

Involving Parents in Preschool programs:
Effects on Child and Mother Outcomes

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Chapter 1

Literature Review

1.1 Introduction

This chapter presents a literature review on early childhood interventions and women's empowerment.

In the first part I highlight the importance of intervening on children at an early stage. Throughout the chapter, the main early childhood programs in the US and the rest of the world are reviewed. Particular importance is given to the discussion on the role of the family vs. centre-based child care for the child's development.

In the second part I give an overview of how the world has been dealing with women's empowerment and gender equality over the last decades, together with the current situation in the developing world in general and in Ecuador in particular. Afterwards, some of the most effective ways on how to reach these goals are depicted, focusing primarily on the role of education and access to economic opportunities. The chapter ends with a review of the different measures of women's power that have been used by the literature across time.

1.2 Early Childhood Development

1.2.1 Overview

In the early literature on human capital, Becker (1964) highlighted that acquired human capital models could explain many characteristics of earning differentials that models based on innate and constant cognitive ability alone could not [13].

Another part of the literature focused on innate ability instead, as if there was no learning content in schooling (e.g. the signalling literature, [70, 71]). At the same time, non-cognitive features like motivation, persistence, time preference, and self-control were disregarded.

More recent research has recognized the role of both cognitive and non-cognitive abilities in determining schooling and socioeconomic returns, and today there is widespread agreement that non-cognitive abilities, even if harder to measure, play an important role [37]. Moreover, both cognitive and non-cognitive skills can be improved: innate ability does not completely determine eventual outcomes, environmental factors are also relevant. Skills or abilities are gained and improved during the life cycle of an individual, but their malleability differs at different times in life. The gaps in skills among individuals emerge early and persist. Heckman and Masterov (2007) find that young children in disadvantaged environments have lower IQs and academic performance, lower wages in adulthood, and are more likely to behave antisocially [48]. Shonkoff et al. (2009) also find poorer health outcomes for young children in disadvantaged environments. The main differences among children already exist before school begins [69]. This highlights the importance of intervening in the first years of childhood. Cunha and Heckman (2007) develop a model of skill formation that summarizes these and other findings from the recent literature [27].

Rates of return to human capital investment across all ages

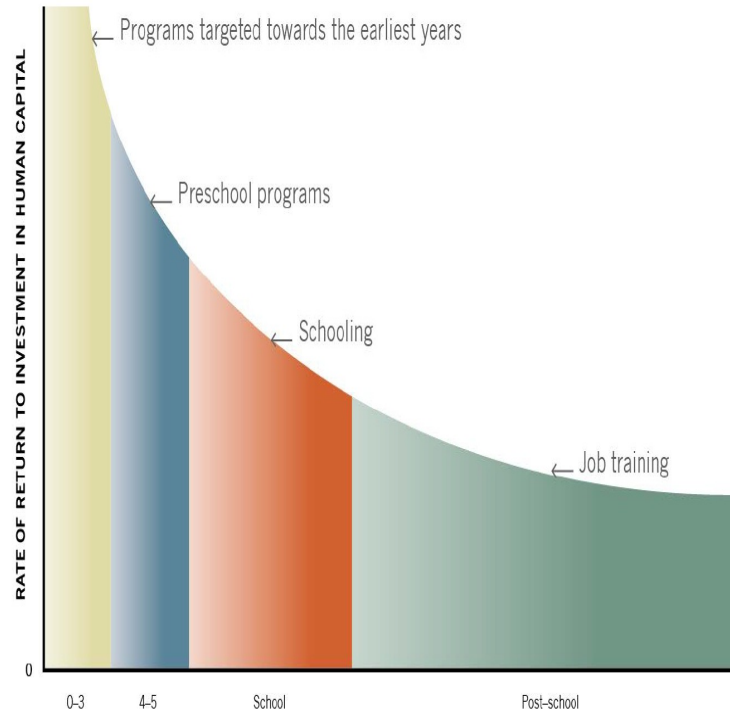


Figure 1.1:
Source: [24]

In the figure above we can see the returns to a marginal increase in investment at different stages of the life cycle. Age is drawn on the horizontal axis, while the rate of return to investment in human capital is on the vertical axis. The underlying assumption is that the same investment is made at each time period. *Ceteris paribus*, the rate of return to a dollar of investment made while the individual is younger is higher than a dollar invested at a later stage. For people with higher innate ability, the above curve lies farther out to the right. Returns are measured on numerous outcomes. If interventions are early enough, child schooling, health, cognition and behaviour of children can be improved both in the short and in the long run [48, 69]. Therefore, investments should be pursued at an early stage, but they should also be sustained and followed up to be effective.

A possible explanation of these findings comes from Cunha et al. (2006). According to them, skills accumulated in early childhood are complementary to

Overall effect sizes of early childhood interventions on child cognition, behaviour, schooling and health outcomes over the short and longer term

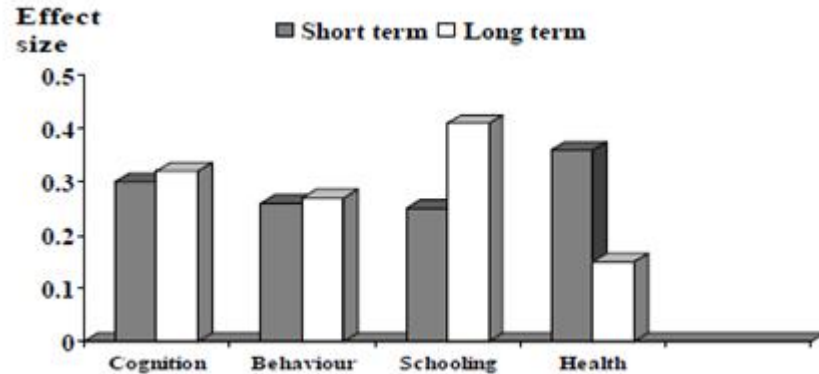


Figure 1.2:
Source: [61].

later learning, in two ways: 1) early investments bolster the productivity of later investments and 2) early investments are most effective when followed by later investments. Moreover, skills are self-productive: skills acquired in one period augment the skills attained at later periods, i.e. they are self-reinforcing. Complementarity and self-productivity together lead to multiplier effects which explain why “skill begets skill through a multiplier process” [28]. Therefore, there exist high returns to early investments in the life cycle, while remediation of insufficient early childhood investments appears costly and difficult [21, 55, 20]. At the meeting held by the Inter-American Bank in Costa Rica in 2007, early childhood interventions were viewed as the most effective program to ameliorate public spending [80]. The awareness of the importance of educational investments in early childhood is increasing now and the global pre-primary gross enrolment ratio is rising. Despite such progress, as you can see from the figure below governments still pay comparatively little attention (relative to education at other ages) to early childhood education, and this is even more extreme in developing countries:

Average shares of public current expenditure on education by level, by income group, 2005

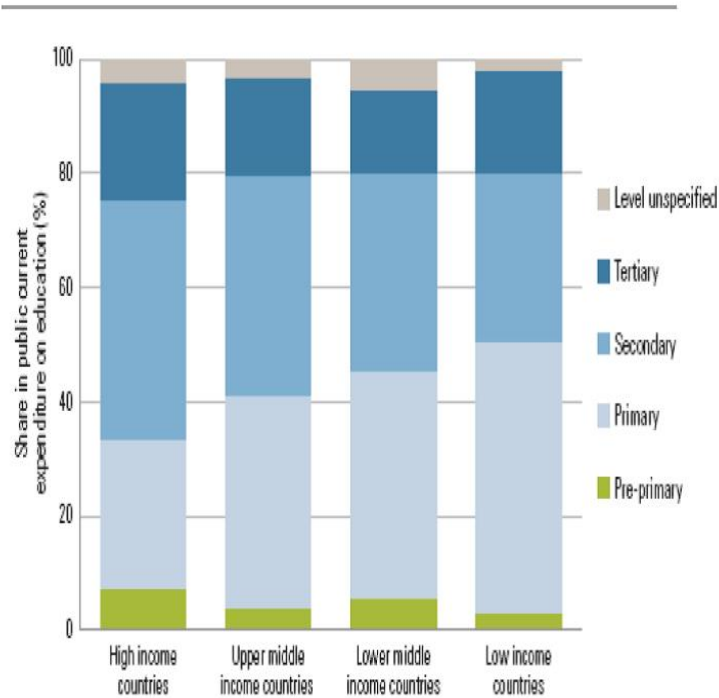


Figure 1.3:
Source: Unesco, 2010.

