for the different waves of our surveys. Each column reports results from a regression of an indicator of whether a given lottery participant had data for a given year (relative to registry or previous wave of survey) on an indicator of winning the lottery and strata fixed effects. Robust standard errors are in parentheses. The survey implemented in 2012, due to financial constraints, only interviewed a subsample of 64 *creches*, corresponding to approximately 40 percent of the sample. Therefore, column (3) refers to the matching sample between 2015 and 2012. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table 2: Balance across covariates for lottery winners and lottery losers

	Lottery loser	Lottery winner	Regression adjusted difference	N
	(1)	(2)	(3)	(4)
Male child	0.507	0.533	0.026	3,897
	(0.500)	(0.499)	(0.017)	
White child	0.324	0.346	0.023	3,887
	(0.468)	(0.476)	(0.015)	
Black child	0.122	0.105	-0.017	3,887
	(0.327)	(0.307)	(0.010)	
Mixed race child	0.524	0.523	-0.002	3,887
	(0.500)	(0.500)	(0.016)	
Other race child	0.030	0.026	-0.005	3,887
	(0.170)	(0.158)	(0.005)	
Birthweight in quilos	3.189	3.206	0.024	3,742
	(0.615)	(0.612)	(0.020)	
Birth height in centimetres	49.26	49.29	0.038	3,722
	(4.056)	(4.233)	(0.136)	
Planned Birth	0.329	0.346	0.017	3,770
	(0.470)	(0.476)	(0.015)	
First Born	0.442	0.426	-0.014	3,764
	(0.497)	(0.495)	(0.016)	
Age of the Mother at Birth	20.28	20.37	0.089	3,767
	(4.890)	(4.968)	(0.157)	
Prenatal Care	0.948	0.944	-0.003	3,765
	(0.223)	(0.230)	(0.007)	
Natural Birth Delivery	0.691	0.662	-0.028*	3,768
	(0.462)	(0.473)	(0.015)	
Premature Birth	0.121	0.131	0.008	3,762
	(0.327)	(0.337)	(0.011)	
Breastfed up to 6 Months	0.772	0.751	-0.022	3,770
	(0.420)	(0.433)	(0.014)	
HH per capita income	586.200	634.500	56.010	4,103
	(1818.900)	(2841.300)	(70.490)	
HH size	4.547	4.638	0.107	4,137
	(3.463)	(4.553)	(0.124)	
Age of caregiver	29.250	29.150	-0.142	3,776
	(9.768)	(9.157)	(0.304)	
Caregiver can read and write	0.965	0.982	0.017***	3,768
	(0.184)	(0.134)	(0.005)	
Caregiver has at least basic education	0.676	0.707	0.034**	3,404
	(0.468)	(0.455)	(0.015)	
	(0.114)	(0.122)	(0.004)	
p-value joint		.128		

Notes: This table considers covariate balance for the evaluation sample. Columns 1 and 2 show mean values for lottery losers and lottery winners; column 3 displays the results of a regression of each covariate on a dummy variable indicating whether the individual was a lottery winner and strata fixed effects; column 4 reports the number of observations. Robust standard errors are in parentheses. Data come from registry and 2008 survey. P-value for the F-test of overall significance is reported at the bottom of the table. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table 3: Impact of lottery on daycare attendance

		Probability (Years in Daycare $\geq i$)			
	Years in Daycare	i=1	i=2	i=3	i=4
	(1)	(2)	(3)	(4)	(5)
Lottery Winner	0.637***	0.190***	0.207***	0.168***	0.072***
	(0.048)	(0.012)	(0.017)	(0.019)	(0.014)
Control group mean	1.895	0.784	0.608	0.379	0.124
N	2,410	2,410	2,410	2,410	2,410

Notes: This table displays the impact of winning the lottery on average years attending daycare (Column 1), and on the probability of (years attending daycare greater than i) (Columns 2 - 5). Column 1 shows ITT estimates from a regression that includes strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. Columns 2-5 present estimates of simultaneous regressions of dummies for attending daycare for 1+, 2+, 3+ and 4+ years on lottery status, controls for race and gender of the child, and strata dummies. Standard errors are in parentheses. Daycare attendance is based on self-reported survey data collected in 2012 and complemented with data from 2015 for the remainder of the sample not surveyed in 2012. The p-value is zero for the F test of null hypothesis that the differences between all simultaneous regressions coefficients are equal to zero. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table 4: Average intent-to-treat effects by groups of outcomes

	Labor market	Income and assets	Child anthropometrics	Child cognitive	Home environment
	(1)	(2)	(3)	(4)	(5)
2008 average effects	0.090***	0.086***			0.079***
	(0.032)	(0.025)			(0.031)
N	3754	3762			3762
2012 average effects	0.068*	0.101***	0.138***	0.071*	0.013**
	(0.035)	(0.035)	(0.048)	(0.037)	(0.006)
N	3468	1486	1438	1486	1486
2015 average effects	0.048*	0.033	0.093**	0.025	-0.007
	(0.029)	(0.026)	(0.041)	(0.032)	(0.017)
N	5075	2049	1946	1999	2050

