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

Orazio Attanasio, Ricardo Paes de Barros, Pedro Carneiro, David K. Evans, Lycia Lima, Pedro Olinto, and Norbert Schady

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 initial daycare enrollment. 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 32 percent increase in total 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, which are likely to have resulted from the better nutrition they received in the center rather than the increase in resources at home. They also saw shorter-term gains in cognitive development, which in contrast to the impacts on nutrition, likely resulted from the short-term gains in home resources.

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1 Introduction

Public provision of daycare programs for young children living in disadvantaged households serves two important goals. The first is to offer education, socialization, and enriched nutrition opportunities to children (to which they may otherwise have limited access) during the first years of their lives. It is well established that these opportunities play a fundamental role in the process of child development and may have long-run impacts. The second is to allow caregivers to participate in the labor market, limiting breaks in their careers, potentially increasing their subsequent labor market attachment and boosting household resources during critical years for child development.

There is, however, limited evidence from low- and middle- income countries on the impact of large-scale public daycare provision. Most of the empirical studies to date have focused on home-based interventions for very young children or preschool for older children, but not on daycare centers in the early years of life (0 to 3). Yet daycare services form a large and growing part of the childcare sector, especially in middle-income countries.[1]

In this paper we study the impacts of large-scale provision of public daycare for poor families and their children in Rio de Janeiro, Brazil. The context we study is typical of what would be observed in poor urban areas in middle-income countries: (i) families are poor, and mothers are frequently employed; (ii) multigenerational living is common in many households; (iii) the provision of adequate nutrition is a central component of public education; and (iv) quality ratings for these types of centers are lower than the average for centersin high-income countries, although they are typical of centers in middle-income countries. This is an experimental study which exploits the fact that in late 2007, the government of Rio de Janeiro randomly assigned approximately 25,000 applicants ages 0-3 to 11,000 available slots in free public daycare centers. A random sample of about four thousand children was selected to measure the impacts of the program. Detailed surveys, including measures of child development and home resources, were administered to children and parents in 2008, 2012 and 2015 (one, four, and seven years after enrollment), allowing us to map out the trajectory of impacts for longer than most studies. This is the first large scale experimental evaluation of freely provided daycare (in a large metropolitan area) in a middle income country.

Access to public daycare affects children directly, through stimulation and nutrition (and other health services), but also indirectly, through caregivers' responses (in the labor market and at home). It is difficult to empirically distinguish the impact of each of these channels, but at the very least one would need to have in the same dataset information on child care participation, child outcomes, and parental responses. Surprisingly, such datasets do not exist. Studies of daycare typically focus either on their impact on children (e.g., Kline and Walters 2016), or their impact on caregivers (e.g., Gelbach 2002), but not on both sets of outcomes simultaneously.

Our unique study enables us to estimate the impacts of access to free daycare on health and cog-

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

nitive outcomes of children, the employment and income of all adult members in their households, and home environments. We find that access to daycare has a positive impact of 0.34 standard deviations (SD) on children's height and weight, which persists long after they have left child care centers. Although this is a novel result, because nutrition is not an outcome that is commonly documented in daycare studies (with some recent exceptions, e.g., Bernal et al. 2024), it is consistent with what is found in the school meals literature. There is also an impact of 0.22 SD on their cognition shortly after they leave daycare, which is consistent with positive short term impacts of daycare on this outcome found in other studies (Evans et al. 2024). However, these impacts do not last, something which can only be learned from our longer term longitudinal analysis (which is also uncommon in the literature, especially in low- and middle-income countries).

Access to daycare also makes it easier for the children's potential caregivers to work, and we see an increase in their employment and income. What drives this is not an increase in work outcomes of parents (since there are already high levels of employment among fathers and mothers in our sample), but of grandparents, in particular co-residing grandmothers (who were likely to have the main caregiving responsibilities in the household). This is a novel result; a more recent study finds a related result in Canada (Karademir et al. 2024). These impacts are stronger when children are of daycare age (by about 0.34 SD), decline over time, and eventually disappear by the time children are in elementary school. (Access to public elementary schools is universal.) We also see a parallel pattern of a short-term increase of 0.24 SD in the quality of home environments (e.g., reading to the child), which disappears in the elementary school years.

Our leading hypothesis is that the impacts on children's height and weight are a direct result of better nutrition at daycare centers, since these impacts persist even though the impacts on home resources and environments do not. In contrast, short-term impacts on child cognition could be primarily a result of the short-term improvements in home resources and environments, as both disappear simultaneously. In the setting we study, it is plausible that the nutrition that children receive in daycare centers is substantially better than what they receive at home. In contrast, this may not be true of the quality of the stimulation received in daycare centers, given the difficulty in providing high-quality education in public daycare centers in Brazil (Paes de Barros et al. 2011, Campos et al. 2010, Bruns et al. 2012) and elsewhere (Belsky et al. 2007, Vandell et al. 2010).

The final section of the paper tests these hypotheses more formally. However, random variation in the availability of daycare is not enough to examine this issue without additional assumptions. We begin with strong conditional independence assumptions which are standard in mediation analysis (where family resources and home environments partly mediate the impact of daycare on child outcomes conditional on a rich set of controls). Although these are strong assumptions, we show supporting evidence for the validity of the procedure. We find that, consistent with our hypotheses, home resources and environments mediate much of the short-term impact of daycare on cognition, but almost none of the short- or long-term impact on anthropometrics. We also present similar

estimates from structural models of daycare participation, family resources, and child development, which relax the conditional independence assumptions just mentioned. Instead, to generate the additional exogenous variation required to identify the model, we interact winning the lottery with demographic characteristics of the household (as in Kline and Walters 2016).[2]

We bring two new perspectives to this literature. First, although much (not all) of the daycare literature emphasizes impacts on skills, the most sustained impacts observed in our study are on nutrition. This finding could possibly generalize to similar settings throughout the developing world where children are poor (and deprived from adequate nutrition), and the quality of daycare is not very high. There exist several studies of the academic and health impacts of providing free school meals, but they concern primarily older children (in elementary school and beyond). Nevertheless, our estimates of the impacts of daycare on height and weight are in line with these studies (e.g., Kristjansson et al. 2007, Watkins et al. 2015, Wang et al. 2021).[3]

Second, although much of the literature examines (and typically finds positive) labor supply responses by mothers (e.g., Gelbach 2002, Baker et al. 2008 and many of the studies reviewed in Evans et al. 2021 and Halim et al. 2023), the most important estimated impacts on caregivers are on the labor supply of grandmothers who co-reside with the their children and grandchildren (see also Karademir et al. 2024 for an example from Canada). Parents, and in particular mothers, have high levels of employment (even in the absence of daycare centers), and grandmothers are important providers of childcare. This type of environment is likely to hold in many other situations across the developing world.[4]

Our research fits directly into a small literature examining the provision of center-based childcare in the first three years of life in low- and middle-income countries.[5] Among those studies in this literature, 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

[2]Below we explain under what assumptions this variation enables us to identify the impact of daycare on child outcomes, its impact on household resources, and the impact of household resources on child outcomes.

[3]There are, of course, several reviews of evaluations of nutrition programs (e.g., Bank 2010, Escher et al. 2024, Boomer et al. 2020), and even comparisons of standalone nutrition programs and integrated nutrition and stimulation programs (e.g., Dulal et al. 2021), although, as we said above, remarkably these are not available with regard to daycare centers (one exception is Bernal et al. 2024, a very recent study subsequent to ours). In addition, it is rare to find studies of longer term impacts of nutrition interventions. Two exceptions are a study from Guatemala (Rivera et al. 1995, Hoddinott et al. 2013), which shows evidence of sustained impacts on nutrition, and one from Jamaica (Walker et al. 2005, Walker et al. 2006), which does not. The former study shows impacts of nutrition supplementation in the height of adolescent boys of about 10 to 15% of a standard deviation, but not for girls. The lasting impacts on anthropometrics we report here are larger than the ones in the Guatemala programme.

[4]Notably, a review of early childhood development interventions in low- and middle-income countries (mainly of smaller scale and examining other types of programs) 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).

[5]A recent systematic review of childcare interventions found that the vast majority of studies were of programs targeted towards older children (Evans et al., 2024). A focus on the earliest years of life is important from the perspective of the child (if this is a highly sensitive period of learning providing foundations for the future), and the caregiver (since this is a period requiring particularly intense caregiving by an adult).

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). A more recent paper, also in Colombia, studies high quality center care (Bernal et al., 2024), which is found to have sustained impacts on nutritional but not on cognitive outcomes of children (as in our paper). 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 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). Another study, in another Brazilian city, examines impacts of daycare only on maternal employment, finding positive effects (Sanfelice, 2023).

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 (e.g., Schweinhart et al. 2005, Barnett and Masse 2007, Belsky et al. 2007, Vandell et al. 2010, Black et al. 2014, Baker et al. 2019, Fort et al. 2020). In light of this, our findings of short lived impacts on cognitition are not necessarily surprising, since it is difficult to design programmes with sustained effects on this outcome (Bailey et al. 2017, Jenkins et al. 2018), even when they have long term impacts on multiple other outcomes, such as education, income, health and crime, as in the case of Schweinhart et al. (2005). Since center quality is often cited as a central determinant of its impacts on child cognition (e.g., Belsky et al. 2007, Vandell et al. 2010), perhaps one reason for a lack of long term impacts on cognition is that many daycare centers, especially in low- and middle-income countries, have low quality. There have been several calls to increase the quality of center-based care in developing countries (Bruns et al., 2012; Devercelli and Beaton-Day, 2021), especially because large and increasing fractions of children attend these centers from an early age. (Some of these papers even argue that center quality can be an important determinant of labor supply responses of caregivers.) The quality of the centers we study is typical not only of centers in Brazil, but in several other developing countries.[6] As in most of the literature in low- and middle-income countries (Evans et al., 2024), we find positive short-term impacts of daycare on cognition. While these impacts do not endure over time, this could well be true of many other programs investigated in the literature: we cannot tell because longer term follow-ups are so uncommon.[7]

[6]Others have examined the potential impacts of improving quality (Araujo et al., 2019; Andrew et al., 2024).

[7]A larger literature examines the short and long term impact of preschool programs for older children, usually between 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, 2011; Gilliam and Zigler, 2000; Shager et al., 2013). The variability of observed impacts across studies could reflect differences in quality of different programs and, in some cases, in the fidelity to the model that was originally developed.

Finally, also relevant is the literature that studies the impact of cash transfers (inducing increases in home resources) on child nutrition. Two recent reviews (Manley et al., 2020, 2022) show ambiguous and generally small impacts of cash transfers on nutrition, in the short and long term. This finding is consistent with our argument that the large impacts on nutrition we report are primarily due to daycare attendance, not to an increase in home resources.

The remainder 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, with a higher GDP per capita than the 2007 national average (11,477 USD in Rio versus the 7,374 USD country average), accounting for 5 percent of the national GDP. 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.

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, in practice there are not enough public daycare centers (or creches) to fully meet the demand. Based on school census data, there were in 2007 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 implemented a lottery (in December of 2007) to allocate children to available vacancies for the 2008 academic year.[8]

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 four age groups, from

[8] 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.

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 ages 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 a high-school level certificate of early education training.

The creche curriculum included physical play, instructional toys, art, music, storytelling, and rest time, as part of a structured curriculum developed by the municipal education team. While each center was supposed to follow the curriculum, the team at each center had some autonomy in adapting their pedagogical plan. 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.[9] 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 daycare 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

[9] Examples of creche menus are posted online (Prefeitura da Cidade do Rio de Janeiro, 2019).

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, all of which met at least one of the vulnerability criteria mentioned above.