As a consequence, the supply of early childhood education largely differs across countries. “Coverage remains very low in most of the developing world and few programmes exist for children under age 3” [81]. Children from poorer countries risk to have less access to early childhood programs than those from richer countries. Grantham-McGregor (2007) claims that today we face the challenge of providing access to early childhood interventions in developing countries for 559 million children under age 5. In fact, less than 1% of the total education budget is devoted to preschool education in developing countries [43].

1.2.2 Early childhood programs - Evidence from the world

1.2.2.1 Evidence from the USA

There are a few very famous early childhood programs that involve parents to a certain extent and for which data are still being collected through long-term

follow ups. They are all targeted at children from disadvantaged families in the United States.

One is the **High/Scope Perry Preschool**. The first estimates of the program were captured by Barnett, 1985. 58 black children were randomly selected to enter the program between 1962 and 1967. They participated in it for two years: they were enrolled at age 3 or 4 and stayed until age 6. The average age at entry was three and a half years. It was a half-day program (two hours and a half for five mornings a week) on a small scale in Ypsilanti (Michigan) public schools. Every week, the teacher visited the house for 90 minutes, trying to involve the mother in the educational process. During the summer holidays (from June to mid-October) there were no classroom sessions. There were follow ups at age 27 and 40. Treated children once adults showed higher median annual earnings and higher median monthly incomes at ages 27 and 40, were more likely to be working at both ages, had more stable dwelling arrangements, owned a car, and were more likely to have graduated from high school. Statistics on crime for the treatment group showed an improvement too: overall arrests were reduced, as well as arrests for violent crimes, property and drug crimes and subsequent prison or jail sentences. Fewer treated men reported using sedatives, sleeping pills, or tranquilizers, marijuana or hashish, or heroin [68]. However, the initial increase that was captured in IQ faded out in four years after the treatment. This brought Conti et al. (2012) to suggest that the Perry Preschool Program worked mainly through non-cognitive channels [24].

There are two major drawbacks to the data from this intervention [73]: 1) the small sample size; 2) it was a research initiated model program and it was unclear how these results could be achieved in non-model preschool programs such as those offered by public schools or NGOs.

The **Abecedarian program** was a full-day educational child care program based at the Fran Porter Graham Child Development Institute in Chapel Hill (North Carolina). Children participated in the program for 5 years: they entered at 4 months and continued until age 8. It involved 111 children born between 1972 and 1977 from randomly selected high risk families. Most of the children in the four cohorts were Afro-American (98%) . Half of them were recruited for the preschool intervention while the other half entered the control group. At five years old, children were randomly divided once more: a group was assigned to a school age program while the remaining children formed the control group. In total there were 4 groups. The preschool intervention was offered in a day care centre setting where children came six to eight hours per day, five days a week,

50 weeks per year. The school treatment started at kindergarten and lasted until the third year of elementary school. A resource teacher was assigned to each child. The resource teacher was in charge of giving the child supplementary home activities in maths and reading, helping the family to support the child (also transporting children to different places), and acting as a link between the family and the school. Resource teachers visited the school and the child's house nearly 17 and 15 times per year respectively. Nutritional supplements were also provided. It was one of the most intensive and longest programs.

There were follow-ups when participants reached age 12, 15, and 21. Even when adults, children who participated in the preschool treatment got higher scores on intellectual and academic measures (the full-scale Wechsler intelligence test and verbal intelligence test), reading and math skills (Woodcock-Johnson scales for broad reading, letter-work identification, broad mathematics, calculation, reading-grade equivalent, and math-grade equivalent), enjoyed more years of education (on average half a year more), were more likely to attend a 4-year college, and teenage girls were less likely to be pregnant. Effects on crime were not found, nor on the Wechsler performance intelligence test, on graduating high school, on being employed or on use of alcohol. Marijuana use within the past 30 days and cigarette use were significantly lower; no differences were found on the use of other illegal drugs [22].

Temple et al. (2007) criticize the small sample size [73].

The **Chicago Child-Parent Centers** (CPC) was implemented in 11 Chicago public schools in 1967. The program was targeted at preschool age children (age 3), and lasted until age 9 if they so wished. The schools were in the high-poverty neighbourhoods of Chicago. The Centres provided half-day care during the school year and full-time care for a month and a half during the summer holidays. They were directed by a Head Teacher in collaboration with headmasters of the primary schools. The Head Teacher coordinated the program, parental involvement and other services offered to the community. Parents were offered the chance to volunteer in the class and to participate in scholastic events. They were also invited to a program for their personal development and to other events. In this non-experimental environment, 989 minority (93% African American) children enrolled in the program in 1983-4; 550 children who enrolled in kindergarten only formed the control group. Individuals were followed up to age 22 and data keep on being collected. The total sample therefore reaches approximately 1,500 children. Overall, the treatment group showed significantly lower rates of special education and grade retention. At the same time, they

showed more years of education (about a one-half) and higher rates of school completion at age 27. The program showed an effect on crime too: juvenile petitions by age 18 were lower [73].

The **Head Start Program** started in 1965 [9], providing social, health, and nutritional services to children and their low-income parents [65]. 561,000 children, mostly African American, participated in the program. The Head Start expanded quickly [38]. More than 22 million pre-school aged children had been enrolled in the program by the end of 2005. Since 2000, many studies have been engaged in evaluating the program and the evidence is ambiguous. In 1998, Congress asked for an intensive study of the program: the Head Start Impact Study. It was conducted with approximately 5,000 3- and 4- year-old children randomly assigned either to the program or to other services selected by their parents. The data collection went on since 2002 to 2006. Benefits were found on the cognitive domain for children in the treatment groups: for the 4-year-old group benefits concentrated in language and literacy, whereas for the 3-year-old group in more cognitive domains (including maths, health status, parent reading to child, etc.). However, the advantages in cognitive outcomes, social-emotional outcomes, health outcomes, and parenting outcomes faded away in both groups later on [62]. Why the initial gains were offset later on is not fully clear [34]. However, Garces (2002) points out that the fact that positive effects on test scores faded out by around the third grade “does not necessarily imply that Head Start children do not benefit from starting school “on the right foot” [38].” The declining gain in test scores seems to be at odds with the positive impact on longer term outcomes [34], reported in the study of Deming (2009). Deming (2009) evaluates the long-term effects of Head Start for children enrolled between 1984 and 1990 comparing siblings, under the assumption that selection into the program among members of the same family is uncorrelated with unobserved determinants of outcomes. He finds that the long-term impact of Head Start is about 0.23 standard deviations on a summary index of young adult outcomes (including high school graduation, college attendance, idleness, crime, teen parenthood, and health status), with greater effects for more disadvantaged children. He also measures a gain of 0.15 standard deviations in an age 5-6 test score that is reduced to about 0.05 by ages 11-14 [31].

A program that was born from the Head Start Program is the **Early Head Start**, established in 1995 to serve specifically children in their first 3 years of life and their low-income families (or low-income pregnant mothers) within the

existing Head Start setting. The Early Head Start offers three different interventions: a home-based intervention with weekly home visits and fortnightly socialization meetings for mothers, a centre-based intervention that also offers at least two yearly home-visits, and a combination of the two [19]. Findings on the effects of the program on children’s development differ depending on the studies that have been carried out.