Notes: This table considers, for 2008, 2012 and 2015, the impact of winning the lottery on an index of variables related to labor outcomes, income outcomes, child anthropometrics, child cognitive outcomes and home environment, respectively. The index was constructed following Anderson (2008). All estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table 5: Average instrumental variables effects by groups of outcomes

	Labor market	Income and assets	Child anthropometrics	Child cognitive	Home environment
	(1)	(2)	(3)	(4)	(5)
2008 average effects	0.149**	0.166***			0.120*
	(0.066)	(0.053)			(0.067)
N	2283	2287			2287
2012 average effects	0.108*	0.168***	0.228***	0.120*	0.021**
	(0.056)	(0.059)	(0.082)	(0.063)	(0.011)
N	3468	1486	1438	1486	1486
2015 average effects	0.075	0.050	0.146**	0.039	-0.11
	0.048	(0.040)	(0.065)	(0.051)	(0.026)
N	4576	2049	1946	1999	2050

Notes: This table considers, for 2008, 2012 and 2015, the impact of winning the lottery on an index of variables related to labor outcomes, income outcomes, child anthropometrics, child cognitive outcomes and home environment respectively. The index was constructed following Anderson (2008). All estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table 6: Intent-to-treat estimates of effects on labor market outcomes for all household members

	Parent		Grandparent		Sibling		None	
	2012	2015	2012	2015	2012	2015	2012	2015
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Monthly Income	52.928*	45.571	245.069***	65.970	117.359**	42.661	24.555	47.600
	(30.434)	(32.089)	(83.177)	(79.894)	(59.524)	(41.229)	(62.115)	(59.958)
Control group mean	712.128	768.848	441.024	376.281	230.707	169.688	355.985	232.959
N	2,212	2,985	438	478	244	577	574	556
Currently Employed	0.007	0.019	0.208***	0.076	0.162*	0.102*	(0.055)	0.056
	(0.018)	(0.016)	(0.059)	(0.058)	(0.086)	(0.055)	(0.051)	(0.055)
Control group mean	0.773	0.762	0.513	0.512	0.374	0.341	0.554	0.405
N	2,212	2,978	438	475	244	555	574	553
Weekly working hours	0.812	0.041	10.684***	3.407	4.138	1.797	(0.096)	4.630
	(1.023)	(0.878)	(2.967)	(2.775)	(4.113)	(2.290)	(2.507)	(2.537)
Control group mean	32.715	30.639	20.105	16.959	16.366	11.956	21.947	12.786
N	2,126	2,811	415	430	241	527	536	509
Contribution to Social Security	-0.009	0.020	0.218***	0.066	0.154**	0.020	-0.059	0.009
	(0.022)	(0.192)	(0.057)	(0.059)	(0.069)	(0.045)	(0.048)	(0.052)
Control group mean	0.521	0.514	0.278	0.381	0.191	0.176	0.340	0.290
N	2,209	2,953	478	471	243	551	569	547

Notes: This table considers, for 2012 and 2015, the impact of winning the lottery on monthly income, current employment, weekly working hours and contribution to social security for all household members. All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table 7: Intent-to-treat estimates of effects on household income, expenditures, asset index, access to bank account and credit

	2008	2012	2015
	(1)	(2)	(3)
Household Income	49.968***	110.982**	66.011
	(14.880)	(50.031)	(58.307)
Control group mean	613	1,102	1,361
N	3,762	1,486	2,049
Food expenditures		27.551*	-5.132
		(16.193)	(16.340)
Control group mean		557	620
N		1,439	1,971
Asset index z-score	0.066**	0.131**	0.041
	(0.031)	(0.052)	(0.035)
Control group mean	-0.038	-0.075	-0.037
N	3,762	1,486	2,049
Access to bank account		0.071***	0.019
		(0.026)	(0.022)
Control group mean		0.570	0.590
N		1,482	2,045
Access to credit		0.019	0.022
		(0.026)	(0.022)
Control group mean		0.430	0.420
N		1,481	2,042

Notes: This table shows, for 2008, 2012 and 2015, the impact of winning the lottery on the household income, mean household expenditures, asset index z-score, mean access to bank account (at least one household member with a bank account), and mean access to credit (at least one household member holding a credit card). All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. For the non-standardized measures we include the control group mean. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table 8: Intent-to-treat estimates of effects on home environment