Beneficiaries were selected by lotteries specific to each creche-age group combination. Lotteries were carried out in those groups for which the demand for vacancies exceeded the number of vacancies. 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.[10]

A sample of 4,349 children in 232 creche-age groups was selected for the impact evaluation among the creche-age groups that participated in the lottery. 55% of these children were applying for an age 0 slot, 21% were applying for an age 3 slot, and the remainder were equally split between age 1 and age 2 slots (the imbalance across these groups makes it hard to examine whether impacts vary depending on age at entry).[11] For each creche-age group and treatment status (lottery winner or loser) the number of children selected for the sample was 5, 10, 15, or 20, 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 initial 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 M children in the list are treated, and the remaining ones are control, even if some of the M children initially offered a slot end up refusing it (or some of the children at the bottom of the list eventually get offered a slot). 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).

Parents could only register for one lottery (one age group in one daycare center). It is however possible that some parents attempted to circumvent the system by registering their children in different lotteries, for different daycare centers. To do so they would have to change some identifying information, such as the child's name, gender, and birth date. We have searched lottery records

[10]Not all creche-age group combinations were subject to meaningful lotteries, either because there was no excess demand, or because no slots were available (after taking out the slots for those in the priority list and those with special needs). However, lotteries were run in the majority of creche-age group combinations.

[11]In analysis available on request, we show that impacts are not statistically different across groups.

for potential duplicates using flexible algorithms, and this type of behavior does indeed occur. However, as far as we can see, it is quite rare and is unlikely to affect our estimates.

Winning the lottery gives a family the opportunity to place their child in free daycare, which as we discuss below, is an opportunity that more than 90% of lottery winners take advantage of. Parents who were not allocated a daycare slot in the 2007 lottery could reapply one year later, and be admitted then. We show below that winning the lottery has a strong impact not only on the probability of attending daycare in 2008, but also on the total amount of daycare attended throughout the first 3 years of life.

3.2 Data

In our empirical analysis we use administrative records from the application questionnaire that caregivers filled out to participate in the lottery, combined with three rounds of survey data. When caregivers applied for a space at a creche, they filled out a short but detailed questionnaire with basic identifying information (e.g., name, gender, date of birth), and questions related to the household's vulnerability (household income, 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). Baseline information for our study was constructed from answers to this questionnaire, which gives us a rich pre-lottery description of all applicants (response rates for all the items in the lottery questionnaire are close to 100%).

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. In addition to household demographics (some of which could be endogenous to daycare enrollment), the survey asks about the birth weight and birth height of the child, the age of the mother at birth, and whether the pregnancy was planned. These are all variables that predate daycare enrollment and which can be added to the lottery records as part of baseline information for our study.

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 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 (who is one of the child's parents in 85% of the households), included information on income and assets, labor market outcomes for all household members, stress of the mother, and home environment characteristics.[12] 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, we have assessments of cognitive function, child behavior, and height and weight of the child. For cognitive function there are three batteries:[13]

- The TVIP, a Portuguese-language adaptation of the Peabody Picture Vocabulary Test, which measures vocabulary development (Dunn et al., 1986).
- Three measures of executive function, which relate to working memory, mental flexibility, and self-control: the Head Toes Knees Shoulder exercise (Ponitz et al., 2008), the Pencil Tapping Test (Diamond and Taylor, 1996), and the Stroop Test (Stroop, 1935).
- Two of the Woodcock-Johnson-Muñoz tests of visual-spatial thinking and associative memory: Visual Integration and 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 assessment of temperament in children 3 to 7 years old. The CBQ has five subscales: frustration, attention focusing, soothability, impulsivity, and inhibitory control.

In 2015, the same household questionnaire was applied to the whole sample (except for the maternal stress module). 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. In all survey waves interviewers were blind to treatment status of survey respondents and the children they were assessing.

[12] Maternal stress was measured by a perceived stress scale validated in Brazilian Portuguese by Luft et al. (2007).

[13] 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). Anthropometrics, cognitive, and socio-emotional skills were only assessed for the focal child (the one in the lottery). Information on siblings is not available.

Balance and attrition

Table 1 shows that child and household characteristics are balanced across treatment arms. For this analysis we include variables from the lottery records as well as some variables from the 2008 survey that could not be affected by the outcome of the lottery (race of the child, birth weight, birth height, age of the mother at birth, whether the birth was planned, whether the mother went to prenatal care and whether she had a c-section, and whether the child was premature and whether she was the firstborn child in the family).

There are two reasons why the number of observations is not exactly the same for all variables. First, there are 4,349 children in the sample, we have answers to the lottery questionnaire for 4,149 (the top 14 variables in the table), and we have answers from the baseline survey for 3,776 (the remaining variables). We describe attrition patterns in more detail below. Second, for a few variables, we do not have valid records for all observations.

There are 26 variables in Table 1. In the first two columns we report means and standard deviations of each variable for those who lost and won the lottery. In the third column we present differences between each two groups after including lottery fixed effects (although the inclusion of fixed effects has almost no impact on these differences), along with p-values (in brackets) for the test of whether each difference is equal to zero (p-values are calculated after adjusting critical values for multiple hypothesis testing using the Romano and Wolf procedure, as described in Clarke et al. 2020). The last column displays the sample size for each comparison, which is larger for variables coming from the lottery questionnaire than for variables from the 2008 survey. For all variables, differences between lottery winners and losers are very small, and we cannot reject that any of these differences is statistically equal to zero.[14]

We now turn to attrition. There are four points in time to consider: the lottery questionnaire and the 2008, 2012 and 2015 surveys. To begin with it is easier to ignore the 2012 survey because of its different sampling scheme; we return to it later.

The original sample has 4,349 individuals. Questionnaires from the lottery registry are available for 4,149 of them (95.4%), and the 2008 and 2015 survey rounds interviewed, respectively, 3,776 (86.8%) and 2,051 (47.2%) children and their households. Rates of attrition in the survey are high,

[14]Recall that although our sample is drawn randomly from lottery participants, there are individuals who do not participate in the lottery, either because they were in the priority groups for creche enrollment or because no lottery took place for the creche-age group they applied for (either because there were no slots available, or because there was no excess demand). Using the lottery records, in results available on request we examine whether the sample is representative of the wider population applying for a daycare slot in 2007. There are almost no differences between the pre-lottery characteristics of individuals in our sample and those participating the lottery, and even when they are statistically different from zero, the magnitude is substantively very small. Some differences are expected, related to being part of the priority group (because of health issues or special needs of the child). Children in the sample are also slightly less exposed to domestic violence than those in the overall sample.

but similar to those in many other longitudinal surveys in low- and middle-income countries.[15]

There are three questions (of increasing complexity) about attrition which are important: (i) is attrition selective (or random)?; (ii) is there differential attrition between lottery winners and losers?; and (iii) is attrition differentially selective between lottery winners and losers? (in other words, to what degree is our answer to Question (i) different for lottery winners and losers?). To answer Question (i) we compare baseline variables (from the lottery survey, and from the 2008 survey when possible) for households who have and have not stayed in the sample in each wave, whereas for Question (ii) we compare the proportion of households winning the lottery among those who have or have not stayed in the sample in each wave. Therefore, Question (ii) is a component of Question (i). Question (iii) concerns a different set of comparisons.

As we just mentioned, we require a separate discussion of attrition for the 2012 survey because it has a different sampling frame. The 2012 survey took place only in 6 of the 10 education districts in Rio de Janeiro from which the original sample was drawn. Therefore, in the following discussion, whenever we mention the 2012 survey we need to refer to this smaller original sample. Of the original 4,349 children, 2,769 resided in the 6 education districts targeted in the 2012 survey. Of these, 1,486 (53.7%) were successfully interviewed.

Table A.1 in the appendix presents differences in baseline characteristics between children and families who did and did not answer the survey at each interview round. There are three sets of columns, corresponding to three rounds: 2008, 2012 (for which, as mentioned above, the comparisons are relative to the correspondingly smaller sample) and 2015. For each year there are two columns: the mean and standard deviation of the variable for those not in the survey, and average difference between those in the survey and not in the survey, together with the standard error (asterisks are used to denote different p-values for the test of whether the difference is equal to zero, after adjusting for multiple hypothesis testing as in Clarke et al. 2020). There are only small differences in the characteristics of attritors and non-attritors at each wave, and few are statistically different from zero. With regards to differential attrition between lottery winners and lottery losers, attrition is higher in the latter group than in the former, but again the difference is small, and statistically indistinguishable from zero after accounting for multiple hypothesis testing.

Appendix Table A.2 tests whether the small, statistically insignificant selective attrition reported in Appendix Table A.1 (observed in baseline variables) is different between lottery winners and losers. We find no pattern of differential attrition, suggesting that attrition likely affects the

[15] 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 for the median survey, much higher if we look at the average survey.

sample of lottery winners and losers in a similar way.[16] Tables A.3, A.4, and A.5 present balance checks for the 2008, 2012 and 2015 samples (with one table for each survey). Each table shows the value of each variable for the lottery losers, the winners, and the regression-adjusted differences for each variable (after controlling for lottery fixed effects) between lottery winners and losers (with the corresponding standard error, and asterisks denoting different levels of statistical significance after accounting for multiple hypothesis testing). For all survey years we have very balanced samples between lottery winners and losers.

In sum, there is sizable attrition in our study (inherent to the difficulty in following up children and families primarily in low-income urban communities), which is unsurprising and similar in its magnitude to other long term longitudinal studies in similar settings. However, attrition is not differentially selective among lottery winners and losers. It does not affect the balance of our sample in any of the survey waves, and it is unlikely to induce bias in our results. To be sure, we include versions of our main estimates which correct for missing data due to attrition using a multiple imputation procedure (Rubin, 2004); these make little difference to our results.

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 losers are similar (on average) on both observed and unobserved characteristics, so any differences in their subsequent outcomes can be attributed to access to daycare.

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.

In fact, 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. Thus, the main difference between lottery winners and losers is in the amount of full-time public daycare taken up by each group, not whether any

[16] 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 across variables between treatment and control arms. We show the coefficient on this interaction for each variable and survey wave, the corresponding standard error, and asterisks to indicate whether this coefficient is statistically different from zero (at different significance levels) after we account for multiple hypothesis testing using Clarke et al. (2020). We apply the procedure one survey wave at a time, instead of pooling all hypotheses across survey waves.

daycare was taken up or not.[17]

A central question is: What is the counterfactual mode of care that is relevant for this study? Winning the lottery provides access to full-time public daycare. Alternative child care modalities are home care (which may include the use of an informal caregiver in the home), part-time public daycare, and part time or full time private daycare. Below we show that in our sample (which is representative only of lottery applicants), families use almost exclusively two of these options: full-time public daycare and home care. Winning the lottery switches individuals from home care to full-time public daycare, with little change in the use of private daycare or of part-time care either in the public or private sectors.

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, based on this model:

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

In this equation, y_{igc} is an outcome of interest for individual i, who participated in the lottery for age group g in daycare 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-daycare center pair, within which each lottery took place), and ϵ_{igc} is an error term.[18] $\beta_{\texttt{ITT}}$ is the ITT coefficient, which measures the impact of winning the lottery on the outcome of interest.

Going beyond the intent-to-treat estimates to 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.[19]

[17] As mentioned above, some parents also attempted to register their children multiple times for the lottery. This was not allowed, so in these cases parents would have to change the name of the child in the application, which was then submitted to the same creche as the original application or to another creche. We have done a search for duplicate applications matching names, dates of birth, gender, and addresses that are similar but not exactly the same across applications. Only 28 such cases were found, a tiny fraction of the overall volume of applications in 2008.

[18] We assume errors are independent and identically distributed (i.i.d.). We could allow for spatial correlation at the level of the daycare center, or age group - daycare center combination, but this is not necessarily correct since the randomization is at the individual level. Accordingly, in results available on request, we can show that allowing for clustered standard errors makes little difference for the results.

[19] 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.

IV estimates are based on the following equation:

$$y_{igc} = \lambda + \beta_{\texttt{IV}} T_{igc} + \Omega \mathbf{X}_{igc} + \pi_{gc} + \upsilon_{igc} \tag{2}$$

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.

This model assumes that outcomes are a linear function of years in *creche*. However, this relationship could be non-linear, and below we present models that allow for this possibility, although they are not identified if we have a single binary instrument. Therefore, as we explain below, we also explore variation in the size of the waitlist for each lottery.