Overall, the evidence on the effect of such programs on cognitive development is quite mixed: programs like the Early Head Start or the Head Start seem to have a tiny effect on cognitive development, whereas other programs, such as the Abecedarian program, have a greater influence [9, 34]. Even though there is consensus on the relevance of intervening at an early stage, which are the most effective and efficient ways to do it is still discussed [61].

1.2.2.2 Evidence from other countries

For early childhood interventions outside the US, here are relatively few high-quality evaluations [61]. Two are the main literature reviews that address them. Baker-Henningham and Lopez Boo (2010) “Early Childhood Stimulation Interventions in Developing Countries: A Comprehensive Literature Review”, where they thoroughly examine 28 programs implemented in low and middle income countries; and Nores and Barnett (2010) “Benefits of early childhood interventions across the world: (Under) Investing in the very young”, where they review 56 quasi-experimental and randomized studies related to 30 programs in 23 countries in Europe, Asia, Africa, Central and South America.

In order to compare the various programs, NB (2010) calculate Cohen’s *D* effect sizes for the outcomes and conduct a meta-analysis for the effects. Average effect sizes of early childhood interventions are found to be positive for cognitive gains (e.g. vocabulary, language, mathematics), behavioral change (e.g. self-regulation, aggression, hyperactivity), health gains (e.g. height, weight, nutrition status) and amount of schooling (e.g. attendance, years of schooling): they go from 0.26 to 0.39. Through the meta-analysis, NB (2010) observe a positive correlation between targeting the program by age and children’s health outcomes. They also find that educational or mixed (nutrition and educational) interventions have the highest impact on cognitive skills (effect size 0.35), with respect to cash transfers (0.17) or nutritional only programs (0.25). Educational programs have the greater impact on schooling and behaviour. On the other side, nutrition interventions are the most influential on health outcomes. Over-

all effects are lower when better quality interventions are considered and more pronounced in higher income countries. Finally, effects seem to be stable over time, with the exception of diminishing health effects [61].

Soon after, Baker-Henningham and Lopez Boo (2010) publish their literature review, with a primary focus on educational programs (they do not consider either cash transfers, or solely nutrition or health interventions) on low and middle income countries. Ten of the programs that they examine overlap with the programs studied by NB (2010).

BL (2010) group these interventions into five categories:

1. Stimulation interventions in early infancy with a focus on enhancing maternal-child interaction;
2. Stimulation interventions with disadvantaged children and their families;
3. Stimulation only interventions with undernourished children and their families;
4. Combined stimulation and nutrition programs;
5. Stimulation interventions with children at-risk due to health problems [6].

Four studies were analyzed in the first group. From these four studies it is difficult for them to draw any kind of conclusion. However, it seems that supporting maternal and child interactions improve maternal behaviour. Only Cooper et al. 2009 find child benefits too, on the child's attachment status at 18 months [25, 26, 39].

BL (2010) investigate twelve interventions in the second group. Children who benefit from the stimulation programs at an early stage benefit in their mental development, at least in the short term. The same improvement is found on mothers' behaviour. Too few studies examine the impact on child behaviour at all, on children's schooling in the long term and on mothers' outcomes in the long term, which makes it impossible to say anything conclusive on these domains.

In the third group five treatments are taken into account. Early stimulations benefit the mental development of undernourished children in the short run, but effects on their behaviour is mixed. It also appears that educational interventions are not enough to improve the child growth. This seems to suggest that a nutrition component should be added to push the growth of undernourished

children. There is also some evidence of better maternal mental health and parenting behaviours.

Three of the randomized experiments evaluated combined stimulation and nutrition programs in upper-middle income countries. They document beneficial effects on children’s mental development both in the short and in the long run. The evidence on maternal outcomes and children behaviour is not sufficient to make conclusions though.

Finally, three randomized studies assess the effects of stimulation programs on children at-risk because of their health. There seem to be benefits on the child’s mental development over the short term. Two out of these three studies find a positive effect on the child’s motor development. Mother outcomes are disregarded in these papers.

Overall, it seems that stimulation program targeted to very young children have benefits both on the child and the mother. Consistent gains are found in the children’s mental development (in 20 out of 21 studies reviewed in BL(2010)) and in children’s behaviour (9 out of 10 studies). Positive effects on children’s schooling (4 out of 5 studies) and on children’s motor development (7 out of 12 studies) are found in some evaluations. The child health domain is never considered, and impacts on nutrition seem to be non-sufficient if a nutritional component is not added to the stimulation intervention. Early educational programs have a positive impact on parenting skills of the mothers (14 out of 16 studies). Whether the mothers gain something more from these interventions is not clear-cut. Whether all the benefits found last over the long run is studied in 7 articles only. All of them find a positive result in child cognition, child schooling, child’s academic performance, child’s mental health when adolescent and child’s behaviour (as reported by the mother). It is interesting to note that these benefits are consistent across different countries.

One of the potential problems when considering these programs is that they are usually small and supervised by research staff. When scaled up, and once the supervision is absent, benefits could diminish. Only two of the programs considered by BL (2010) are large scale interventions: the PIDI (Proyecto Integral de Desarrollo Infantil) in Bolivia, and a comprehensive early child development in the Philippines. Here, the benefits on child outcomes are still present. [6]

BL (2010) notice that children who benefit the most from early childhood interventions are the most disadvantaged ones, in terms of gender, family background, and health status. This is consistent with some of the findings analyzed by NB (2010) and with evidence from the US [8]. However, BL (2010) do not

find any correlation between benefits and children’s IQ [6, 61].

The opposite seems to be true with respect to mothers: apparently the most disadvantaged gain the least. Some evidence suggests that mothers with higher IQ or more years of schooling benefit the most. No correlation is found with maternal psychosocial function (e.g. whether she suffers from depression), but the evidence is very limited. Probably the most disadvantaged mothers need more intensive programs to make a change for the better.

After this thorough analysis, BL (2010) conclude that high quality programs that last longer and are more intense give better results. They suggest that interventions should involve the active enrolment of the parents (or the caregivers in charge of the children). The active participation of mothers is recommended to make sure that mothers actually learn from the program. This is particularly true in poorer contexts where, due to the low education maternal background, discussions and information sharing is not sufficient for them to understand the content. Instead, mothers should be involved in practical activities and be encouraged to continue them daily. In more general terms, BL (2010) recognize that more research is required to understand the optimal mode of delivery. A similar conclusion is found in Barnett (2007). However, programs that target both the mother and the child seem to work better. Sure enough, programs should aim at improving the general well-being of the family, particularly that of the mother. For these reasons, BL (2010) acknowledge that “group parenting sessions may be a cost-effective method of service delivery but this approach has not been properly evaluated”. At the same time, they stress that a better understanding of the effect of these interventions on mothers’ well-being would be beneficial to realize how wide the range of potential outcomes is [6, 10].

1.2.3 The role of the family

As we have seen there is no certainty on which early childhood interventions work better, but they need to take into account the role of the family. One of the first studies of the impact of the family on child outcomes is Leibowitz (1974) [56]. Through her theoretical model the author shows that children in the first grade already exhibit sizeable differences in verbal and mathematics skills, which reflect gaps in innate ability as well as in human capital received (proxied by the endowments of the mother). Nowadays it is indeed well recognized by both the theoretical and empirical literature that parental influence is a key factor in child development [12, 74, 2], that families are relevant in the skill formation

process [28], and that parental investments at the beginning of a child's life are fundamental for their cognitive development [66]. If families play their role poorly the consequences for their children are detrimental [52, 40]. Indeed, differences in the family constitute a main source of inequality in abilities and future socioeconomic outcomes [28].