	2008	2012	2015
	(1)	(2)	(3)
Weekly hours with the child	-12.334***	-1.024	0.782
	(1.121)	(0.968)	(0.933)
Control group mean	55	60	55
N	3,762	1,482	2,049
Ever reads or sings for the child		0.065***	0.009
		(0.025)	(0.022)
Control group mean		0.630	0.470
N		1,484	2,048
Number of children' books at home ≥ 8		0.036	0.013
		(0.024)	(0.020)
Control group mean		0.265	0.289
N		1,482	2,045
Positive attitudes towards the child		-0.023	-0.001
		(0.015)	(0.012)
Control group mean		0.558	0.530
N		1,484	2,034
Negative attitudes towards the child		-0.013**	-0.002
		(0.006)	(0.006)
Control group mean		0.048	0.021
N		1,483	1,124
Stress of the caregiver z-score	-0.079**	0.036	0.070
	(0.031)	(0.053)	(0.044)
Control group mean	0.040	-0.009	-0.042
N	3,762	1,486	2,048

Notes: This table shows, for 2008, 2012 and 2015, the impact of winning the lottery on i) Total time in weekly hours caregiver spends with the child; ii) probability of anyone in the household ever reading or singing for the child; iii) probability of the household having at least 8 children's books; iv) positive and Negative attitudes towards the child, based on observational data reported by the enumerator and v) Stress of the mother z-score, based on self reported data collected through the *Perceived Stress Scale* by Luft et al. (2007). All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. For all measures we include at the bottom of each panel the control group mean. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table 9: Intent-to-treat estimates of effects on anthropometrics: height for age (HFA) and weight for age (WFA)

	Height for Age		Weight for Age	
	2012	2015	2012	2015
	(1)	(2)	(3)	(4)
Lottery winner	0.163**	0.110**	0.199***	0.140**
	(0.067)	(0.055)	(0.073)	(0.070)
Control group mean	0.099	0.258	0.012	0.182
N	1,433	1,939	1,436	1,946

Notes: This table shows the impact of winning the lottery on the mean z-scores of anthropometrics measures, HFA and WFA, using data collected in years 2012 and 2015. All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. Height and weight were standardized using World Health Organization growth standards to calculate HFA and WFA z-scores. As the WHO only has standardized weight for children up to 114 months, age equal to 114 was imputed to all children older than 114 months in 2015 to avoid losing observations. For HFA z-scores, no imputation was carried out as the WHO standards are available for older ages. The same imputation exercise for HFA generates very similar results (slightly higher point estimates). $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table 10: Intent-to-treat estimates of effects on children's cognitive function

	2012 Cognitive measures				
	Aggregate cognitive z-score	TVIP	Executive Function	Memory for Names	Visual Integration
	(1)	(2)	(3)	(4)	(5)
2012 mean z-scores	0.067**	0.112**	0.059	0.085	0.041
	(0.032)	(0.052)	(0.051)	(0.053)	(0.052)
N	1,486	1,466	1,481	1,476	1,486
	2015 Cognitive measures				
	Aggregate IQ z-score	Verbal comprehension	Perceptual reasoning	Working memory	Processing speed
	(1)	(2)	(3)	(4)	(5)
2015 mean z-scores	0.044	-0.011	0.091**	0.045	-0.006
	(0.043)	(0.043)	(0.044)	(0.045)	(0.045)
N	1,999	1,999	1,999	1,999	1,996

Notes: This table shows the impact of winning the lottery on the mean z-score for different measures of children's cognitive function in years 2012 and 2015. The upper panel displays the aggregate cognitive z-score in column (1), the TVIP vocabulary test in column (2), the aggregate z-score of executive function tests in column (3), the z-score for the Memory for Names Test in column (4) and the z-score for the Visual Integration test in column (5). The lower panel displays the aggregate IQ z-score in column (1), and its components in columns (2)-(5), respectively verbal comprehension, perceptual reasoning, working memory and processing speed. All scores have been standardized to have mean zero and standard deviation one within age and within the sample. All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

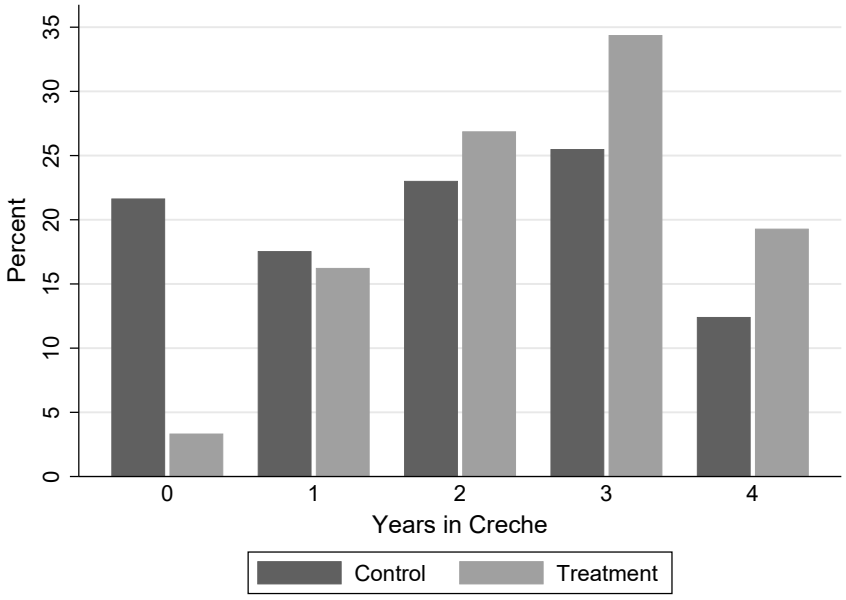
Table 11: Intent-to-treat estimates of effects on child behavior