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, the 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 the Romano-Wolf multiple hypothesis correction (Clarke et al., 2020) and estimates for major outcomes using a strictly balanced panel. The construction of the indices is described in detail in Appendix A.

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). Then we provide ITT estimates for the main individual components of these indices, with the corresponding 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 2 we examine differences in years in daycare between those who did and did not win the lottery.[20] In the first column we present estimates from a regression of the number of years in any

[20] To construct time in daycare for each child we merge education histories from the 2012 and 2015 surveys.

type of daycare on an indicator for winning the lottery, age and gender, and strata fixed effects. We see that, on average, children who do not win the lottery (control group mean) attend daycare for 1.4 years (out of a maximum possible 4 years), while those who win the lottery attend daycare for an additional 0.46 years during their first four years of life (a 32 percent increase).

In columns 2 and 3 of Table 2 we distinguish years in private and years in public daycare. From the control means, we see that, in this sample (of applicants to the public daycare lottery), there is very little enrollment in private daycare (0.1 years on average, from a maximum of 4 years). In addition, we also observe that the estimated impact of winning the lottery on participation in daycare in column 1 is almost exclusively driven by an increase in public daycare, with very little change in private daycare attendance. In other words, the lottery shifts children from home care to public daycare, with almost no change in enrollment in private daycare.

Columns 4 and 5 instead distinguish years in part-time and full-time daycare. Part-time care is not important in our sample, and winning the lottery primarily affects years in full-time care. In sum, families and children in our sample mostly choose between home care and full-time public daycare. Even though theoretically, there could be multiple choice alternatives faced by these families, generating multiple potential counterfactuals for the use of full-time public daycare, in practice there is only one relevant counterfactual to full time public daycare, which is full-time home care. This result facilitates the interpretation of our estimates of the impacts of winning the lottery on family and child outcomes.

Having established that winning the lottery is a strong predictor of attending full-time public daycare, we now turn to estimating impacts of winning the lottery on outcomes. Table 3 shows ITT estimates from equation 1, using as outcomes each of our five indices (one in each row). The table has three columns, for outcomes measured in 2008 (when we do not have measures of children's anthropometrics or cognitive development), 2012, and 2015.[21] There are large positive impacts on all three (household) indices measured in 2008. The 2008 survey was conducted 6-11 months after lottery results were known, and lottery winners had the opportunity to enroll their children in free full-daycare from the time of the lottery (so by the time of the survey they could have benefited from 6 months of daycare). These results indicate that access to full-time care enabled caregivers to participate more intensely in the labor market (measured by the labor index, capturing employment and wages of individual adult household members) and to generate additional resources for the household (measured by the index of household income and assets). Winning the lottery also led to an increase in the index of home environments, which in 2008 primarily captures caregiver stress.

Impacts on labor market outcomes decline after children have left daycare (in 2012 and 2015), but remain positive, suggesting that lottery winners were able to benefit from sustained gains in labor market attachment due to their early experience in the labor market. Impacts of winning

[21] Accounting for selective attrition using multiple imputation gives similar results (Table A.6 in the Appendix).

the lottery on income and assets in 2008 and 2012, also decline in 2015. By 2015 there are also no detectable impacts on the home environment (the index of home environments in 2012 and 2015 mostly captures parenting behaviors, and the availability of resources for stimulating children).

There is a fade-out in the impacts of daycare on labor market and family income outcomes over time, which is natural. As children grow older and finally enter elementary school, 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 relative to carers in families who did not win. There does not seem to be any long-term impact of increased labor market attachment among caregivers of lottery winners. Such a medium to long-term analysis of the impacts of daycare on labor market outcomes of caregivers is not possible on most studies on this topic which focus on shorter term impacts.

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 centers, or because the increase in household resources enables parents to buy better food (below we attempt to distinguish these two mechanisms). There are also impacts on children's cognitive development in 2012, although these are smaller and no longer statistically significant by 2015.[22]

The magnitude of the ITT estimates does not correspond to the impact of using daycare on children and families, given that both lottery winners and losers took up some daycare. Therefore, our main IV estimates are shown in Table 4 (which can be interpreted as the impact of an additional year in daycare on the indices reported in Table 3). We find that each additional year in daycare leads to between a 0.10 to 0.14 SD increase in the labor market index, although the impact is only statistically significant in 2012. In 2012, we see a 0.34 SD increase in the income and assets index, although by 2015 the impact (0.12 SD) is smaller and statistically insignificant. There is also an impact on the home environment index in 2012, which disappears later.

For 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 (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 smaller and fade-out more quickly.

It is possible that outcomes are nonlinear functions of years in daycare. This function could be concave (because of diminishing returns), convex (because of dynamic complementarity), or have other shapes. However, with a single binary instrument it is difficult to investigate this issue. We would need additional sources of exogenous variation in access to daycare.

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

One alternative would be to use the size of the potential waitlists for each lottery, known from the application registry. The impact of winning the lottery should increase with the size of the waitlist, because with longer waitlists it is harder to gain access to daycare if a child was not one of the original lottery winners. (We show in the appendix that the impact of winning the lottery is indeed larger in locations with longer waitlists.) Therefore, we will explore the variation in the impact of winning the lottery on exposure to daycare across locations where waitlists are of different sizes to identify the impacts of different levels of exposure on outcomes.[23] Such a procedure does not require the size of the waitlist to be random across lotteries, since we control for lottery fixed effects. It does however rely on the assumption that the only reason the impact of the lottery on outcomes varies with the size of the waitlist is because the size of the waitlist (which captures exogenous supply restrictions) affects years of exposure to daycare, and not for other confounding reasons. (For example, waitlists could be larger for daycare centers which are particularly effective, in which case centers with stronger impacts on outcomes would be centers where winning the lottery leads to lower increases in exposure; or they could be larger where there is higher demand for labor or more employment opportunities, inducing more families to apply for a daycare slot.)[24]

For parsimony, we only present results for 2012 outcomes in the main paper, in Figure 1 (estimates for 2015 and for alternative specifications of the equation for years in daycare are available on request). Across outcomes, we find that there is typically a monotonic relationship between years of exposure to daycare and outcomes. We cannot reject that this relationship is linear for any outcome, and the point estimates do not indicate systematic deviations of linearity in one direction or another (e.g., concavity or convexity), therefore we proceed with the linear models in the remainder of the paper. We recognize however that our estimates are imprecise, limiting our certainty that the model is approximately linear.

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

[23] An alternative would be to use the position in the waitlist as an instrument. However, conditional on lottery outcome, position on the waitlist does not predict daycare attendance.

[24] We estimate a two equation model, where $y_{igc} = \alpha + f(E_{igc}) + \Gamma \mathbf{X}_{igc} + \delta_{gc} + \epsilon_{igc}$ is used to measure the impact of years of exposure to daycare (E_{igc}) on outcomes, and $E_{igc} = \theta + \eta L_{igc} + \lambda L_{igc} W_{igc} + \sigma L_{igc} W_{igc}^2 + \Pi \mathbf{X}_{igc} + \phi_{gc} + \omega_{igc}$ is used to measure the impact of winning the lottery on years in daycare (where W_{igc} measures the number of slots per applicant in each lottery, which is inversely related to the size of the waiting list). This model can be estimated by instrumental variables as in the main section of the paper, but to improve precision (without major changes in the results) we use a maximum likelihood estimator, assuming that the errors of these two equations are joinly normally distributed. $f(E_{igc})$ is a flexible function of E_{igc} which is parameterized by using indicator functions for years in daycare. We also estimate a specification where instead of using a quadratic in W_{igc} to model the impact of the waitlist, we discretize W_{igc} into 5 quintiles. Results are similar across these two approaches.

4.1 Household outcomes

Labor force participation and income

We begin with the components of the household level indices. Table 5 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 outcomes are considered: monthly income, employment, weeks worked, and whether the individual contributes to social security (all these variables take a value of 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 information for each household member, one of whom is then identified as the main caregiver. Therefore, in this table we look only at impacts in 2012 and 2015.[25]

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 (cohabiting) grandparents and siblings over the age of 15 (Table 5). Note that the majority of 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. By 2015, the effects of daycare on grandparents and older siblings are still positive, but smaller and no longer statistically significant.

The lack of an average impact on the labor market outcomes of parents is probably due to the fact that about 70 percent of mothers (90 percent of fathers) were already working, even among the group of families who did not win the lottery (see Appendix Table A.8). Therefore, publicly provided daycare relaxed constraints to labor force participation primarily for grandmothers and other potential caregivers (for whom employment rates were much lower: about 50 percent for grandparents and 35 percent for siblings).

Co-residence with grandparents is relatively frequent in this setting, occurring in roughly 20% of the households in our sample. Note that treatment does not affect the probability of grandmothers living in the household, as displayed in Appendix Table A.9, so our results are not driven by changes in the composition of households.[26]

The income and employment effects on grandparents and siblings are accompanied by higher

[25] Impacts in 2008 are documented in Appendix Table A.7. 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.1) at the intensive (currently employed) and extensive (weekly hours) margins, as well as on household income.

[26] There are no impacts of winning the lottery on household composition: presence of grandparents, household size, number of adults (over 18), number of children 18 or under, and children under 7. This means that there are no impacts on, for example, whether a grandparents moves out because there are fewer caregiving needs, or on whether fertility goes up because of access to childcare (for the target child). We also checked if impacts of daycare on child outcomes (nutrition, cognitive and non-cognitive outcomes) varied with household composition, namely the presence of a cohabiting grandparent. The estimates were too imprecise to be informative either way (available on request).

social security contributions, which are an indication of gains in formal sector employment. The reported impacts for grandparents, but not those for older siblings, remain statistically significant even after accounting for multiple hypotheses testing, as reported in Table A.10 in the Appendix.[27]

The effects on the labor market participation of individuals translate to gains in household resources, as documented in the second column of Tables 3 and 4. This can also be seen in Table 6, where we disaggregate the index in its different components. Only two of the coefficients in this table are statistically different from zero after accounting for multiple hypothesis testing, as shown in Appendix Table A.10 (the number of observations varies slightly across variables because of small differences in non-response rates). 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.11).

This increase in income, a consequence of stronger labor market participation, likely led to increases in consumption and assets. 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 enrollment in daycare on household income and assets, with similar patterns of fade-out (see Appendix Table A.12).

Home environment

We also investigate how access to childcare affects other, non-financial aspects of the home environment, previously summarized in the home environment index. Table 7 documents a short-run negative impact of winning the lottery (in 2008) on the total time the caregiver spends with the child, which is expected as childcare is replacing some 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 see 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 unsurprising because by 2012 (as opposed to 2008) almost no children in the sample remain enrolled in daycare. This same pattern of effects can be observed in the IV estimates (Table A.13). Finally, the aggregate home environment

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

improvements shown in Table 3 are larger among the boys in our sample (Table A.14), although we cannot reject that there are no gender differences in impacts.

4.2 Child development outcomes

In both 2012 and 2015, we observe large, statistically significant gains in both height-for-age and weight-for-age (Table 8), 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.15) 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.)[28] All these impacts remain statistically significant after adjusting the critical values for multiple hypothesis testing (Table A.10) or restricting the sample to a balanced panel (Table A.16). Impacts on anthropometric outcomes appear to be largely driven by girls (Table A.14), although these impacts are not statistically different by gender. These results also remain even if we take only first born children.

Access to public daycare improved the nutritional intake of these (mostly poor) children, which may have happened through two channels. The direct channel is through the provision ofmeals and snacks in daycare centers, an important feature of the service they provide, as discussed above.[29] There is also an indirect channel operating through an increase in household resources, which led to an increase in food expenditure (documented above), presumably driven by the consumption of more and higher quality food by households who got access to free daycare. Below we present a suggestive mediation analysis that attempts to distinguish these two channels.