Since the link with the family is so relevant for the development of a young child, a question on the effect of non-parental child care vs. home care has been posed. There is a wide literature in psychology, sociology, and also economics that has been trying to deal with it.

When a child goes to a non-parental child care, his parents' care is substituted with someone else's care. The effect on children will depend on the quality of parental and non-parental care. Moreover, if the child care is used so that the mother can be employed, other factors will play a part: higher family income, which could benefit the child, but also more stressed mothers, and potentially shorter breastfeeding.

Already in 1978, Belsky and Steinberg write that high-quality centre-based day care has no effects (nor good or bad) on the mental development of the child or on the child's relationship with the mother, whereas it increases the level of (both good and bad) interaction with other children [14]. However, data availability was still scarce in the 1980s and studies suffered from many weaknesses: lack of family background information, lack of measures of quality of care, ambiguity in the measures of what was defined as negative behaviour which could instead reflect more independence from the parents [60]. In the 21st century more evidence becomes available and some negative effects are found. In 2001, the National Institute of Child Health and Human Development Study of Early Child Care observes that rates of illness are higher for children raised in child care with respect to children raised at home in their first two years of life. Gordon et al. (2007) also find that the time spent in centre-based care by young children is positively correlated with infectious diseases [42]. However, in the NICHR (2001) the differences in child health are not significant when measured at age 3. The higher rates of illness are also associated with behavior issues, but not with school performance [4]. In 2003 the NICHD extends the analysis of non-parental care to 4.5 years old children: they observe that the longer children spend in non-parental care, the more externalizing problems and conflict with adults they show. This is true also when quality of the child care and family background are controlled for. More time in care is also predictive of at-risk levels of problem behavior, assertiveness, disobedience, and aggression

[60]. In 2004 the NICHR-ECCRN finds a link between child care and better first-grade schooling outcomes, but with more behavioural issues. As we saw before, studies on programs like the Head Start gave similar results on cognitive outcomes (even though these faded away across time). Magnuson et al. (2007) find that prekindergarten is positively related to higher reading and mathematics skills when entering school, effects that dissipate by the spring of the first grade. They also find more behavioural problems, but these instead are more persistent. A link with academic gains (longer and larger) is found for more disadvantaged children [58]. Negative behavioural outcomes are also found by Belsy et al. (2007): children who stay longer in center-based child care show more problem behaviors through sixth grade. Children who spent longer hours in child care between 3 months and 4.5 years also score lower on vocabulary in fifth grade [15].

Nowadays, DeCicca and Smith (2011) suggest that time spent at home is more beneficial than time spent at school at younger ages. They estimate the impacts of entering kindergarten in Canada, the most common early childhood program, one year later. They find that one year less in kindergarten decreases the probability of repeating third grade and that it raises math and reading scores in tenth grade. Differences are larger for low income students and males [29]. Similar results are found by Bernal and Keane (2011) who exploit exogenous variation in US welfare policy rules to compare cognitive development of children of singles mothers who are raised on child care with the ones raised at home. They find that a year of child care reduces cognitive child test scores by 2.1%, i.e. by 0.114 standard deviations, a sizeable effect. However, this effect is mainly driven by informal care (i.e. non-centre-based care by other relatives or nonrelatives), which is used by 75% of the sample. Formal centre-based care does not have detrimental effects [17]. Yamauchi and Leigh (2011) look at Australian data and find that full-time non parental care, especially centre care, exhibits a negative correlation with toddler's behavioural outcomes, which is even larger when the family education background is higher and smaller when the carer/child ratio is higher. However, it must be noted that the relationship is very weak and not causal [86].

There is also a vast literature on the effects of maternal employment itself. But here as well, the results are conflicting. Ruhm et al. (2004) say that the general agreement of the most recent (and higher quality) literature is that maternal employment has detrimental effects on the child's first year, effects that are offset when the child is two or three. In their paper, Ruhm et al. (2004)

also find the presence of a negative correlation between mother’s employment and child’s verbal ability at ages three and four, but that this relationship is partially offset in the next two years. However, they notice that mother’s employment at an early stage of her child life is also associated with a child’s worse performance in reading and maths when the child is five- and six-years-old [66]. Even though they are only showing correlations (and not causal relations), Belsky et al. (2007) suggest that interventions targeted to improving parenting could benefit children more than trying to improve the quality of child care. However, nothing prevents to make attempts in both directions at the same time [15]. Bernal (2008) uses a structural model to indicate that one year of maternal employment, together with child care, drives a reduction in test scores of 1.8%, i.e. 0.13 standard deviations [16]. Bernal and Keane (2011) review the most recent papers on the effect of maternal employment on child outcomes. They find that about a third claims positive effects, a third negative effects, and the last third mixed evidence [17].

1.3 Women’s Empowerment and Gender Equity

1.3.1 Overview

Since the last decades of the twentieth century, empowering women and gender equality have been recognized as pivotal goals for our society.

The United Nations General Assembly declared 1975 as the International Women’s Year and in that same year the first World Conference on Women was held in Mexico City. Thereafter the UN Decade for Women was opened, in 1976-1985 [76]. In 1979 the United Nations General Assembly adopted the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), which was later signed by 165 world leaders. In the first article of the Convention, discrimination against women was defined as “any distinction, exclusion, or restriction made on the basis of sex which has the effect or purpose of impairing or nullifying the recognition, enjoyment or exercise by women, irrespective of their marital status, on a basis of equality of men and women, of human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other field [36]”. The Convention called nations themselves to fight discrimination against women, and States that ratified the Convention committed to undertake measures to end these forms of unequal treatment.

During the 1990s women’s movements around the globe fought to put gender

equality and women's empowerment on the agendas of the UN Conferences. Thanks to their active mobilization, the 1992 UN Conference on Environment and Development discussed the women's role in the environment, and the 1993 UN Second World Conference on Human Rights included for the first time women's rights among human rights [18].

The International Conference on Population and Development (ICPD) held in Cairo in 1994 marked another important step [83]. In the ICPD it was agreed that "the empowerment and autonomy of women and the improvement of their political, social, economic and health status is a highly important end in itself. In addition, it is essential for the achievement of sustainable development [75]" Therefore, "countries should act to empower women and should take steps to eliminate inequalities between men and women as soon as possible [75]". 179 governments participated in the Conference, finalizing the ICPD Programme of Action for the following 20 years [82]. The 1995 Fourth World Conference on Women held in Beijing proved to be a further accomplishment, promoting equal participation of men and women in many areas. After these conferences, many other gender equality initiatives took place. [18, 64]

Six years after the ICPD, in 2000, the Millennium Summit took place in New York, where 189 States adopted the Millennium Declaration. Eight Millennium Development Goals (MDGs) were established to be reached by 2015 for the promotion of development[84]. Among them, goal No. 3 ("Promote gender equality and empower women") and goal No. 5 ("Reduce by three quarters the maternal mortality ratio") explicitly highlighted the importance of gender issues [76]. In this chapter we will focus on goal No. 3. To meet this goal, seven strategic priorities for action were identified by the UN Millennium Project Task Force 3. They are summarized in the following table:

Table 1.1: Seven Strategic Priorities for Action on Millennium Development Goal 3

1. Ensuring universal primary education while helping entrance to post-primary education for girls.
2. Guarantee sexual and reproductive health and rights.
3. Investing in infrastructure to reduce women’s and girls’ time burdens.
4. Guaranteeing women’s property and inheritance rights.
5. Eliminating gender inequality in employment by decreasing women’s reliance on informal employment, closing gender gaps in earnings, and reducing occupational segregation.
6. Increasing women’s seats in political bodies.
7. Fighting violence against women.

Source: [18]

Today the belief that “empowering women and girls with more choices and more freedoms is crucial to achieving a better future for all” is still present (Amartya Sen, 2012, [79]). Gender equity is still perceived important because it is a value in itself, because women could contribute to development and economic growth[?], and because the whole family could benefit from it, especially children [72]. Indeed, the role of women seems to be “a strategic variable in economic development, through its effects on demographic behavior as well as on human-capital formation in the next generation [32].