	Child Behavior Questionnaire					
	Aggregate CBQ z-score	Frustration	Attention	Soothability	Impulsivity	Inhibition
	(1)	(2)	(3)	(4)	(5)	(6)
2012 mean z-scores	0.001	-0.004	0.006	0.025	-0.081	0.061
	(0.052)	(0.053)	(0.053)	(0.053)	(0.054)	(0.053)
N	1,483	1,483	1,483	1,483	1,483	1,483
2015 mean z-scores	0.004	0.003	-0.036	-0.025	0.012	0.053
	(0.068)	(0.068)	(0.067)	(0.067)	(0.067)	(0.066)
N	923	923	923	923	923	923

Notes: This table shows the impact of winning the lottery on the mean z-score for our measures of children's behavior based on the child behavior questionnaire in 2012 and 2015: the aggregate CBQ z-score in column (1), and its components in columns (2)-(6), respectively frustration, attention, soothability, impulsivity and inhibition. All scores have been standardized to have mean zero and standard deviation one within age and within the sample. All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

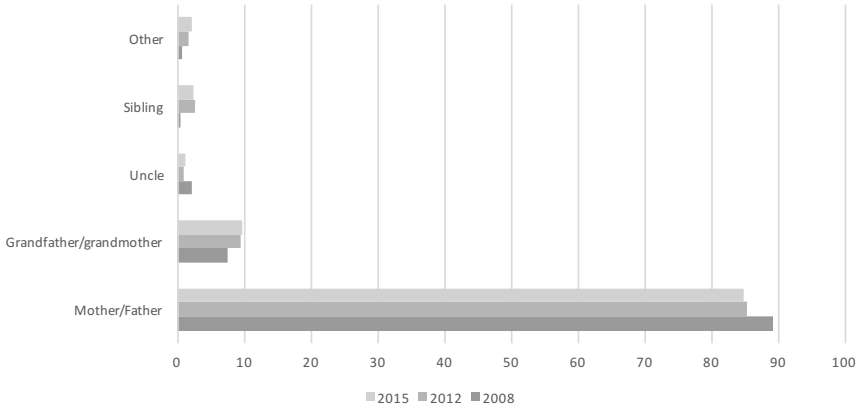
Appendix A

Figure A.1: Years in Creche by Lottery Status



Notes: This figure reports average years in *creches* by lottery status, based on self-reported survey data on *creche* attendance collected in 2012 and 2015

Figure A.2: Identity of the Main Caregiver



Notes: This figure displays the identity of the person reported as the main responsible for taking care of the child in 2008, 2012 and 2015.

Table A.1: Differential selective attrition between all rounds of data collection

	Male child	White child	Black child	Mixed race child	Other race child	Birthweight in kg	Birth height in cm	Planned Birth	First Born	Age of the Mother at Birth	Prenatal Care
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2008 to registry											
Interviewed in 2008 * Lottery winner	-0.035	-0.019	0.126**	-0.086	-0.020						
	(0.097)	(0.090)	(0.060)	(0.095)	(0.031)						
N	3897	3887	3887	3887	3887						
2012 to 2008											
Interviewed in 2012 * Lottery winner	0.014	0.014	-0.004	0.005	-0.015	-0.041	0.137	0.016	0.003	0.174	0.004
	(0.034)	(0.032)	(0.021)	(0.034)	(0.011)	(0.042)	(0.285)	(0.032)	(0.034)	(0.329)	(0.016)
N	3,774	3,764	3,764	3,764	3,764	3,742	3,722	3,770	3,764	3,767	3,765
2015 to 2008											
Interviewed in 2015 * Lottery winner	-0.010	0.042	0.002	-0.038	-0.005	0.004	0.255	-0.038	-0.032	0.025	-0.003
	(0.034)	(0.032)	(0.021)	(0.033)	(0.011)	(0.041)	(0.278)	(0.031)	(0.033)	(0.321)	(0.015)
N	3,774	3,764	3,764	3,764	3,764	3,742	3,722	3,770	3,764	3,767	3,765