As mentioned in the introduction, it is rare to see studies of nutrition interventions that follow individuals for several years. Two cases we know are a study from Guatemala (Rivera et al. (1995), Hoddinott et al. (2013)), which shows evidence of sustained impacts on nutrition, and one from Jamaica (Walker et al. (2005), Walker et al. (2006)), which does not. The intent-to-treat impacts documented in our paper are comparable to those in the Guatemalan study, but the instrumental variable estimates are arguably larger. In the introduction we also discussed the literature on cash transfers and nutrition which, again, shows ambiguous results of cash transfer programs on anthropometric outcomes of children.

In 2012, we 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 9). 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

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

[29] As mentioned above, children were also monitored by health professionals in daycare centers, and intervention was provided when problems were detected. This could also result in effects on nutrition, although these would be more likely in the case of obvious undernourishment (which we do not seem to have in our data).

in our IV estimates (Table A.17). 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, i.e., only to the (sub-)sample surveyed in 2012 (Table A.18).

Our finding that daycare attendance has small and short-lived gains on cognition could be a consequence of low center quality (Bruns et al., 2012; Devercelli and Beaton-Day, 2021). Daycare quality is often cited as a central determinant of daycare impacts on child cognition (Belsky et al., 2007; Vandell et al., 2010). That said, the quality of the centers we study is typical not only of centers in Brazil, but in several other developing countries, in a context where large fractions of children attend such centers. Our study is especially relevant to understand impacts of expanding access to the most typical daycare centers available in this context.

Impacts on reported child behavior are mostly small and statistically insignificant, as seen in Table 10. 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). (Another example is from Italy Fort et al. 2020.) The Rio de Janeiro creche program boosted physical outcomes substantially with no apparent adverse behavioral outcomes.

4.3 Mediation Analysis

The results reported so far show that access to full time daycare led to medium-term gains in child anthropometrics, short-term gains in cognition, and short-term gains in home resources and the quality of the home environment. The hypothesis we proposed above is that the impacts on children's height and weight are a direct result of access to daycare centers and the enriched nutrition they provide, since these impacts persist even though the impacts on home resources and environments do not. In contrast, short-term impacts on child cognition could be primarily a result of the short-term improvements in home resources and environments, as both disappear simultaneously. In this section we examine this hypothesis in more detail.

It is difficult to distinguish direct and indirect (through home environments) effects of daycare without full knowledge of the production function of learning, or at the very least, the causal impact of home resources and environments on child outcomes. A central challenge is that we do not have instrumental variables for home resources and environments. Instead, we begin by controlling for a very detailed set of individual and household characteristics (and therefore not affected by access to daycare). This is a standard mediation analysis with many controls.

To be specific, we augment the ITT model of equation 1 with a vector of potential mediators $\mathbf{M}_{igc}$, which include some of the indices used previously in the paper, namely income and assets in 2008, 2012 and 2015, stress score in 2008, and home environments in 2012 and 2015:

$$y_{igc} = \alpha + \beta_{\texttt{M}} L_{igc} + \Theta \mathbf{M}_{igc} + \Gamma \mathbf{X}_{igc} + \delta_{gc} + \epsilon_{igc} \tag{3}$$

We compare the estimate of $\beta_{\texttt{M}}$ in equation 3 to the estimate of $\beta_{\texttt{ITT}}$ in equation 1, and we also examine how $\beta_{\texttt{M}}$ changes as we change the vector of variables included in the vector of mediators, $\mathbf{M}_{igc}$. $\mathbf{X}_{igc}$ is a detailed vector of controls, which includes not only race and gender, but also indicators for: gender, year of birth, household size, household income, employment and job search behaviour of caregivers, whether the child has special needs or chronic health problems, whether another family member has chronic health problems, abuses drugs or alcohol, or is engaged in criminal behavior, and whether there are other children in the household attending the daycare center the child is applying for (from the lottery application records), the decile of the child birth weight, whether the pregnancy was planned, household size, whether the child is the first born, the age of the mother when the child was born, whether the mother attended (6 sessions of) prenatal care, whether the child had a natural birth or a cesarean section, and whether the child was born premature (we also include indicators for whether each variable was missing due to non-response).

Our assumption is that conditional on this detailed set of controls, the remaining variation in the mediators we consider is exogenous. This is a strong assumption, in spite of our large set of conditioning variables. Therefore we interpret our results as suggestive of the extent to which these mediators (home environments and home resources, or other correlated variables which are similarly affected by access to free daycare) partly explain the impacts of daycare on children.

The results of this exercise are reported in Table 11 for outcomes (anthropometrics and cognitive achievement) in 2012, and Table 12 for outcomes in 2015. Starting with panel A of Table 12, as we include more variables in $\mathbf{M}_{igc}$, the coefficient on winning the lottery declines from 0.134 ($\beta_{\texttt{ITT}}$)[30] to 0.109 ($\beta_{\texttt{M}}$), so the impact of daycare on 2008 and 2012 home resources and environments can explain at most 19% of the total impact of daycare on anthropometrics in 2012. In contrast, when we examine impacts on cognitive achievement in 2012 in panel B, the decline in this same coefficient is from 0.091 to 0.029, which means that the impact of daycare on 2008 and 2012 home resources and environments can explain at most 68% of the total impact of daycare on cognition in 2012. Consistent with these results, notice also that the mediators we use (especially those measured in 2012) are more strongly correlated with cognition than anthropometrics.

In other words, not much of the impact of daycare on anthropometrics is mediated by home resources, which suggests that it is likely a direct result of the nutrition provided in daycare. We cannot however rule out that daycare induces changes in other unobserved (home) mediators that are relevant for anthropometrics. In contrast, most of the gains on cognition resulting from exposure to daycare are due to an improvement in home resources and environments. The latter can be a

[30]This estimate is slightly different from the equivalent estimate from Table 3 because of the additional controls included in the mediation analysis, which make little difference for the results in Table 3 (available on request).

result of the observed increase in labor supply of adult household members, and of information parents may have received by contacting frequently with staff in daycare centers.

In Table 12 we present a similar analysis for 2015 outcomes, and 2008 and 2015 mediators (we do not use 2012 mediators because, as explained above, the sample is smaller for 2012). The results for anthropometrics are similar to the ones reported above: only 26% of the impact of daycare on this outcome can be attributed to home environments and resources, so (subject to the caveats above) the bulk of this impact could be attributed to enriched nutrition in daycare centers. Daycare impacts on 2015 cognition are small to start with so we do not comment on the mediation results (since there is essentially nothing to mediate), besides noting that (as in 2012) cognition remains strongly associated with the mediators (income and assets, and home environments).[31]

As discussed before, we recognize that this type of mediation analysis is exploratory, because we do not observe exogenous variation in mediators, and have to rely on the assumption that the variation we observe is exogenous conditional on the controls included in the model. However, we detail three sets of results which, taken together, boost our confidence in our conclusions.[32]

First, if home resources and environments are not important mediators of the impact of daycare on anthropometrics, and instead the impact of daycare on this variable is primarily due to nutrients provided in daycare, then we would expect the impact of daycare on the anthropometrics index in 2015 to be fully "mediated" by the impact of daycare on the anthropometrics index in 2012. This is because no children participated in daycare between 2012 and 2015, and therefore, were not exposed to nutrition services provided by daycare between these two years. Table 13 shows that this is precisely the case in our data. In the first column we show the impact of having access to daycare on the anthropometrics index in 2015 (taken from our table 12), in the second column we show the same impact for the more restricted sample of children for whom we also observe 2012 anthropometrics (which is similar to the one in the first column), and in the third column we show how this estimate changes when we add 2012 anthropometrics as a "mediator". The coefficient on winning the lottery is zero, and the coefficient on 2012 anthropometrics is large, suggesting that the entire impact of winning the lottery on 2015 anthropometrics comes through 2012 anthropometrics.

Second, repeating the motivation for the mediation analysis (discussed in the introduction and at the start of this section), if home resources and environments mediate much of the impact of daycare on cognition, then we may expect the decline in the impact of daycare on cognition from 2012 to 2015 to be in large part explained by the decline in the impact of daycare on home environments and resources in the same period. Looking at Table 3 we observe that β_{ITT} declines from 0.099 in 2012 to 0.033 in 2015 for the cognitive index, from 0.152 to 0.054 for the income and assets index, and from 0.107 to -0.019 for the home index. The percent decline of β_{ITT} for both

[31]The sample is not quite constant across columns of Tables 11 and 12 because there are some missing values for some of the mediators. However, keeping the sample constant does not lead to substantial changes in results, as shown in Tables A.19 and A.20 in the appendix.

[32]We also investigated if our results varied across households with and without a cohabiting grandparent. Our estimates, available on request, were imprecise, and not statistically different across these two types of households.

mediators matches (or is even larger than) the percent decline of β_{ITT} for cognitive achievement.[33]

Third, in the Appendix we present estimates from an extension of the mediation analysis (or a structural model) presented above which relaxes the conditional independence assumption, and introduces instead a different set of assumptions. There are three main changes relative to the mediation analysis above: i) we mediate the impacts of daycare attendance on outcomes (as opposed to the ITT impacts of winning the lottery), which is why we also call this a structural model; ii) to simplify the model (and, as explained next, reduce the number of endogenous variables) we consider only one mediator (combining home resources and home environments) measured only in the year the outcome is measured (we ignore 2008 mediators)[34]; and iii) we allow this mediator (as well as years of daycare attendance) to be endogenously chosen by households. This requires however access to additional variables (instruments) that generate exogenous variation not only on daycare attendance, but also on the mediator. To construct such instruments, we assume that interactions between winning the lottery and household characteristics (the number of co-resident grandparents in the household and quartiles of the distribution of pre-lottery household income), only affect outcomes either through the direct impacts of daycare attendance, or the indirect impacts coming through the mediator (what we rule out is heterogeneity in the impacts of daycare attendance coming through variables other than the mediators we consider). This is analogous to strategies used in Kline and Walters (2016) and other papers to generate additional exogenous variation from a randomized experiment, in order to go beyond standard treatment effect estimates and estimate more complex structural models.[35] The main results are in Appendix Table A.23. They are more imprecise but qualitatively similar to the results from the mediation analysis discussed above.

5 Conclusion

We study impacts of public daycare 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

[33] Notably, the coefficients measuring the "influence" of the 2012 mediators on 2012 outcomes (in table 11) are similar to those measuring the "influence" of 2015 mediators on 2015 outcomes (in table 12). In other words, the influence of the mediators on the outcomes is similar across waves, while the impact of the program on the mediator declines substantially across waves, which is what (in the mediation analysis) leads to a decline in the impact of daycare on cognitive achievement.

[34] We show in Appendix Tables A.21 and A.22 that if we were to do the analysis of tables 11 and 12 only with this mediator our conclusions from those tables would not change.

[35] We estimate a three equation model using a maximum likelihood estimator. The first equation is analogous to equation 3: $y_{igc} = \lambda + \beta_{\text{S}} T_{igc} + \Phi \mathbf{M}_{igc} + \Omega \mathbf{X}_{igc} + \pi_{gc} + \upsilon_{igc}$, where β_{S} denotes the structural model estimate of the impact of daycare on a given outcome. The second and third equations model T_{igc} (time in daycare, so these are no longer ITT results) and $\mathbf{M}_{igc}$ as a function of exogenous determinants $\mathbf{Z}_{igc}$ and controls $\mathbf{X}_{igc}$: $T_{igc} = \sigma_{\text{T}} + \Psi_{\text{T}} \mathbf{Z}_{igc} + \Xi_{\text{T}} \mathbf{X}_{igc} + \eta_{\text{T}gc} + \zeta_{\text{T}igc}$ and $\mathbf{M}_{igc} = \sigma_{\text{M}} + \Psi_{\text{M}} \mathbf{Z}_{igc} + \Xi_{\text{M}} \mathbf{X}_{igc} + \eta_{\text{M}gc} + \zeta_{\text{M}igc}$, where $\mathbf{Z}_{igc}$ is a vector of instruments which includes an indicator for whether an individual won the lottery (L_{igc}), and interactions of this variables with the number of cohabiting grandparents in the household, and family income quantiles. The variables in $\mathbf{Z}_{igc}$ are strong predictors of T_{igc} (F-stats of 10), and of $\mathbf{M}_{igc}$ for 2012 (F-stat of 5), but not for 2015 (as seen above, the impacts of the lottery on household resources and environments in 2015 are weaker than in 2012, although still positive).