Overall, countries have made progress towards reaching the MDGs, but much still needs to be done. “The goals of reducing maternal mortality and achieving gender equality and women’s empowerment face the greatest challenges across all countries [32]”. Nowadays, the areas where equity between genders is further to be fully achieved seem to be Northern Africa, sub-Saharan Africa and Western Asia [77], but also Latin America and the Caribbean (LAC) suffer from this problem. Let us briefly take a look, for example, at a Latin American country where I will focus my attention in the next two chapters: Ecuador.

“Ecuador’s Constitution upholds gender equality, prohibits any form of sexual discrimination and provides for equal opportunity for men and women in access to productive resources and in marriage. In reality, however, few women own land and households headed by women generally have a lower income than those headed by men. In 2008, women received approximately 65 percent of the pay received by men for equal work and there were fewer women than men employed in professional work and skilled trades. Restrictions in access to bank loans pose serious problems for women. Although the law prohibits violence

against women, including within marriage, abuse continues to be widespread, and women in Ecuador suffer from violence, discrimination and disproportionate poverty. Only 3 percent of reported sexual violence against women is investigated to term. Prostitution is legal in Ecuador, a contributing factor to violence against women [85].”

According to the first enquiry on gender-based violence run by the *Instituto Nacional de Estadística y Censo* (INEC), violence against women is equally spread in rural (58.7%) and urban areas (61.4%). In 76% of the cases where women reported violence, the offender was the partner/ex-partner, 87.3% suffered from physical violence, and 76.3% from psychological violence [51].

The Inter-American Development Bank (IDB) has recognized gender equality as one of the objectives needed to push economic and social development in the whole Latin American region. For this reason the IDB is currently working to help its members to respect the commitments that they all made when ratifying the CEDAW.

1.3.2 What are the most effective ways to empower women and achieve equity between genders?

Across time various policies have been adopted to promote gender equality and women’s empowerment. Some of these policies had the explicit and direct goal of achieving gender equality, some others aimed instead at achieving different MDGs, but indirectly helped improving gender equality [45].

Examples of direct interventions focused on:

- Improving girls’ education: e.g. scholarships for girls, private latrines facilities for girls at school, professional training centres for women, school-to-work transition programs for girls, free school meals, textbooks, financial assistance for girls from poor families, sensitizing school systems and teachers to gender issues, to girls’ health (e.g. micronutrient supplementation programs for girls, maternal health);
- Rural development: e.g. female extension workers;
- Protecting sexual and reproductive health and rights: e.g. giving classes on sexual education in schools and communities, provision of free basic obstetric, post- and pre- natal services;

- Reducing the gender gap in employment: e.g. providing vocational programs for girls or care services to children to allow women to work, financial interventions for self-employed women, strengthening the ability of governments to provide such interventions;
- Increasing women’s political representation: e.g. training women candidates in elections or training elected women, adopting quotas for female political representation;
- Improving legal systems: e.g. removing discriminatory legal code, defending equal rights to property and inheritance;
- Fighting violence: through hotlines, legal and psychiatric assistance for victims, setting a minimum wage for marriage, protecting girls from child labor, training judges and police to face gender-based violence, protecting girls from prostitution [35, 44, 45].

Other policies were designed for different purposes, but improved gender equality indirectly. Examples of these are micronutrient supplementation programs for underweight children, provision of water services, installing electrical infrastructure, construction of wells, expenditures on education, expenditures on health, increasing access to primary health care, interventions in the rural development sector, and eliminating illiteracy [35, 44, 45].

1.3.2.1 One channel for empowering women: education

Education is sometimes thought to be one of the first drivers of empowerment [64]. There is substantial evidence that education can improve cognitive skills (fundamental for women’s empowerment), aspirations, the access to information (to bring awareness of their condition), the access to the tools to face the world and the ability to use them [53, 57]. More educated women are less likely to experience domestic violence [53]. This is consistent with the findings in West Bengal by Sen (1999). Schuler et al. (1996) analyze a sample of women in Bangladesh and also find that having some education reduces the likelihood of being beaten by nearly one third. However, the authors think that this difference is driven more by the perception among families of the value of their daughters and by their social class rather than by education itself [67]. Andrabi et al. (2012) demonstrate that maternal education positively affects time spent by their children on homework, time spent by the mothers helping them in their

homework, and children’s test scores. However, they do not find an effect of education on intra-household decision-making [5].

Levine et al. (2001) develop a theoretical model of how women’s schooling may lead to social and demographic change. They also test this model in Nepal and Venezuela. They find evidence that literacy may be a way in which schooling develops health skills and the ability to understand information. However, selection bias should have been addressed better [57].

As we have just seen, an aspect of education is literacy. “It is widely recognized that mastering literacy is essential for living in a modern society [63].” However, there were still 775 million illiterate adults in 2010, 64% of whom were women. If we want women to be integrated and promoters of development, we need to provide them with basic education. Literacy could help empowering women. Literate women are more likely to be employed, to be more productive, earn higher wages, and consequently gain easier access to credit. Moreover, making a mother literate would enhance not only her chances, but also her children’s (e.g. children will be less likely to die young and more likely to be healthy and better educated) [63, 64, ?].

Nonetheless, literacy programs per se are not enough: their effect is highly dependent on social, cultural, political and economic factors of the context where beneficiaries live [11].

1.3.2.2 One channel for empowering women: access to economic opportunities

As we previously saw, gender equality is recognized to go beyond the reduction of the education gaps in primary and secondary education: “it also requires equal economic opportunities, equal ownership and control over productive assets, freedom from drudgery, equal representation in decision-making bodies, and freedom from the threat of violence and coercion” [45]. We will now concentrate on women’s access to the labor market. The wage earned by women, particularly when critical to household survival, shifts the balance of power within the couple in their favour [53]. Moreover, the possibility to work allows women to expand their social networks, be more independent, and delay marriage and childbirth. Research has also shown broader positive effects of women working: an increase in female labor force participation can lead to per capita income growth and poverty reduction at the national level. A woman working can also benefit the overall status of her own family. Indeed, in conditional cash transfers targeted

to mothers in the Latin American region, women have shown to spend a “higher percentage of their income on education, health, and nutrition for the household, decreasing the inter-generational transmission of poverty [49].”

In some studies improvements in household relations are also found [53].

The UN Millennium Project Task Force 3 focuses mainly on two strategies to achieve gender equity in employment: 1) supporting women’s control over economic assets; 2) guaranteeing women’s access to employment, by public schemes or traineeships in firms [44].

To ease women’s access control over economic assets, governments need to guarantee women’s property and inheritance rights, especially for the owning of houses and lands, both *de iure* and *de facto* [18].

Guaranteeing access to credit to women is another way to raise their control over economic assets. For this reason microfinance programs also fall in the first category of strategies. These programs help women to get credit and enter the labour market as self-employed. To be effective they must take into account the different needs of women when offering loans, insurance, savings or other products (e.g. women may not be able to own assets in some countries, therefore they have to be offered character-based lending rather than collateral-based lending) [44]. Microfinance programs also need to provide non-financial services such as trainings for women’s organizational and business skills or legal aid. This way they can contribute to poverty reduction, especially for women [59]. They also seem to have a wider impact, influencing their degree of political participation, the access to government programs, self-confidence, and the likelihood of adhering to campaigns and protests [54]. More generally, women’s access to credit can be claimed to improve women’s self-perception, women’s power in the household decision process, and to reduce domestic violence [53]. One of the major examples of microfinance networks is constituted by women self-help groups (SHGs), where 10-20 members make small regular savings until they form a fund of money that can be lent back to the members or to others. Most of SHGs are in India. SHGs improve the nutrition of its members, increase their consumption and asset accumulation. The extreme poor gain the largest benefits from participating [30].