	Natural Birth Delivery	Premature Birth	Breastfed up to 6 Months	HH income	HH size	Age of carer	Carer can read and write	Carer has at least basic education	Carer has at least secondary education	Carer has at least higher education	Highest grade completed of carer
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
2008 to registry											
Interviewed in 2008 * Lottery winner				67.07	-0.212						
				(212.7)	(0.374)						
N				4,103	4,137						
2012 to 2008											
Interviewed in 2012 * Lottery winner	-0.044	0.058**	0.076***	-96.57	-0.413	-0.190	-0.008	-0.018	0.005	-0.000	-0.140
	(0.032)	(0.023)	(0.029)	(154.1)	(0.291)	(0.637)	(0.011)	(0.031)	(0.033)	(0.009)	(0.168)
N	3,768	3,762	3,770	3,562	3,592	3,776	3,768	3,404	3,404	3,404	3,346
2015 to 2008											
Interviewed in 2015 * Lottery winner	0.012	0.018	0.005	-13.30	-0.264	-0.034	-0.001	-0.034	-0.007	0.010	-0.103
	(0.031)	(0.022)	(0.028)	(150.5)	(0.284)	(0.622)	(0.011)	(0.030)	(0.032)	(0.008)	(0.164)
N	3,768	3,762	3,770	3,562	3,592	3,776	3,768	3,404	3,404	3,404	3,346

Notes: This table shows differential selective attrition results for the different waves of our surveys for 22 covariates. Each column reports results of a regression of each covariate on an indicator of whether there was individual data for a given year (relative to registry or a previous wave of survey), on an indicator of winning the lottery, and the interaction between them. All specifications include strata fixed effects. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.2: Multiple Imputation - Average Effects by Groups of Outcomes

	Labor outcomes	Income outcomes	Child Anthopometrics	Child Cognitive	Home environment outcomes
	(1)	(2)	(3)	(4)	(5)
2008 average effects	0.090***	0.086***			0.079***
	(0.032)	(0.025)			(0.031)
N	3757	3762			3762
2012 average effects	0.059	0.077**	0.080*	0.049	0.008
	(0.040)	(0.033)	(0.043)	(0.036)	(0.006)
N	3362	2213	2201	2213	2213
2015 average effects	0.054*	0.026	0.057	0.020	-0.006
	(0.029)	(0.025)	(0.037)	(0.029)	(0.015)
N	3553	3485	3460	3470	3485

Notes: This table shows, for 2008, 2012 and 2015, the impact of winning the lottery on an imputed values of an index of variables related to labor outcomes, income outcomes, child anthropometrics, child cognitive outcomes and home environment respectively. The index was constructed following Anderson (2008). The imputation method follows Rubin (2004). All estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.3: Intent-to-treat estimates of effects on labor market outcomes for caregivers - 2008

	Caregiver
	2008
	(1)
Currently Employed	0.048***
	(0.016)
Control group mean	0.410
N	3,754
Weekly working hours	1.855***
	(0.702)
Control group mean	17
N	3,753

Notes: This table shows, for 2008, the impact of winning the lottery on current employment and weekly working hours and contribution to social security for the main caregiver of the child. All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.4: Intent-to-treat estimates of effects on labor market outcomes for parents - mothers and fathers

	Mothers		**Fathers**	
	2012	2015	2012	2015
	(1)	(2)	(1)	(2)
Monthly Income	28.351	20.399	92.855	74.106
	(31.826)	(35.241)	(57.630)	(60.076)
Control group mean	560.294	629.366	973.856	984.909
N	1,385	1,806	827	1,179
Currently Employed	0.002	0.010	0.014	0.027
	(0.026)	(0.023)	(0.019)	(0.019)
Control group mean	0.682	0.675	0.928	0.895
N	1,385	1,799	827	1,179
Weekly working hours	0.142	-0.655	1.213	0.767
	(1.247)	(1.077)	(1.369)	(1.294)
Control group mean	26.036	24.914	44.843	40.002
N	1,354	1,737	772	1,074
Contribution to Social Security	0.006	-0.008	-0.054	0.057*
	(0.027)	(0.025)	(0.036)	(0.031)
Control group mean	0.424	0.464	0.587	0.592
N	1,384	1,786	825	1,167

Notes: This table shows, for 2012 and 2015, the impact of winning the lottery on monthly income, current employment, weekly working hours and contribution to social security for mothers and fathers of the child. All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.5: Intent-to-treat estimates of effects on household composition

	2012	2015
	(1)	(2)
Grandparent living at home	-0.023	-0.011
	(0.022)	(0.026)
Control group mean	0.234	0.203
N	1,486	1,027

Notes: This table shows, for 2012 and 2015, the impact of winning the lottery on the probability of having a grandmother living at home. All estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.6: Robustness testing: multiple hypothesis testing.