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. Other studies in this field rarely report any results on employment impacts for individuals other than parents, and thus likely 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 outcomes for children and 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. 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 provided in daycare centers. 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). We do not observe impacts on socio-emotional skills.

The fact that child care interventions that have been evaluated in different contexts show very different outcomes suggests that service quality matters beyond mere access to services. Because this program has been deployed at scale, it can be used as the basis for subsequent interventions to improve its quality.

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Table 1: Balance across covariates for lottery winners and losers

	Lottery loser	Lottery winner	Regression adjusted difference	N
Male child	0.477	0.515	0.038	4,149
	(0.500)	(0.500)	(0.016)	
Year of birth: 2004	0.098	0.103	0.002	4,146
	(0.298)	(0.304)	(0.004)	
Year of birth: 2005	0.485	0.486	0.001	4,146
	(0.500)	(0.500)	(0.009)	
Year of birth: 2006	0.268	0.263	-0.003	4,146
	(0.443)	(0.440)	(0.010)	
Year of birth: 2007	0.149	0.148	0.000	4,146
	(0.356)	(0.355)	(0.005)	
Household size	4.347	4.338	-0.007	4,102
	(1.614)	(1.622)	(0.049)	
Caregiver employment	0.684	0.685	0.001	4,124
	(0.465)	(0.465)	(0.014)	
Caregiver job search	0.285	0.286	0.004	4,057
	(0.451)	(0.452)	(0.014)	
Needs childcare in order to work	0.983	0.989	0.007	4,032
	(0.131)	(0.104)	(0.004)	
Child has a chronic health condition	0.080	0.066	-0.014	4,119
	(0.271)	(0.248)	(0.008)	
Child has special needs	0.002	0.001	-0.001	4,119
	(0.049)	(0.031)	(0.001)	
Someone in household has chronic health condition	0.184	0.196	0.012	4,112
	(0.387)	(0.397)	(0.012)	
Domestic violence in the household	0.068	0.069	0.001	4,130
	(0.251)	(0.254)	(0.008)	
Household income	588.176	628.117	47.509	4,083
	(2,107.365)	(2,831.289)	(74.743)	
Race: White	0.524	0.523	-0.002	3,887
	(0.500)	(0.500)	(0.016)	
Race: Black	0.324	0.346	0.023	3,887
	(0.468)	(0.476)	(0.015)	
Race: Mixed	0.122	0.105	-0.017	3,887
	(0.327)	(0.307)	(0.010)	
Birthweight (kg)	3.189	3.206	0.024	3,742
	(0.615)	(0.612)	(0.020)	
Birth height (cm)	49.259	49.289	0.038	3,722
	(4.056)	(4.233)	(0.136)	
Age of the mother at birth	20.292	20.375	0.079	3,766
	(4.876)	(4.968)	(0.157)	
Planned birth	0.329	0.346	0.017	3,770
	(0.470)	(0.476)	(0.015)	
Firstborn	0.442	0.426	-0.014	3,764
	(0.497)	(0.495)	(0.016)	
Prenatal care	0.948	0.944	-0.003	3,765
	(0.223)	(0.230)	(0.007)	
C-section delivery	0.309	0.339	0.029	3,768
	(0.462)	(0.473)	(0.015)	
Premature birth	0.121	0.131	0.008	3,762
	(0.327)	(0.337)	(0.011)	

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. Significance adjusted using the Romano-Wolf method is indicated by *. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table 2: First Stage - Impact of Lottery on Years in daycare

	Years in any daycare	Years in private daycare	Years in public daycare	Years in part-time	Years in full-time
	(1)	(2)	(3)	(4)	(5)
Lottery Winner	0.461***	-0.057***	0.518***	-0.026*	0.464***
	(0.045)	(0.016)	(0.046)	(0.014)	(0.046)
Control group mean	1.427	0.101	1.326	0.077	1.287
N	2405	2405	2405	2405	2405

Notes: This table displays the impact of winning the lottery on average years attending any daycare (Column 1), and on average years attending private, public, part-time and full-time daycare (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. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table 3: Average intent-to-treat effects by groups of outcomes

	2008	2012	2015
	(1)	(2)	(3)
Income and Assets	0.105***	0.152***	0.054
	(0.031)	(0.052)	(0.043)
N	3762	1486	2049
Labor outcomes	0.092***	0.068*	0.048*
	(0.032)	(0.035)	(0.029)
	3754	3468	5075
Child Anthropometrics		0.154***	0.106**
		(0.004)	(0.047)
N		1438	1946
Child cognitive		0.099*	0.033
		(0.052)	(0.042)
N		1486	1999
Home environments	0.079**	0.107**	-0.019
	(0.012)	(0.052)	(0.045)
N	3762	1486	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 4: Average instrumental variables effects by groups of outcomes

	2012	2015
	(1)	(2)
Income and Assets	0.335***	0.115
	(0.114)	(0.086)
N	1486	2049
Labor outcomes	0.143*	0.104
	(0.073)	(0.065)
	3468	4576
Child Anthopometrics	0.335***	0.231**
	(0.117)	(0.099)
N	1438	1946
Child cognitive	0.217*	0.072
	(0.112)	(0.087)
N	1486	1999
Home environments	0.235**	-0.040
	(0.111)	(0.091)
N	1486	2050

Notes: This table reports IV estimates of the effect of an additional year of daycare attendance (instrumented by lottery status) on 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: Intent-to-treat estimates of effects on labor market outcomes for all household members

	Parent		Grandparent		Sibling		Others	
	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 6: 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: ITT effects from regressions with strata fixed effects and controls for child race and gender. For non-standardized measures we report the control group mean. Robust standard errors in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table 7: 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's 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 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 effects include strata fixed effects and controls for race and gender of the child. For all measures we report the control group mean. Robust standard errors in parentheses. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table 8: 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 9: 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 10: 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. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table 11: Mediation analysis for cognitive and anthropometric outcomes - 2012

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Child Anthropometrics 2012						
Lottery Winner	0.145***	0.132**	0.117**	0.119**	0.127**	0.112**
	(0.0536)	(0.0537)	(0.0552)	(0.0553)	(0.0555)	(0.0553)
Income and Assets 2008			0.111***	0.104***		0.0944***
			(0.0294)	(0.0311)		(0.0314)
Stress Score 2008			0.0703**		0.0891***	0.0682**
			(0.0310)		(0.0308)	(0.0310)
Income and Assets 2012		0.0850***		0.0507		0.0475
		(0.0284)		(0.0316)		(0.0316)
Home Environments 2012		0.00313			0.0150	0.0112
		(0.0291)			(0.0303)	(0.0301)
N	1,438	1,438	1,369	1,369	1,369	1,369
Panel B. Child Cognitive 2012						
Lottery Winner	0.106**	0.0612	0.0534	0.0444	0.0544	0.0261
	(0.0522)	(0.0508)	(0.0531)	(0.0525)	(0.0530)	(0.0521)
Income and Assets 2008			0.154***	0.106***		0.0994***
			(0.0283)	(0.0296)		(0.0295)
Stress Score 2008			0.0513*		0.0706**	0.0394
			(0.0298)		(0.0294)	(0.0292)
Income and Assets 2012		0.179***		0.160***		0.150***
		(0.0268)		(0.0299)		(0.0296)
Home Environments 2012		0.162***			0.166***	0.157***
		(0.0266)			(0.0279)	(0.0273)
N	1,486	1,486	1,412	1,412	1,412	1,412

Notes: This table presents the results for the mediation analysis for child anthropometrics and cognitive outcomes for 2012. The first column reports the ITT results and, from columns 2 to 6, each column presents coefficients from a regression with different mediators. All regressions include the same set of controls: child's gender; race (four categories); deciles of birth weight and height; whether the pregnancy was planned; whether the child is firstborn; the number of household members; deciles of household income; caregiver's age at childbirth; whether the mother had at least six prenatal visits; type of delivery (cesarean section); whether the child was born prematurely; and indicators for a set of pre-treatment household characteristics. All models also include strata fixed effects. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 12: Mediation analysis for cognitive and anthropometric outcomes - 2015

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Child Anthropometrics 2015						
Lottery Winner	0.0994**	0.0968**	0.0742	0.0737	0.0811*	0.0744
	(0.0467)	(0.0466)	(0.0481)	(0.0481)	(0.0480)	(0.0481)
Income and Assets 2008			0.0378	0.0317		0.0197
			(0.0269)	(0.0275)		(0.0279)
Stress Score 2008			0.0651**		0.0628**	0.0555**
			(0.0259)		(0.0259)	(0.0262)
Income and Assets 2015		0.0663**		0.0654**		0.0569**
		(0.0257)		(0.0271)		(0.0272)
Home Environments 2015		0.0401			0.0484*	0.0395
		(0.0248)			(0.0260)	(0.0262)
N	1,946	1,946	1,861	1,861	1,861	1,861
Panel B. Child Cognitive 2015						
Lottery Winner	0.0389	0.0332	0.0007	-0.0016	0.0241	0.0027
	(0.0429)	(0.0419)	(0.0433)	(0.0429)	(0.0432)	(0.0426)
Income and Assets 2008			0.150***	0.118***		0.106***
			(0.0242)	(0.0246)		(0.0248)
Stress Score 2008			0.0417*		0.0414*	0.0167
			(0.0233)		(0.0233)	(0.0233)
Income and Assets 2015		0.152***		0.140***		0.124***
		(0.0232)		(0.0242)		(0.0243)
Home Environments 2015		0.123***			0.140***	0.114***
		(0.0226)			(0.0238)	(0.0237)
N	1,999	1,999	1,909	1,909	1,909	1,909

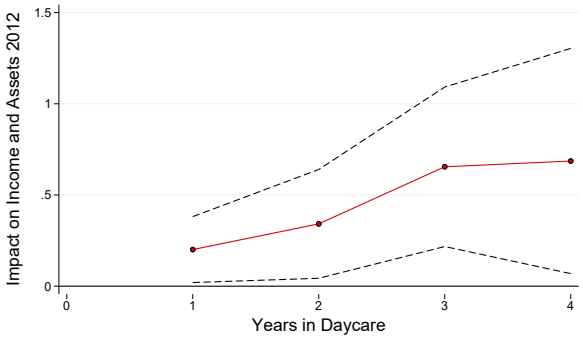
Notes: This table presents the results for the mediation analysis for child anthropometrics and cognitive outcomes for 2012. The first column reports the ITT results and, from columns 2 to 6, each column presents coefficients from a regression with different mediators. All regressions include the same set of controls: child's gender; race (four categories); deciles of birth weight and height; whether the pregnancy was planned; whether the child is firstborn; the number of household members; deciles of household income; caregiver's age at childbirth; whether the mother had at least six prenatal visits; type of delivery (cesarean section); whether the child was born prematurely; and indicators for a set of pre-treatment household characteristics. All models also include strata fixed effects. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 13: Mediation analysis for anthropometrics 2015 outcomes - anthropometrics 2012 as mediators

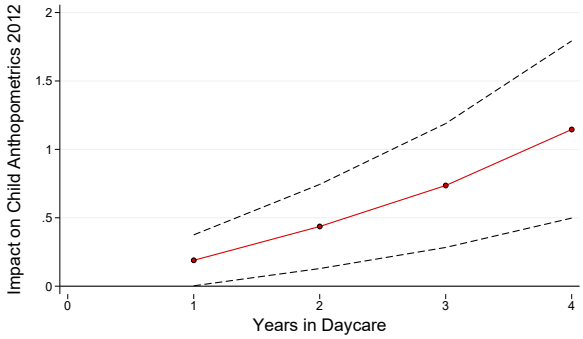
	Child Anthropometrics 2015		
	(1)	(2)	(3)
Lottery Winner	0.106**	0.117*	0.007
	(0.047)	(0.063)	(0.042)
Child Anthropometrics 2012			0.738***
			(0.022)
N	1,946	1,061	1,061