However, microfinance programs themselves, as literacy programs themselves, do not necessarily empower women. On the contrary, they may even disempower them. Credit might turn into debt, impoverishing and putting in more trouble women who are already poor. Moreover, women may feel the pressure to save and their basic consumption may be cut down because of this.

Finally, the very poorest women cannot easily access microfinance programs [59].

More recently, Banerji et al. (2013) analysed the impact of micro-credit in India on various outcomes, among which women's empowerment. Later on in the chapter we will discuss how they built the index to capture women's empowerment. What needs to be stressed now is that they do not find any effect on women's empowerment, neither in the short or in the long run [7].

In the second category of strategies that can allow poor women to get a job and earn an income there are public employment guarantees, job training programs, and more generally provision of child care facilities and protection from violence [18, 53].

The global female labour force participation has been increasing strongly in the last decades [78]. The gender gap in labour markets all over the world has been shrinking, at least until the crisis burst in 2007 [50]. Despite the increased female participation in the labor market with respect to decades ago, women can be exposed to exploitation. Moreover, most women in low-income countries work in the informal sector, with worse pay and working conditions than in public and formal jobs. This is particularly true among the workers with the lowest education level [53, 44].

1.3.3 How to measure women's power

There is no direct measure of women's power. As a consequence, women's power must be proxied [?, 33].

The way the measurement is approximated varies across different studies [72]. There are mainly two possible ways to proxy for it: either using women's characteristics or using indicators of women's self-perception of her power.

Women's characteristics that can be and have been used as proxies are education, employment status, earned income, potential income, the ownership over assets (such as land, livestock, equipment, financial assets, businesses, and consumer durables) [3].

Researchers can also ask women about their self-perception of their own autonomy, whether they are allowed to go out, to make decisions in the household on fertility choices, on expenses, etc. How to deal with the answers given by women, whether to use them as distinct measures or to use them together to construct an index, depends on the studies [3]

According to Swain (2009), “most researchers construct an index/indicator of women’s empowerment. While this might take into account an important aspect of women’s empowerment, it still suffers from the arbitrary assignment of weights to variables used in constructing the indicator of women’s empowerment.” [72]

Goetz and Gupta (1996) also recognize the difficulty in measuring empowerment. For this reason they do not explore in depth questions on women’s empowerment within the household and the community, but ask only about women’s managerial control over the productive activity involved when receiving loans.[41]

Hashemi et al. (1996) build an index of women’s empowerment focusing on 8 dimensions. They use it to assess the effects of two credit programs for women in Bangladesh. To build the index they exploit 8 different indicators (giving them different weights):

1. An indicator for mobility, e.g. if she ever goes to the market, outside the village, etc.;
2. An indicator for economic security, e.g. if she owns her house, if she has cash savings, etc.;
3. An indicator for the ability to make small purchases, e.g. cooking oil, soap, ice cream or sweets for children, etc.;
4. An indicator for larger purchases, e.g. pots, pans, children’s clothing, etc.;
5. An indicator for the involvement in major household decisions, individually or jointly with the husband;
6. An indicator for relative freedom from domination by the family, e.g. if money has been taken from her in the last year;
7. An indicator for political and legal awareness, e.g. if she knows the name of a local government official;
8. An indicator for participation in public protests and political campaigns.

Moreover, the authors create an indicator of contribution to family support, based on the woman’s rough assessment of her relative contribution to the family expenses [47].

Afridi (2005) examines the effect of intra-household bargaining on the bias against schooling of girls in India. The author constructs an index of women's autonomy by asking on different domains:

1. Who makes the following decision in your household:

- (a) What items to cook;
- (b) Health care for yourself;
- (c) Purchasing jewellery or other major household items;
- (d) Your going and staying with parents and siblings.

If the wife answers "the husband", the index equals 1; if she answers that they "both decide jointly", 2; 3 if she decides "on her own".

2. Freedom of movement:

- (a) Do you need permission to go to the market?
- (b) Do you need permission to visit relatives or friends?

If wives answer that they are "not allowed", the index equals 1; if "yes", 2; if "no", 3.

3. Physical Abuse:

- (a) How often have you been beaten or mistreated physically in the last 12 months?

The answers are coded as 1 if she answers "many times"; 2 if "few times or once"; 3 if "none".

4. Access to money:

- (a) Are you allowed to have money set aside that you can use as you wish?

The responses are coded as 1 if she answers "no"; 3 if "yes" [1].

Chakraborty et al. (2011) construct a new type of index for female autonomy. They ask questions on different decision making domains, but they take the answers from the husband to build the index. They ask each husband who decides in the house on:

1. Household food consumption;
2. Husband's clothes;
3. Wife's clothes;
4. Child's clothes;
5. Child's education;
6. Child's health;
7. Expenditure on durables;
8. Transfers made to parents or relatives of the husband;
9. Transfers made to parents or relatives of the wife;
10. Husband's labor force participation;
11. Wife's labor force participation;
12. The use of contraceptives.

For each type of decision, they create a categorical variable that equals 3 if the husband answers that it is the wife deciding, 2 if both together decide, 1 if he is the one deciding. They do not give equal weights to each categorical variable, but they use factor analysis to determine the weights [23].

Banerji et al. (2013) consider many proxies for women's empowerment to evaluate the effects of a new microcredit group in India. They fear that examining each proxy singularly will generate a multiple inference problem, i.e. that 5% of them may show to be significantly affected by the treatment just by chance. To address this, the authors build an equally weighted average of z-scores for the 16 proxies that are:

1. Indicators for women making decisions on each of food, clothing, health, home purchase and repair, education, durable goods, gold and silver, investment;
2. Levels of spending on school tuition, fees, and other education expenses;
3. Medical expenditure;
4. Teenage girls' and teenage boys' school enrolment;

5. Counts of female children less than one year and one to two years old.

They select these proxies because they are likely to be affected by changes in women's bargaining power in the decision-making process [7].

As we have seen, various types of proxies can be used to measure women's power and there is not an agreement on which one is the most precise. It is highly dependent on the context.

1.4 Conclusion

Nowadays the importance of intervening at an early stage for the development of a child is well established and much still needs to be done to support these interventions and overcome inequality. There is evidence of positive effects of early childhood interventions both in the developed and in the developing world, but which is the best mode of delivery is still to be found. The involvement of the family appears as a key factor to take into account in the design of such programs.

Women's empowerment and gender equality are also recognized as fundamental goals in our societies. However, these objectives are still far from being achieved, particularly in developing countries. Literacy programs and micro-finance programs, even though helpful, do not seem to be sufficient to bring to the equality desired. Are there other programs that can help to improve women's condition today?

Chapter 2

The *PelCa* Program - Effect on Children

2.1 Introduction

As we have seen in the first chapter, it is important to intervene on children at a very early stage of their life. Research on which are the most effective interventions to improve cognitive and non-cognitive skills of children is still on-going. What are the effects of preschool interventions that involve parents on children outcomes?

The *PelCa* program (*Preescolar en la Casa* – preschool at home) is a home preschool intervention based on group parenting sessions that is implemented in Pisullí, a disadvantaged urban neighbourhood in the northwest of Quito, Ecuador. The program was opened by the AVSI NGO in 2005. Currently there are more than 300 children in the *PelCa* preschool program and approximately 250 children who participated in the *PelCa* preschool program and now participate in school programs in the NGO. This policy setting offers us the opportunity to evaluate an example of early childhood development intervention based on group parenting sessions. The objective of this chapter is to study the effects of this early childhood development intervention on child outcomes. We will evaluate whether the treatment helps children in different domains: cognitive skills, health outcomes, non-cognitive skills, enjoyment at school, care and help received from mothers.