					Romano-Wolf	
Table	Outcome	Column	Estimate	P-Value	RW	>0.10?
(1)	(2)	(3)	(4)	(5)	(6)	(7)
6	Currently employed (2008) - Caregiver	1	0.048***	0.0026	0.0639	
6	Weekly working hours (2008) - Caregiver	1	1.855***	0.0081	0.1479	x
6	Monthly income (2012) - Caregiver	2	62.850**	0.0504	0.5764	x
6	Currently employed (2012) - Caregiver	2	0.048*	0.0718	0.6683	x
6	Weekly working hours (2012) - Caregiver	2	2.471**	0.0437	0.5335	x
6	Contribution to social security (2012) - Caregiver	2	0.022	0.4106	0.9970	x
6	Monthly income (2015) - Caregiver	3	5.962	0.8637	0.9980	x
6	Currently employed (2015) - Caregiver	3	0.017	0.4530	0.9970	x
6	Weekly working hours (2015) - Caregiver	3	-0.028	0.9781	0.9980	x
6	Contribution to social security (2015) - Caregiver	3	-0.008	0.7361	0.9970	x
6	Monthly income (2012) - Mother	4	28.120	0.3779	0.9920	x
6	Currently employed (2012) - Mother	4	0.002	0.9463	0.9980	x
6	Weekly working hours (2012) - Mother	4	0.110	0.9301	0.9980	x
6	Contribution to social security (2012) - Mother	4	0.006	0.8170	0.9970	x
6	Monthly income (2015) - Mother	5	17.210	0.6275	0.9970	x
6	Currently employed (2015) - Mother	5	0.005	0.8280	0.9980	x
6	Weekly working hours (2015) - Mother	5	-0.840	0.4382	0.9970	x
6	Contribution to social security (2015) - Mother	5	-0.015	0.5363	0.9970	x
6	Monthly income (2012) - Grandparent	6	245.10***	0.0034	0.0749	
6	Currently employed (2012) - Grandparent	6	0.208***	0.0004	0.0120	
6	Weekly working hours (2012) - Grandparent	6	10.68***	0.0004	0.0120	
6	Contribution to social security (2012) - Grandparent	6	0.218***	0.0002	0.0060	
6	Monthly income (2015) - Grandparent	7	65.970	0.4096	0.9970	x
6	Currently employed (2015) - Grandparent	7	0.077	0.1881	0.9481	x
6	Weekly working hours (2015) - Grandparent	7	3.407	0.2206	0.9700	x
6	Contribution to social security (2015) - Grandparent	7	0.066	0.2682	0.9830	x

Notes This table shows the results of Romano-Wolf multiple hypothesis correction for all outcomes reported in Tables 6-11, reporting the original estimate and both the original p-values and also the Romano-Wolf p-values. The table extends across multiple pages. The correction is carried out following Clarke et al. (2020).

Table A.6: Robustness testing: multiple hypothesis testing.

					Romano-Wolf	
Table	Outcome	Column	Estimate	P-Value	RW	>0.10?
(1)	(2)	(3)	(4)	(5)	(6)	(7)
6	Monthly income (2012) - Sibling	8	117.400**	0.0504	0.5724	x
6	Currently employed (2012) - Sibling	8	0.162*	0.0595	0.6114	x
6	Weekly working hours (2012) - Sibling	8	4.138	0.3160	0.9850	x
6	Contribution to social security (2012) - Sibling	8	0.154**	0.0273	0.3826	x
6	Monthly income (2015) - Sibling	9	42.660	0.3014	0.9840	x
6	Currently employed (2015) - Sibling	9	0.102*	0.0641	0.6394	x
6	Weekly working hours (2015) - Sibling	9	1.797	0.4332	0.9970	x
6	Contribution to social security (2015) - Sibling	9	0.020	0.6608	0.9970	x
7	Asset index z-score (2008)	1	0.066**	0.0303	0.2048	x
7	Asset index z-score (2012)	2	0.131**	0.0109	0.1079	x
7	Asset index z-score (2015)	3	0.041	0.2389	0.8092	x
7	Household Income (2008)	1	49.968***	0.0008	0.0120	
7	Household Income (2012)	2	110.982**	0.0277	0.2048	x
7	Household Income (2015)	3	66.011	0.2529	0.8092	x
7	Access to bank account (2012)	2	0.071***	0.0064	0.0779	
7	Access to bank account (2015)	3	0.019	0.4000	0.8092	x
7	Access to credit (2012)	2	0.019	0.4662	0.8092	x
7	Access to credit (2015)	3	0.022	0.3247	0.8092	x
7	Food expenditures (2012)	2	27.551*	0.0875	0.4635	x
7	Food expenditures (2015)	3	-5.132	0.7502	0.8092	x
8	Weekly hours with the child (2008)	1	-12.334***	0.0000	0.0000	
8	Weekly hours with the child (2012)	2	-1.024	0.2826	0.9051	x
8	Weekly hours with the child (2015)	3	0.782	0.4018	0.9560	x
8	Ever reads or sings for the child (2012)	2	0.065***	0.0090	0.0899	
8	Ever reads or sings for the child (2015)	3	0.009	0.6849	0.9660	x

Notes This table shows the results of Romano-Wolf multiple hypothesis correction for all outcomes reported in Tables 6-11, reporting the original estimate and both the original p-values and also the Romano-Wolf p-values. The table extends across multiple pages. The correction is carried out following Clarke et al. (2020).

Table A.6: Robustness testing: multiple hypothesis testing.