Notes: This table presents the results for the mediation analysis for anthropometrics 2015 outcomes, mediated by child anthropometrics in 2012. Specification includes strata fixed effects and controls for race and gender of the child. Robust standard errors are in parenthesis. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

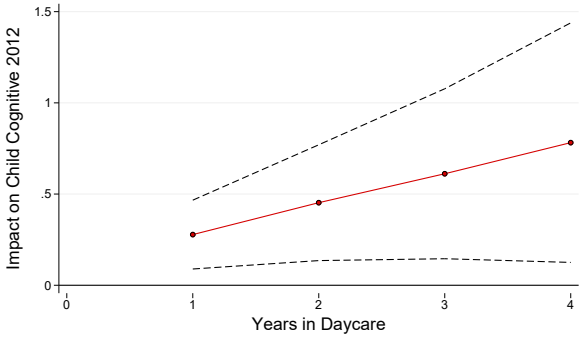
Figure 1: MLE estimates of the (nonlinear) impacts of years in daycare on 2012 outcomes



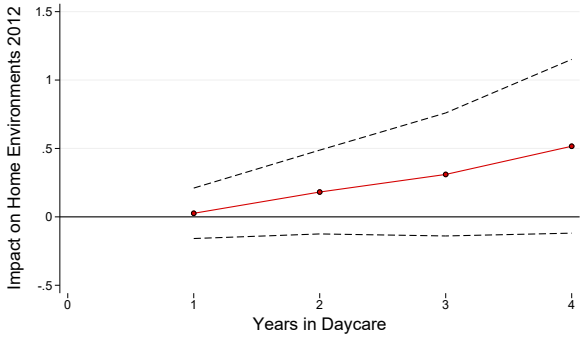
Impacts on Income and Assets (A)



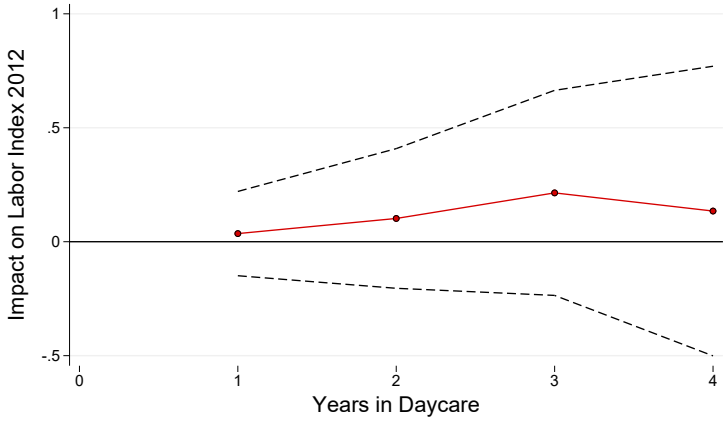
Impacts on Child Anthropometrics (B)



Impacts on Child Cognitive (C)



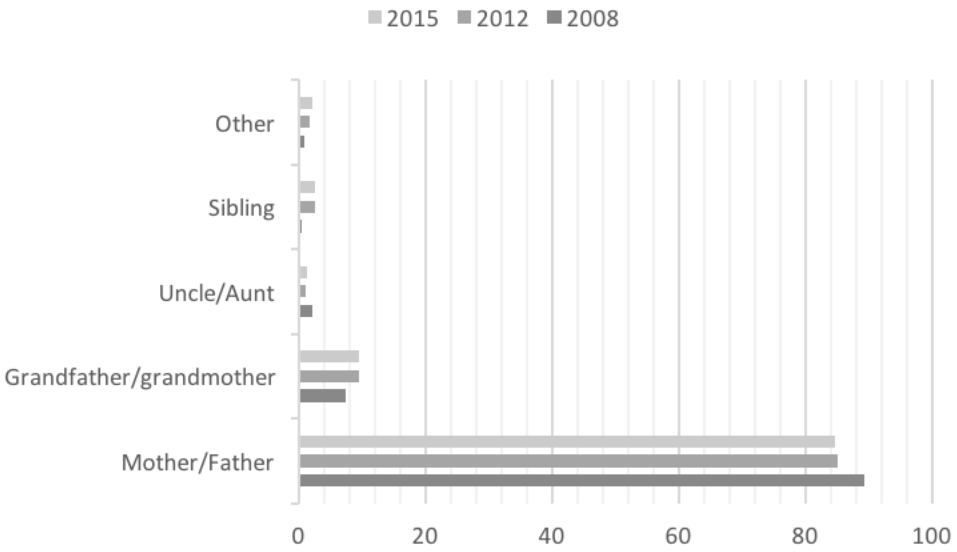
Impacts on Home Environments (D)



Impacts on Labor Index (E)

Notes: These figures report MLE estimates for the nonlinear impact of years in daycare on income and assets (Panel A), child anthropometrics (Panel B), child cognitive (Panel C), home environments (Panel D), and labor index (Panel E). Estimates come from a model with two equations: (1) outcome as a function of indicators for years in daycare and controls; (2) years in daycare as a function of being a lottery winner, the number of slots per applicant (W_{igt}), its square (W_{igt}^2), interactions with lottery winner, and controls for child race and gender. The errors of the two equations are assumed jointly normal. Dashed lines indicate 90% confidence intervals.

Figure A.1: Identity of the person reported as 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: Difference between Attritors and Non-attritors by Survey Wave

Variable	2008		2012		2015	
	Mean	**Difference**	**Mean**	**Difference**	**Mean**	**Difference**
Lottery	0.506	0.053	0.515	0.023	0.516	0.031
	(0.500)	(0.022)	(0.499)	(0.016)	(0.499)	(0.015)
Male child	0.494	-0.015	0.504	0.012	0.496	0.000
	(0.500)	(0.023)	(0.500)	(0.016)	(0.500)	(0.016)
Year of birth: 2004	0.094	-0.047**	0.104	0.005	0.097	-0.006
	(0.292)	(0.014)	(0.305)	(0.010)	(0.297)	(0.009)
Year of birth: 2005	0.492	0.051	0.452	-0.051	0.503	0.033
	(0.500)	(0.023)	(0.498)	(0.016)	(0.500)	(0.016)
Year of birth: 2006	0.268	0.021	0.301	0.053**	0.261	-0.008
	(0.443)	(0.020)	(0.459)	(0.014)	(0.440)	(0.014)
Year of birth: 2007	0.145	-0.025	0.143	-0.008	0.138	-0.019
	(0.352)	(0.016)	(0.350)	(0.012)	(0.345)	(0.011)
Household size	4.379	0.277**	4.412	0.105	4.411	0.130
	(1.638)	(0.074)	(1.667)	(0.053)	(1.642)	(0.051)
Caregiver employment	0.692	0.063*	0.704	0.030	0.696	0.023
	(0.462)	(0.021)	(0.457)	(0.015)	(0.460)	(0.015)
Caregiver job search	0.277	-0.065*	0.267	-0.028	0.271	-0.027
	(0.447)	(0.021)	(0.442)	(0.015)	(0.445)	(0.014)
Needs childcare in order to work	0.987	0.008	0.991	0.007	0.987	0.002
	(0.114)	(0.006)	(0.097)	(0.004)	(0.114)	(0.004)
Child has a chronic health condition	0.072	-0.003	0.069	-0.006	0.066	-0.013
	(0.259)	(0.012)	(0.254)	(0.009)	(0.248)	(0.008)
Domestic violence in the household	0.002	0.002	0.004	0.003	0.003	0.003
	(0.044)	(0.002)	(0.059)	(0.001)	(0.055)	(0.001)
Someone in household has chronic health condition	0.191	0.010	0.198	0.012	0.179	-0.021
	(0.393)	(0.018)	(0.399)	(0.013)	(0.383)	(0.012)
Domestic violence in the household	0.067	-0.008	0.069	0.001	0.063	-0.011

Table continued

Variable	2008		2012		2015	
	Mean	**Difference**	**Mean**	**Difference**	**Mean**	**Difference**
	(0.250)	(0.012)	(0.253)	(0.008)	(0.242)	(0.008)
Alcohol abuse in the household	0.119	0.006	0.134	0.023	0.114	-0.008
	(0.324)	(0.015)	(0.341)	(0.011)	(0.318)	(0.010)
Drug abuse in the household	0.082	0.014	0.103	0.035**	0.077	-0.006
	(0.275)	(0.012)	(0.304)	(0.009)	(0.266)	(0.008)
Family member incarcerated	0.113	-0.004	0.131	0.026	0.102	-0.023
	(0.317)	(0.015)	(0.337)	(0.010)	(0.302)	(0.010)
Other child in childcare center	0.103	0.052***	0.110	0.021	0.106	0.018
	(0.304)	(0.014)	(0.313)	(0.010)	(0.307)	(0.009)
Household Income	586.318	-164.949	626.598	28.159	556.481	-97.667
	(2284.536)	(115.372)	(2739.140)	(82.314)	(2023.398)	(78.174)
Race: White	0.523	-0.030	0.542	0.030	0.531	0.015
	(0.500)	(0.046)	(0.498)	(0.016)	(0.499)	(0.016)
Race: Black	0.338	0.078	0.319	-0.026	0.318	-0.036
	(0.473)	(0.043)	(0.466)	(0.016)	(0.466)	(0.015)
Race: Mixed	0.111	-0.068	0.110	-0.005	0.123	0.021
	(0.315)	(0.029)	(0.313)	(0.010)	(0.329)	(0.010)
Race: Other	0.028	0.020	0.028	0.001	0.028	0.001
	(0.165)	(0.015)	(0.166)	(0.005)	(0.164)	(0.005)
Birthweight	3.198	0.000	3.200	0.003	3.198	0.002
	(0.613)	(0.000)	(0.611)	(0.021)	(0.609)	(0.020)
Birth height (cm)	49.274	0.000	49.224	-0.080	49.325	0.106
	(4.147)	(0.000)	(3.981)	(0.140)	(4.180)	(0.136)
Age of the mother at birth	20.334	0.000	20.186	-0.236	20.569	0.489*
	(4.922)	(0.000)	(4.796)	(0.166)	(5.123)	(0.160)
Planned birth	0.338	0.000	0.342	0.006	0.343	0.012
	(0.473)	(0.000)	(0.474)	(0.016)	(0.475)	(0.015)
Firstborn	0.434	0.000	0.431	-0.005	0.424	-0.020

Table continued

Variable	2008		2012		2015	
	Mean	**Difference**	**Mean**	**Difference**	**Mean**	**Difference**
	(0.496)	(0.000)	(0.495)	(0.017)	(0.494)	(0.016)
Prenatal care	0.946	0.000	0.954	0.013	0.954	0.018
	(0.226)	(0.000)	(0.210)	(0.008)	(0.209)	(0.007)
C-section delivery	0.324	0.000	0.348	0.038	0.328	0.008
	(0.468)	(0.000)	(0.476)	(0.016)	(0.470)	(0.015)
Premature birth	0.126	0.000	0.136	0.015	0.132	0.012
	(0.332)	(0.000)	(0.342)	(0.011)	(0.339)	(0.011)

Notes: This table presents descriptive statistics comparing the values of variables between attritors and non-attritors. The 'Mean' column represents the mean value for participants who remained in the survey, while 'Difference' indicates the variation between attritors and non-attritors. Robust standard errors are in parentheses. Significance adjusted for multiple hypothesis testing using Clarke et al. (2020) is indicated by *.$*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$)