2.2 Background and Design

We will first give a more detailed picture of the *PelCa* program; we will then go through the design used to evaluate it, focusing primarily on the construction of the control group.

2.2.1 Background

AVSI, the Association of Volunteers in International Service, is an international not-for-profit, non-governmental organisation (NGO) based in Italy. It was founded in 1972. Today it operates in 35 countries in Eastern Europe, Africa, Latin America and the Middle East, directing more than 80 long term projects that have beneficial effects on more than 90,000 people. It reached Ecuador in 2001. Since the beginnings, it has been working in close collaboration with the Vicariate of Education, aiming at the development of the rural communities around Portoviejo, a small city on the coast, in the province of Manabí. The main activities relate to infant and child development and education. In 2005 one AVSI branch was opened in Pisullí, a disadvantaged urban neighbourhood to the northwest of Quito. Thanks to the joint work with Fundación Sembrar, a local non-profit organization, and the local parish, AVSI funded a community development centre where it implemented a modified version of *PelCa* (*Preescolar en la casa* – home preschool), the program we will analyse. The NGO rapidly expanded: it now includes afterschool programs and other services offered to more than 700 children, youth and their families. There are more than 50 members in the local staff. Financial support is guaranteed by grants and donations from the CEI (Italian Bishop Conference Charity) (2006-2008), the MAE (Italian Ministry of Foreign Affairs) (2009-2011), the CAM (Comunidad de Madrid) (2009-2012), and several private donors.

Table 2.1: Current children involved in the pre-school, school and afterschool programs

	<i>Quito</i>	<i>Portoviejo</i>
<i>Pre-school area</i>	<i>329</i>	<i>283</i>
<i>School area</i>	<i>250</i>	<i>Na</i>
<i>Afterschool activities</i>	<i>162</i>	<i>684</i>

At the centre of our analysis there is *PelCa*, the main activity of the AVSI NGO in Ecuador, the one that provides the educative method for the other

activities. The *PelCa* program in the preschool area is targeted to parents of children from 0 to 5 years old. Fortnightly meetings are held in small groups (usually 6-7 mothers -or other guardians like grandmothers or fathers- with their children), under the guidance of a family advisor. In the first part of the meeting, children socialize among them playing on a carpet with games and didactic materials, while parents read and discuss about some leaflets on family education. In the second part of the meeting, parents and children work together: they are taught dynamics, ring-a-ring-a-roses, songs, learning games and various activities that parents can reproduce at home (building games and didactic material, reading to their children, puppets, etc.). In the last part of the meeting, the family advisors verify the tasks assigned to the mothers in the previous two weeks. A notebook of activities is given to every child according to his age, where parents can find activities focused on the development of different areas. The family advisors verify the learning of children one by one, then they assign them reinforcement activities or further learning to each parent. The assigned tasks have to be completed at home by the parent and child involved in the two weeks following. Advice on extra and personalized activities is also given. In the rural area (Manabí Province), the frequency of the meetings has been recently increased, changing them from fortnightly to weekly.

Families usually acquire knowledge about the program through a poster hung outside the NGO and by word of mouth in the neighbourhood. Once they express interest, they are asked about their names and contact information. AVSI employees visit the family at home in order to collect data on the family circumstances, observe life conditions in the house, evaluate the real need of support and identify family weaknesses and strengths. To be eligible the child must be younger than 3 years old (so that he/she can participate for at least two years in the program) and the parent must commit to participate in fortnightly meetings and perform at home the tasks assigned for the two weeks interval between meetings. AVSI's policy requires the involved parent to spend many hours at home with the child and therefore this parent is asked not to work while in the preschool *Pelca* program. General wealth and closeness to the NGO buildings are also taken into account in the selection process. Parents of children above the preschool age (i.e. from 5 to 11 years old) can still remain in the *Pelca* school programs in the NGO. Depending on their characteristics, they will be offered to participate in one of these three options:

1. Fortnightly meetings structured as in the preschool area (where topics and

activities are adapted to the older age of the children);

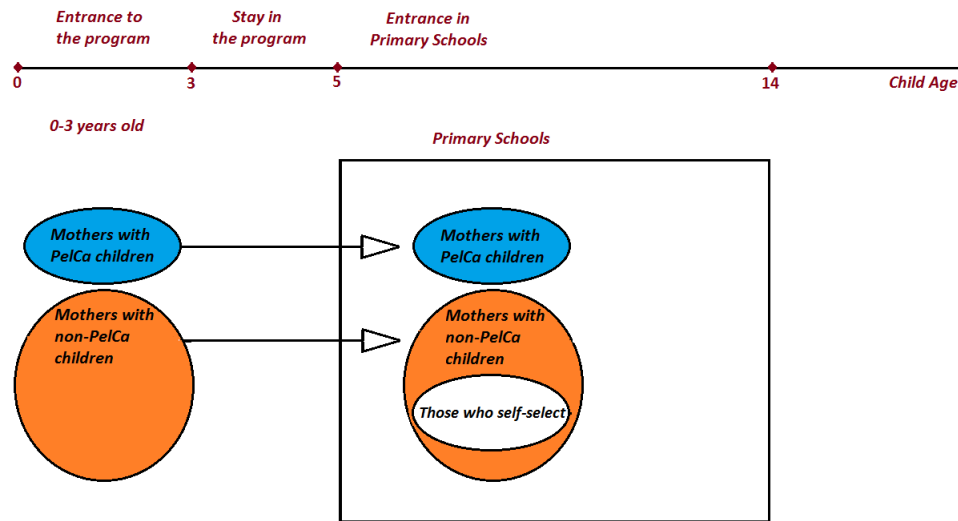
2. Fortnightly meetings for “mixed” families (i.e. families with at least one child in the school area program and one in the preschool program);
3. Monthly meetings for full time workers; here children come daily to the AVSI centre to be helped in their daily homework; for this reason they do not need to attend the meetings with the parents.

Every year the application to the program starts at the end of April. The demand for nurseries and similar programs in the area is high: the NGO receives various applications within two weeks only. Among the applicants 50 families approximately are selected to start the program in September and the application process ends then.

2.2.2 Design

How to compare mothers and children who participated in the program with mothers and children who did not? A comparison that does not take into consideration self-selection in the program would lead to biased results. As we can see from the picture below, when they are 5 years old *PelCa* children and non-*Pelca* children go to the same primary schools in the area.

Figure 2.1: Identification Strategy



The entire population of children in primary schools who did not participate in the program (represented by the orange circle in the picture) cannot form the control group because of selection bias. Therefore, we select in the control group only those mothers whose primary school children did not participate in the *PelCa* preschool program when younger, but who would like their younger preschool age child to enter the program now (represented by the white circle in the picture). This way we get rid of selection bias, because both treatment and control groups self-selected into the program.

How was the control group formed?

The control group was formed through the regular process that AVSI uses to select the new families that will enter the program. However, the period during which families are allowed to apply to the program was extended to two months in order to be able to reach more control families with the required characteristics.

AVSI aimed at selecting to the program their regular quota of about 50 families who would have started the intervention in September 2012. Families with at least one child who attends school were chosen from the pool of all applicants to form the control group. These families were invited to an interview in June-July 2012, where the mother participated in a structured interview with us, the child took a test of cognitive and non-cognitive skills and his height and weight were measured. The mother was asked to bring the child's vaccination certificate (where children's height, weight and head circumference at birth are measured) and the child's school report cards of the previous and current year. A local employee was responsible for selecting from among the applicants the families with a school age older sibling and guide them about the documents they needed to bring to the interview in June-July 2012. The treatment and control groups were interviewed again in 2013.

As previously mentioned, due to the high time commitment of mothers during the program, treated mothers are asked not to work during the program. For most this condition is irrelevant but some may have to leave the labour force. We will take this difference into account during the analysis.