					Romano-Wolf	
Table	Outcome	Column	Estimate	P-Value	RW	>0.10?
(1)	(2)	(3)	(4)	(5)	(6)	(7)
8	Number of children' books at home > 8 (2012)	2	0.036	0.1328	0.7323	x
8	Number of children' books at home > 8 (2015)	3	0.013	0.5091	0.9660	x
8	Positive attitudes towards the child (2012)	2	-0.023	0.1368	0.7323	x
8	Positive attitudes towards the child (2015)	3	-0.001	0.9397	0.9660	x
8	Negative attitudes towards the child (2012)	2	-0.013**	0.0415	0.3706	x
8	Negative attitudes towards the child (2015)	3	-0.002	0.7167	0.9660	x
8	Stress of the caregiver z-score (2008)	1	-0.079**	0.0117	0.1029	x
8	Stress of the caregiver z-score (2012)	2	0.036	0.4957	0.9660	x
8	Stress of the caregiver z-score (2015)	3	0.070	0.1121	0.7033	x
9	Weight for Age (2012)	3	0.199***	0.0068	0.0280	
9	Weight for Age (2015)	4	0.140**	0.0431	0.0819	
9	Height for Age (2012)	1	0.163**	0.0131	0.0380	
9	Height for Age (2015)	2	0.110**	0.0479	0.0819	
10	Aggregate cognitive z-score (2012)	1	0.067**	0.0359	0.1683	x
10	TVIP (2012)	2	0.112**	0.0298	0.1584	x
10	Executive Function (2012)	3	0.059	0.2513	0.7525	x
10	Visual Integration (2012)	5	0.041	0.4300	0.7525	x
10	Memory for Names (2012)	4	0.085	0.1070	0.4356	x
10	Aggregate IQ z-score (2015)	1	0.044	0.3039	0.7525	x
10	Verbal comprehension (2015)	2	-0.011	0.8030	0.9703	x
10	Perceptual Reasoning (2015)	3	0.091**	0.0344	0.1683	x
10	Working memory (2015)	4	0.045	0.3045	0.7525	x
10	Processing Speed (2015)	5	-0.006	0.8945	0.9703	x
11	Aggregate CBQ z-score (2012)	1	0.001	0.9833	0.9980	x
11	Aggregate CBQ z-score (2015)	1	0.004	0.9573	0.9980	x

Notes This table shows the results of Romano-Wolf multiple hypothesis correction for all outcomes reported in Tables 6-11, reporting the original estimate and both the original p-values and also the Romano-Wolf p-values. The table extends across multiple pages. The correction is carried out following Clarke et al. (2020).

Table A.7: Intent-to-treat estimates of effects on household income: balanced panel

	2008	2012	2015
	(1)	(2)	(3)
Lottery winner	70.29**	167.0***	90.81
	(29.57)	(59.60)	(82.96)
N	1,080	1,080	1,080

Notes: This table shows the impact of winning the lottery on the household income (in current reais) for years 2008, 2012, and 2015, based on self-reported survey data from these years, for the sample for which there is a balanced panel. All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. For all years the table displays the control group mean. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.8: Instrumental variables impacts of daycare attendance on income-related variables

	2008	2012	2015
	(1)	(2)	(3)
Mean HH Income	100.812***	184.745**	102.291
	(32.430)	(85.245)	(90.278)
N	2,287	1,486	2,049
Mean expenditures		45.504*	-8.058
		(27.298)	(25.670)
N		1,439	1,971
Asset index		0.218**	0.063
		(0.088)	(0.054)
N		1,486	2,049
Access to Bank Account		0.119***	0.029
		(0.046)	(0.034)
N		1,482	2,045
Access to Credit		0.032	0.035
		(0.043)	(0.035)
N		1,481	2,042

Notes: This table reports IV estimates of the effect of an additional year of daycare attendance (instrumented by lottery status) on household income-related variables for years 2008, 2012, and 2015, based on self-reported survey data from these years. All IV estimates are from regressions that include strata dummies and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.9: Instrumental variables impacts of daycare attendance on home environments

	2008	2012	2015
	(1)	(2)	(3)
Total time caregiver spends with child	-19.940***	-1.693	1.212
	(2.558)	(1.571)	(1.451)
N	2,287	1,482	2,049
Ever reads or sings for the child		0.109**	0.014
		(0.043)	(0.034)
N		1,484	2,048
Positive attitudes towards the child		-0.038	-0.001
		(0.026)	(0.018)
N		1,484	2,034
Negative attitudes towards the child		-0.022**	-0.004
		(0.011)	(0.010)
N		1,483	1,124
Stress of the Mother Z-score	-0.120*	0.060	0.103
	(0.067)	(0.088)	(0.065)
N	2,287	1,486	2,048

Notes: This table reports IV estimates of the effect of an additional year of daycare attendance (instrumented by lottery status) on children's home environments for years 2008, 2012 and 2015, based on self-reported survey data from these years. All IV estimates are from regressions that include strata dummies and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table A.10: Average intent-to-treat estimates of effects by groups of outcomes - gender heterogeneity