Table A.2: Difference in Selective Attrition between Lottery Winners and Losers

	2008	**2012**	**2015**
Male child	0.069	0.048	0.028
	(0.047)	(0.034)	(0.032)
	4149	4149	4149
Household size	-0.114	-0.141	0.091
	(0.149)	(0.106)	(0.102)
	4102	4102	4102
Caregiver is employed	0.063	-0.028	-0.035
	(0.043)	(0.030)	(0.029)
	4124	4124	4124
Caregiver is looking for a job	-0.095	0.027	0.033
	(0.042)	(0.030)	(0.028)
	4057	4057	4057
Needs childcare in order to work	-0.002	-0.016	-0.003
	(0.011)	(0.008)	(0.008)
	4032	4032	4032
Child has a chronic health condition	-0.014	0.013	0.006
	(0.024)	(0.017)	(0.016)
	4119	4119	4119
Child has special needs	-0.001	-0.005	-0.002
	(0.004)	(0.003)	(0.003)
	4119	4119	4119
Someone in household has chronic health condition	-0.010	-0.062	-0.015
	(0.036)	(0.026)	(0.025)
	4112	4112	4112
Domestic violence occurred in the household	0.014	-0.039	-0.032
	(0.023)	(0.017)	(0.016)
	4130	4130	4130
Family member abuses alcohol	-0.004	-0.014	-0.007
	(0.030)	(0.022)	(0.021)
	4126	4126	4126
Family member uses drugs	-0.055	-0.043	-0.023
	(0.025)	(0.018)	(0.017)
	4125	4125	4125
Family member is or was incarcerated	-0.029	-0.009	-0.002
	(0.029)	(0.021)	(0.020)
	4128	4128	4128
Household income	108.713	-77.094	-11.909
	(225.629)	(160.613)	(153.738)
	4083	4083	4083
Race: White	-0.086	-0.001	-0.025
	(0.095)	(0.033)	(0.033)
	3887	3887	3887
Race: Black	-0.020	0.021	0.040
	(0.090)	(0.032)	(0.031)
	3887	3887	3887
Race: Mixed	0.126	-0.008	-0.009
	(0.060)	(0.021)	(0.021)
	3887	3887	3887
Race: Other	-0.020	-0.012	-0.006
	(0.031)	(0.011)	(0.011)
	3887	3887	3887
Birthweight (kg)	0.000	-0.041	0.006
	(0.000)	(0.042)	(0.041)
	3742	3742	3742
Birth height (cm)	0.000	0.137	0.259
	(0.000)	(0.285)	(0.278)
	3722	3722	3722

Table A.2 – *Table continued*

	2008	**2012**	**2015**
Age of the mother at birth	0.000	0.147	0.003
	(0.000)	(0.329)	(0.321)
	3766	3766	3766
Planned birth	0.000	0.016	-0.040
	(0.000)	(0.032)	(0.032)
	3770	3770	3770
Firstborn	0.000	0.004	-0.030
	(0.000)	(0.034)	(0.033)
	3764	3764	3764
Prenatal care	0.000	0.004	-0.001
	(0.000)	(0.016)	(0.015)
	3765	3765	3765
C-section delivery	0.000	0.045	-0.011
	(0.000)	(0.032)	(0.031)
	3768	3768	3768
Premature birth	0.000	0.058	0.016
	(0.000)	(0.023)	(0.022)
	3762	3762	3762

Note: For this table we regress variables measured in the pre-lottery registry (or measured in the 2008 survey but concerning variables that predate the study) 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 across variables between treatment and control arms. We show the coefficient on this interaction for each variable and survey wave, the corresponding standard error, and * to indicate whether this coefficient is statistically different from zero at different significance levels after we account for multiple hypothesis testing using Clarke et al. (2020).$*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$) We apply the procedure one survey wave at a time.

Table A.3: Balance across covariates for lottery winners and lottery losers — 2008 Sample

	Lottery loser	**Lottery winner**	**Regression adjusted difference**	**N**
Male child	0.470	0.518	0.047	3,601
	(0.499)	(0.500)	(0.017)	
Year of birth: 2004	0.091	0.097	0.003	3,600
	(0.288)	(0.296)	(0.005)	
Year of birth: 2005	0.493	0.491	-0.005	3,600
	(0.500)	(0.500)	(0.010)	
Year of birth: 2006	0.268	0.268	0.001	3,600
	(0.443)	(0.443)	(0.011)	
Year of birth: 2007	0.147	0.143	0.001	3,600
	(0.354)	(0.350)	(0.005)	
Household size	4.393	4.366	-0.026	3,560
	(1.639)	(1.636)	(0.054)	
Caregiver employed	0.690	0.695	0.007	3,582
	(0.463)	(0.461)	(0.015)	
Caregiver looking for a job	0.280	0.273	-0.007	3,527
	(0.449)	(0.446)	(0.015)	
Needs childcare to work	0.984	0.990	0.006	3,502
	(0.126)	(0.100)	(0.004)	
Child has chronic condition	0.080	0.065	-0.015	3,573
	(0.272)	(0.246)	(0.009)	
Child has special needs	0.003	0.001	-0.002	3,577
	(0.053)	(0.033)	(0.002)	
Family has chronic condition	0.185	0.197	0.010	3,566
	(0.389)	(0.398)	(0.013)	
Domestic violence	0.065	0.069	0.004	3,584
	(0.247)	(0.254)	(0.008)	
Alcohol abuse in family	0.123	0.116	-0.009	3,582
	(0.329)	(0.320)	(0.011)	
Drug use in family	0.085	0.079	-0.008	3,580
	(0.280)	(0.270)	(0.009)	
Family incarcerated member	0.118	0.108	-0.010	3,582
	(0.323)	(0.311)	(0.010)	
Other child in childcare	0.105	0.102	-0.001	3,580
	(0.306)	(0.302)	(0.010)	
Race: White	0.524	0.522	-0.003	3,764
	(0.500)	(0.500)	(0.016)	
Race: Black	0.328	0.347	0.021	3,764
	(0.470)	(0.476)	(0.015)	
Race: Mixed	0.118	0.105	-0.012	3,764
	(0.322)	(0.307)	(0.010)	
Race: Other	0.031	0.026	-0.005	3,764
	(0.173)	(0.158)	(0.005)	
Birthweight (kg)	3.189	3.206	0.024	3,742

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Table A.3 (continued)

	Lottery loser	Lottery winner	Regression adjusted difference	N
	(0.615)	(0.612)	(0.020)	
Birth height (cm)	49.259	49.289	0.038	3,722
	(4.056)	(4.233)	(0.136)	
Age of the mother at birth	20.292	20.375	0.079	3,766
	(4.876)	(4.968)	(0.156)	
Planned birth	0.329	0.346	0.017	3,770
	(0.470)	(0.476)	(0.015)	
Firstborn	0.442	0.426	-0.013	3,764
	(0.497)	(0.495)	(0.016)	
Prenatal care	0.948	0.944	-0.003	3,765
	(0.223)	(0.230)	(0.007)	
C-section delivery	0.309	0.339	0.029	3,768
	(0.462)	(0.473)	(0.015)	
Premature birth	0.121	0.131	0.008	3,762
	(0.327)	(0.337)	(0.011)	

Notes: This table represents the balance for the 2008 sample. Robust standard errors are in parentheses. Data come from registry and survey data. errors are in parentheses. Significance adjusted for multiple hypothesis testing using Clarke et al. (2020) is indicated by *.$*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$)

Table A.4: Balance across covariates for lottery winners and lottery losers — 2012 Sample

	Lottery loser	Lottery winner	Regression adjusted difference	N
Male child	0.467	0.538	0.062	1,415
	(0.499)	(0.499)	(0.027)	
Year of birth: 2004	0.098	0.110	0.010	1,413
	(0.297)	(0.313)	(0.008)	
Year of birth: 2005	0.445	0.459	0.012	1,413
	(0.497)	(0.499)	(0.017)	
Year of birth: 2006	0.317	0.286	-0.022	1,413
	(0.466)	(0.452)	(0.017)	
Year of birth: 2007	0.140	0.146	0.000	1,413
	(0.347)	(0.353)	(0.010)	
Household size	4.460	4.367	-0.115	1,394
	(1.627)	(1.704)	(0.089)	
Caregiver employed	0.715	0.694	-0.019	1,408
	(0.452)	(0.461)	(0.025)	
Caregiver looking for a job	0.255	0.278	0.022	1,388
	(0.436)	(0.448)	(0.024)	
Needs childcare to work	0.992	0.989	-0.003	1,375
	(0.087)	(0.105)	(0.005)	
Child has chronic condition	0.070	0.069	-0.006	1,402
	(0.255)	(0.253)	(0.014)	
Child has special needs	0.006	0.001	-0.004	1,409
	(0.076)	(0.037)	(0.003)	
Family has chronic condition	0.211	0.186	-0.030	1,399
	(0.409)	(0.389)	(0.022)	
Domestic violence	0.082	0.056	-0.024	1,411
	(0.274)	(0.231)	(0.014)	
Alcohol abuse in family	0.144	0.124	-0.016	1,405
	(0.352)	(0.330)	(0.019)	
Drug use in family	0.119	0.088	-0.030	1,406
	(0.324)	(0.284)	(0.016)	
Family incarcerated member	0.139	0.124	-0.015	1,413
	(0.346)	(0.329)	(0.018)	
Other child in childcare	0.109	0.111	0.003	1,407
	(0.312)	(0.315)	(0.017)	
Household income (R)	645.620	608.530	-10.930	1,394
	(2,456.520)	(2,984.480)	(151.680)	
Race: White	0.542	0.543	-0.002	1,486
	(0.499)	(0.499)	(0.026)	
Race: Black	0.302	0.335	0.038	1,486
	(0.460)	(0.472)	(0.025)	
Race: Mixed	0.122	0.099	-0.022	1,486
	(0.328)	(0.299)	(0.017)	
Race: Other	0.033	0.024	-0.014	1,486
	(0.180)	(0.152)	(0.009)	
Birthweight (kg)	3.207	3.193	0.005	1,404
	(0.605)	(0.616)	(0.033)	
Birth height (cm)	49.195	49.251	0.214	1,393
	(3.602)	(4.302)	(0.217)	

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Table A.4 (continued)

	Lottery loser	Lottery winner	Regression adjusted difference	N
Mother's age at birth	20.102	20.264	0.110	1,407
	(4.559)	(5.008)	(0.258)	
Planned birth	0.329	0.353	0.020	1,411
	(0.470)	(0.478)	(0.026)	
Firstborn	0.441	0.422	-0.012	1,410
	(0.497)	(0.494)	(0.027)	
Prenatal care	0.956	0.952	-0.001	1,410
	(0.206)	(0.214)	(0.012)	
C-section delivery	0.314	0.380	0.050*	1,409
	(0.464)	(0.486)	(0.026)	
Premature birth	0.112	0.158	0.039**	1,409
	(0.316)	(0.365)	(0.019)	

Notes: This table represents the balance for the 2012 sample. Robust standard errors are in parentheses.errors are in parentheses. Significance adjusted for multiple hypothesis testing using Clarke et al. (2020) is indicated by *.$*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$)

Table A.5: Balance across covariates for lottery winners and lottery losers — 2015 Sample

	Lottery loser	Lottery winner	Regression adjusted difference	N
Male child	0.468	0.522	0.050	1,953
	(0.499)	(0.500)	(0.023)	
Year of birth: 2004	0.090	0.105	0.001	1,951
	(0.286)	(0.306)	(0.007)	
Year of birth: 2005	0.500	0.506	0.002	1,951
	(0.500)	(0.500)	(0.014)	
Year of birth: 2006	0.275	0.248	-0.008	1,951
	(0.447)	(0.432)	(0.015)	
Year of birth: 2007	0.135	0.142	0.005	1,951
	(0.342)	(0.349)	(0.007)	
Household size	4.404	4.419	0.045	1,923
	(1.616)	(1.667)	(0.075)	
Caregiver employed	0.702	0.690	-0.017	1,941
	(0.457)	(0.463)	(0.021)	
Caregiver looking for a job	0.263	0.278	0.021	1,911
	(0.441)	(0.448)	(0.020)	
Needs childcare to work	0.985	0.989	0.006	1,899
	(0.123)	(0.105)	(0.005)	
Child has chronic condition	0.069	0.063	-0.009	1,937
	(0.254)	(0.243)	(0.012)	
Child has special needs	0.004	0.002	-0.003	1,943
	(0.065)	(0.045)	(0.003)	
Family has chronic condition	0.179	0.179	0.005	1,933
	(0.384)	(0.383)	(0.018)	
Domestic violence	0.073	0.053	-0.013	1,946
	(0.260)	(0.224)	(0.012)	
Alcohol abuse in family	0.121	0.108	-0.011	1,941
	(0.327)	(0.311)	(0.015)	
Drug use in family	0.085	0.069	-0.014	1,940
	(0.279)	(0.254)	(0.012)	
Family incarcerated member	0.107	0.097	-0.009	1,947
	(0.309)	(0.296)	(0.014)	
Other child in childcare	0.106	0.105	0.006	1,941
	(0.309)	(0.307)	(0.014)	
Household income (R)	539.220	572.780	54.870	1,927
	(1,267.590)	(2,539.070)	(95.760)	
Race: White	0.536	0.526	-0.019	2,050
	(0.499)	(0.500)	(0.023)	
Race: Black	0.297	0.338	0.048	2,050
	(0.457)	(0.473)	(0.021)	
Race: Mixed	0.135	0.112	-0.022	2,050
	(0.342)	(0.316)	(0.015)	
Race: Other	0.032	0.024	-0.007	2,050
	(0.177)	(0.152)	(0.007)	
Birthweight (kg)	3.188	3.208	0.029	1,942
	(0.616)	(0.602)	(0.029)	
Birth height (cm)	49.252	49.392	0.204	1,933
	(4.160)	(4.199)	(0.193)	