	Labor Outcomes	Income Outcomes	Child Anthopometrics	Child Cognitive	Home Environment Outcomes
	(1)	(2)	(3)	(4)	(5)
Panel A: Girls					
2008 average effects	0.135**	0.150***			0.056
	(0.047)	(0.038)			(0.048)
N	1796	1800			1800
2012 average effects	0.121	0.120**	0.230**	0.039	0.008
	(0.066)	(0.055)	(0.078)	(0.599)	(0.009)
N	693	693	668	693	693
2015 average effects	0.041	0.053	0.138**	0.026	0.006
	(0.047)	(0.040)	(0.061)	(0.047)	(0.026)
N	1187	974	926	949	975
Panel B: Boys					
2008 average effects	0.056	0.034			0.102**
	(0.045)	(0.037)			(0.044)
N	1958	1962			1962
2012 average effects	0.058	0.096**	0.086	0.094*	0.019**
	(0.061)	(0.048)	(0.070)	(0.052)	(0.009)
N	793	793	770	793	793
2015 average effects	0.091*	0.024	0.20	0.035	-0.026
	(0.047)	(0.037)	(0.062)	(0.049)	(0.025)
N	1289	1075	1020	1050	1075

Notes: This table shows, for 2008, 2012 and 2015, the impact of winning the lottery on an index of variables related to labor outcomes, income outcomes, child anthropometrics, child cognitive outcomes and home environemnt respectively. Panels A and B show estimates separately for girls and boys. The index was constructed following following Anderson (2008). All estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.11: Instrumental variables impacts of daycare attendance on anthropometrics z-scores

	Height for Age		Weight for Age	
	2012	2015	2012	2015
	(1)	(2)	(3)	(4)
Treatment	0.269**	0.170*	0.327***	0.217**
	(0.111)	(0.087)	(0.125)	(0.109)
N	1,433	1,938	1,436	1,946

Notes: This table reports IV estimates of the effect of an additional year of daycare attendance (instrumented by lottery status) on children's anthropometrics in 2012 and 2015, based on self-reported survey data from these years. All IV estimates are from regressions that include strata dummies and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.12: Intent-to-treat estimates of effects on anthropometrics: balanced panel

	Height for Age		Weight for Age	
	2012	2015	2012	2015
	(1)	(2)	(3)	(4)
Lottery winner	0.172**	0.148**	0.196**	0.125
	(0.079)	(0.074)	(0.086)	(0.093)
N	1,050	1,050	1,050	1,050

Notes: This table shows the impact of winning the lottery on the mean z-scores of anthropometrics measures, HFA and WFA, using data collected in years 2012 and 2015, for the sample for which there is a balanced panel. All scores have been standardized using the WHO growth standards. All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.13: Instrumental variables impacts of of daycare attendance on children's cognitive function

	Aggregate Cognitive Score	TVIP	WISC-Perceptual Reasoning
	2012	2012	2015
	(1)	(2)	(3)
Treatment	0.112**	0.191**	0.144**
	(0.054)	(0.090)	(0.070)
N	1,486	1,466	1,999

Notes: This table reports IV estimates of the effect of an additional year of daycare attendance (instrumented by lottery status) on children's cognitive function for years 2012 (aggregate cognitive z-score and TVIP), and 2015 (WISC-Perceptual reasoning index), based on self-reported survey data from these years. All IV estimates are from regressions that include strata dummies and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table A.14: Intent-to-treat estimates of effects on children's cognitive function: balanced panel

	2012 Cognitive measures				
	Aggregate cognitive z-score	TVIP	Executive Function	Memory for Names	Visual Integration
	(1)	(2)	(3)	(4)	(5)
2012 Mean z-scores	0.022	0.032	0.008	0.090	-0.039
	(0.037)	(0.060)	(0.060)	(0.061)	(0.060)
N	1,105	1,105	1,105	1,105	1,105
	2015 Cognitive measures				
	Aggregate IQ z-score	Verbal comprehension	Perceptual reasoning	Working memory	Processing speed
	(1)	(2)	(3)	(4)	(5)
2015 Mean z-scores	0.034	-0.058	0.086	0.094	-0.029
	(0.059)	(0.062)	(0.062)	(0.060)	(0.062)
N	1,105	1,105	1,105	1,105	1,105

Notes: This table shows the impact of winning the lottery on the mean z-score for different measures of children's cognitive function in years 2012 and 2015, for the sample for which there is a balanced panel. The upper panel displays the aggregate cognitive z-score in column (1), the TVIP vocabulary test in column (2), the aggregate z-score of executive function tests in column (3), the z-score for the Memory for Names Test in column (4) and the z-score for the Visual Integration test in column (5). The lower panel displays the aggregate IQ z-score in column (1), and its components in columns (2)-(5), respectively verbal comprehension, perceptual reasoning, working memory and processing speed. All scores have been standardized to have mean zero and σ one within age and within the sample. All ITT estimated effects are from regressions that include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$