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Table A.5 (continued)

	Lottery loser	Lottery winner	Regression adjusted difference	N
Mother's age at birth	20.524	20.612	-0.025	1,953
	(5.098)	(5.148)	(0.236)	
Planned birth	0.343	0.343	-0.014	1,955
	(0.475)	(0.475)	(0.022)	
Firstborn	0.442	0.408	-0.025	1,951
	(0.497)	(0.492)	(0.023)	
Prenatal care	0.957	0.952	-0.004	1,955
	(0.202)	(0.214)	(0.010)	
C-section delivery	0.314	0.341	0.025	1,954
	(0.464)	(0.474)	(0.022)	
Premature birth	0.122	0.142	0.011	1,952
	(0.327)	(0.349)	(0.016)	

Notes: This table represents the balance for the 2015 sample. Robust standard errors are in parentheses.errors are in parentheses. Significance adjusted for multiple hypothesis testing using Clarke et al. (2020) is indicated by $^{*}.*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$)

Table A.6: Multiple Imputation - Average Effects by Groups of Outcomes

	Labor outcomes	Income outcomes	Child Anthropometrics	Child Cognitive	Home environment outcomes
	(1)	(2)	(3)	(4)	(5)
2008 average effects	0.098***	0.087***			0.074**
	(0.031)	(0.032)			(0.033)
N	4349	4349			4349
2012 average effects	0.067	0.152***	0.114**	0.068	0.105**
	(0.041)	(0.059)	(0.050)	(0.055)	(0.045)
N	2769	2769	2769	2769	2769
2015 average effects	0.086***	0.065	0.124***	0.060	-0.037
	(0.029)	(0.044)	(0.044)	(0.043)	(0.045)
N	4349	4349	4349	4349	4349

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.7: 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.8: 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.9: 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.10: 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), and applied to each table separately (as opposed to all tables simultaneously).

Table A.10: 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.10: 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.11: 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.12: 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.13: 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.14: 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.15: 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.16: 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.17: Instrumental variables impacts of of daycare attendance on children's cognitive skills

	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.18: Intent-to-treat estimates of effects on children's cognitive skills: 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. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$

Table A.19: Mediation analysis for cognitive and anthropometrics outcomes - 2012 (keeping sample constant across columns)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Child Anthropometrics 2012						
Lottery Winner	0.147***	0.134**	0.126**	0.128**	0.135**	0.121**
	(0.055)	(0.056)	(0.055)	(0.055)	(0.055)	(0.055)
Income and Assets 2008			0.115***	0.108***		0.098***
			(0.029)	(0.031)		(0.031)
Stress Score 2008			0.072**		0.090***	0.070**
			(0.031)		(0.031)	(0.031)
Income and Assets 2012		0.090***		0.051		0.048
		(0.030)		(0.032)		(0.032)
Home Environments 2012		0.011			0.013	0.009
		(0.030)			(0.030)	(0.030)
N	1,369	1,369	1,369	1,369	1,369	1,369
Panel B. Child Cognitive 2012						
Lottery Winner	0.075	0.034	0.050	0.040	0.049	0.022
	(0.054)	(0.052)	(0.053)	(0.053)	(0.053)	(0.052)
Income and Assets 2008			0.150***	0.102***		0.096***
			(0.028)	(0.030)		(0.030)
Stress Score 2008			0.050*		0.068**	0.039
			(0.030)		(0.029)	(0.029)
Income and Assets 2012		0.188***		0.161***		0.151***
		(0.028)		(0.030)		(0.030)
Home Environments 2012		0.158***			0.166***	0.156***
		(0.027)			(0.028)	(0.027)
N	1,412	1,412	1,412	1,412	1,412	1,412

Notes: This table presents the results for the mediation analysis for child anthropometrics and cognitive outcomes for 2012. Columns 1-6 report different specifications: i) i) first column reports the ITT results; ii) second column presents the results including the income 2008 variables as mediators and iii) third column presents income 2008 and stress score 2008 as mediators, iv) fourth column presents income 2008 and 2012 as mediators; v) column 5 reports stress score and home environments in 2012 as mediators, and vi) column six includes all previous variables as mediators. All specifications include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parenthesis. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table A.20: Mediation analysis for cognitive and anthropometrics outcomes - 2015 (keeping the sample constant across columns)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Child Anthropometrics 2015						
Lottery Winner	0.087*	0.085*	0.079*	0.079	0.086*	0.079*
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
Income and Assets 2008			0.042	0.035		0.023
			(0.027)	(0.028)		(0.028)
Stress Score 2008			0.065**		0.064**	0.056**
			(0.026)		(0.026)	(0.026)
Income and Assets 2015		0.071***		0.069**		0.061**
		(0.026)		(0.027)		(0.027)
Home Environments 2015		0.047*			0.045*	0.036
		(0.026)			(0.026)	(0.026)
N	1,861	1,861	1,861	1,861	1,861	1,861
Panel B. Child Cognitive 2015						
Lottery Winner	0.017	0.013	-0.002	-0.004	0.019	0.000
	(0.043)	(0.042)	(0.043)	(0.043)	(0.043)	(0.042)
Income and Assets 2008			0.142***	0.113***		0.101***
			(0.024)	(0.024)		(0.025)
Stress Score 2008			0.038*		0.038	0.016
			(0.023)		(0.023)	(0.023)
Income and Assets 2015		0.146***		0.134***		0.120***
		(0.023)		(0.024)		(0.024)
Home Environments 2015		0.118***			0.132***	0.108***
		(0.023)			(0.024)	(0.024)
N	1,909	1,909	1,909	1,909	1,909	1,909

Notes: This table presents the results for the mediation analysis for child anthropometrics and cognivitve outcomes for 2015. Columns 1-6 report different specifications: i) i) first column reports the ITT results; ii) second column presents the results including the income 2015 variables and home environments 2015 as mediators and iii) third column presents income 2008 and stress score 2008 as mediators, iv) fourth column presents income 2008 and 2015 as mediators; v) column 5 reports stress score and home ennvironments in 2015 as mediators, and vi) column six includes all previous variables as mediators. All specifications include strata fixed effects and controls for race and gender of the child. Robust standard errors are in parenthesis. $*p \leq 0.1$, $**p \leq .05$, $***p \leq .01$.

Table A.21: Appendix – Mediation analysis with a single mediator (2012)

	(1)	(2)
Panel A. Child Anthropometrics 2012		
Lottery Winner	0.145***	0.134**
	(0.0536)	(0.0538)
Standardized mean of income and home		0.0900**
		(0.0395)
N	1,438	1,438
Panel B. Child Cognitive 2012		
Lottery Winner	0.106**	0.0617
	(0.0522)	(0.0508)
Standardized mean of income and home		0.341***
		(0.0365)
N	1,486	1,486

Notes: This table presents ITT estimates (Column 1) and mediation estimates with one mediator only (Column 2). The mediator is the standardized mean of income and home environment variables in 2012. All regressions include the same set of controls as the mediation exercise in the main text and also strata fixed effects. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.22: Appendix – Mediation analysis with a single mediator (2015)

	(1)	(2)
Panel A. Child Anthropometrics 2015		
Lottery Winner	0.0994**	0.0982**
	(0.0467)	(0.0465)
Standardized mean of income and home		0.105***
		(0.0329)
N	1,946	1,946
Panel B. Child Cognitive 2015		
Lottery Winner	0.0389	0.0344
	(0.0429)	(0.0419)
Standardized mean of income and home		0.274***
		(0.0299)
N	1,999	1,999

Notes: This table presents ITT estimates (Column 1) and mediation estimates with one mediator only (Column 2). The mediator is the standardized mean of income and home environment variables in 2015. All regressions include the same set of controls and strata fixed effects. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.23: Structural Equation Models – Mediation Analysis (2012 and 2015)

	2012		2015	
	No Mediator	With Mediator	No Mediator	With Mediator
Panel A: Cognitive Index				
Semesters in Daycare	0.090	0.028	0.036	0.039
	(0.055)	(0.057)	(0.043)	(0.062)
Mediator	–	0.494*	–	-1.148
	–	(0.273)	–	(1.142)
N	1486	1486	1999	1999
Panel B: Anthropometric Index				
Semesters in Daycare	0.121***	0.090*	0.096**	0.099**
	(0.052)	(0.054)	(0.044)	(0.045)
Mediator	–	0.368	–	0.374
	–	(0.265)	–	(1.063)
N	1486	1486	1999	1999

Notes: Each column reports estimates from a structural equation model with group fixed effects and robust standard errors (in parentheses). The outcomes are standardized cognitive and anthropometric indices for 2012 and 2015. Models in columns (2) and (4) include a continuous mediator combining home environment and income stimulation. All models include baseline covariates. F-tests report the p-value, chi-squared statistic, and degrees of freedom for the joint significance of the instruments in the first stage. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix A Constructing Outcome Indices

Our primary analysis uses indices as dependent variables in the regression models. These indices were constructed to reflect various outcome dimensions: labor, income, child anthropometrics, child cognitive development, and the home environment. All indices were constructed following the methodology outlined in Anderson (2008). Specifically, the indices were constructed using the `icw_index` command in Stata. The `icw_index` command aggregates the variables listed into a single index, following the inverse covariance weighting method described by Anderson (2008). This method ensures that the indices accurately reflect the underlying dimensions they are intended to measure. The inputs for each index are listed below.

A.1 Income and Asset Index

The income and asset index incorporates household income and an asset index derived from the household survey data for the reference years 2008, 2012, and 2015. This index provides a comprehensive measure of the economic status of the households over the specified years.

A.2 Home Environment Index

For 2008, the home environment index was constructed using a stress score index derived from an instrument measuring caregiver stress. For 2012 and 2015, this index was expanded to include the following variables:

- Observational measure (collected by the survey enumerator) of the relationship with the child (both positive and negative aspects). It captures the interactions with the child during the interview.
- Stress score using the same instrument as in 2008
- Variables measuring self reported data on whether the parents ever read or sang to the child
- Number of books in the household, also self reported.

A.3 Labor Outcomes Index

The labor outcomes index for 2008 was constructed using the variables: employment status and hours worked per week of the primary caregiver. For 2012 and 2015, this index was constructed for all family members for whom data was collected and included additional variables such as:

- Employment status
- Hours worked per week
- Whether the individual contributed to social security
- Individual work income

A.4 Child Cognitive Outcomes Index

The cognitive outcomes index incorporates scores from various cognitive tests administered to the children, as detailed in the paper. The tests included are:

- Test of Visual and Auditory Processing (TVIP)
- Visual integration
- Executive function
- Memory for names

A.5 Child Anthropometrics Index

The child anthropometrics index uses two key variables:

- Height-for-age
- Weight-for-age