Comparing the outcomes of the *PelCa* mothers of *PelCa* primary school age children with those of mothers of primary school age children who did not participate in *PelCa* but who chose to enrol in the program with a younger preschool age child in 2012 will allow an estimation of the long term impact of

the program.

2.3 Data

Children and mothers from both groups were interviewed both in summer 2012 and 2013, following a questionnaire that was created specifically for the evaluation.

The survey questionnaire was tested in a pilot in January 2012, when we interviewed 23 mothers from the program: 12 of them with a school age child who participated in the *PelCa* preschool program and 11 of them with a school age child who did not participate to any program associated with the NGO. These interviews contributed to a better understanding of how to improve the questionnaire.

The final version of the 2012 survey questionnaire provided data on pre-treatment characteristics and outcomes. The person to be interviewed was always reassured about the confidentiality of the information she would have provided.

In 2012 we conducted personally a structured interview with each mother.

Among the pre-treatment characteristics, we asked for the date of birth of each component of the family, the birth place of both parents, why the child had not been enrolled in the program if they belonged to the control group, how they got to know about the program if they belonged to the treated group, and if the child suffered from any health problem. The majority of the questions on outcome variables were also asked retrospectively and served as pre-treatment measures, i.e. the questions were asked in 2012 but they referred to a point in time before the treatment took place. As these questions needed to be asked to both control and treatment mothers, and as control mothers could not be asked about a specific behaviour “before treatment” as they had never been treated, the wording of the question was “before your child was born”, e.g. “do you have electricity in your house?” becomes “did you have electricity before your child was born?”. This was the best way we could think of to make sure that the answers given referred to a pre-treatment point in time.

Among the outcomes, we asked specific questions on:

- Time inputs and quality of care of parents towards children¹;

¹Most of these questions were taken from the PIRLS (Progress in International Reading Literacy Study) home surveys. PIRLS is an international study of reading skills for children

- How often mothers bring their child to the doctor;
- Number of people in the house and who they are;
- Whether the father lives at home;
- Beliefs and expectations on the child schooling path;
- The actual schooling path of the child (current grade, if he/she ever repeated a grade or abandoned school temporarily, child's school attendance);
- How satisfied she sees her child with respect to schooling;
- Current civil status;
- Current school level of both parents;
- Working condition of both parents;
- Religious beliefs;
- Characteristics of the house (whether it is owned, rented, borrowed or shared, how many rooms it has, whether it has electricity, drinkable water, a toilet inside or outside);
- Possession of vehicles (cars, motorbikes, bicycles, etc.);
- Intra-household family decision-making (who decides on the education of the child, on what to do if the child is sick, on children's discipline, on how to spend money, on how to spend money on food, on whether the mother can work or not, on fertility choices).

Afterwards there were questions on:

- The average monthly family wage;
- Whether the family needed help from somebody else to cover the expenses.

in their fourth grade. It was assessed for the first time in 2001. It is performed every 5 years since then, allowing countries to monitor their children. Together with the children's test, PIRLS provides background questionnaires for the parents, for the students, for the teachers, and for the schools. The background questionnaire for the parents (PIRLS 2006) is the one that we used to build the survey questionnaire.

The interview lasted approximately 45 minutes.

The measure of time inputs and quality of care towards children was based on the question: “How often do you do the following things with your child?”. The question referred to the following activities:

- Listen to your child read aloud;
- Talk with your child;
- Talk with your child about what he/she is reading on his/her own;
- Discuss your child’s classroom reading work with him/her;
- Go to the library or a bookstore with your child;
- Play with your child;
- Dance with your child ².

Mothers could choose an answer among “Every day or almost every day”, “Once or twice a week”, “Once or twice a month” and “Never or almost never”. As the first couple of answers is very different from the second couple, we created a dummy equal to 1 when the mother answers either “Every day or almost every day” or “Once or twice a week”. Then we constructed an index of mother’s care towards the child as the average of these dummies.

During the mother’s interview, each child was taking tests of cognitive and non-cognitive skills in another room. The cognitive tests were on Spanish language and mathematics and differed for each school grade; they were based on national exams implemented in Latin America. The child could take no more than 20 minutes to complete each test. The timing of the test was recorded by two assistants from Pisullí.

The non-cognitive test employed was the Harter’s Perceived Competence Scale for Children. This scale is generally used to measure self-confidence and perceived competence. It can be divided into five subscales: scholastic competence, social competence, athletic competence, behavioural conduct and general feelings of self-worth. We did not make use of the physical subscale. In total the scale was 24 questions long. The Harter scale is recommended for youth ages 8-14. To analyse it we look both at the general overall score (given by the sum of scores achieved in each question -from 1 to 4 per question, where 4

²Questions based the background questionnaire for parents from PIRLS 2006.

shows the highest competence-) and at the separate subscale scores (given by the sum of scores achieved in the subscale questions, which implies that the total score for each subscale goes from 0 -if no question is answered- to 24 -maximum score that the child can get when all questions are answered showing the highest competence-).

The child was also requested to complete a questionnaire constructed by us. The questionnaire asked whether the child likes to go to school, learn new things, whether he/she feels that the mother or someone else is helping him/her (in his/her homework or taking care of him/her more generally), if there are precise rules in the household, how long he/she spends watching TV, doing homework, and playing with friends.

The mother had to state how much her child enjoys school, pretends to be sick to skip school, is independent, curious and sociable. For each of these questions she could give a score from 1 (“never”) to 4 (“always”). We took an average of the answers to these questions (reversing the score if the question was negative) and constructed an index of child’s behaviour and attitudes in mother’s perspective. During the interview we also asked the mother what is the highest level of education she would like her child to achieve (primary, secondary, university) and what level of education she actually believes her child will reach (primary, secondary, university).

After the child took the tests and answered all questions, his height and weight were measured by the two assistants. At the end of each interview, the child could pick a gift worth 8-10\$ to bring home, as a reward to the family for participating. The child could choose either a book or a toy. Our intention was to capture whether children had become more eager to learn and picked a book as a gift.

Data on weight, height and head circumference at birth of the school age children were gathered through vaccination certificates. Not everybody was able to bring us the vaccination certificate and sometimes, even if they brought it, it was not fully complete. Eventually we managed to collect data on height at birth for 44% of the children, weight at birth for almost 41%, and head circumference at birth for almost 38%.

Measures on various mother outcomes were also captured, but we will focus on these in the next chapter.

In 2012, 166 children and 115 mothers formed the control group, while 244 children and 167 mothers formed the treatment group: 410 children and 282 mothers in total. Some grandmothers who participated in the program instead

of mothers were also interviewed. However, the families where the grandmother was the family member interviewed are not taken into account in the analysis of outcomes as there is no comparison group for them.

In summer 2013, a follow-up research was conducted.

The questionnaire used to interview the mothers was very similar to the one used in 2012, in order to make answers comparable and have a follow-up on the most relevant items. Some other questions were also included to gain a better picture of the situation and understand some puzzles that were found in 2012.

The new areas related to mother outcomes, as we will see in the next chapter.

Other areas that had already been explored in 2012 were enriched with more detailed questions. This happened for:

- Child's health and how the mother takes care of it;
- Child's schooling (the exact grades when the child repeated the year or left school temporarily).

In order to make the collection of data in a shorter period and to lower the burden for the participating families, a team of 10 interviewers was sent to each of the houses. Each interviewer was female and from the place, so that mothers could feel more at ease when interviewed. The interviews followed the questionnaire described above.

Mothers were also asked to show the interviewers the vaccination certificates (as many were missing in the previous year) and the school reports of the child for the year 2012/13.

The interviewers also made sure that the child was completing a cognitive test in Spanish and mathematics, adequate for his/her grade. The children's height was measured during the home visit, but not the weight, as it would have been complicated for the interviewers to carry a scale around the area.

In the follow up we reached 138 control children (83.13%) and 98 control mothers (85.22%), while 218 children (89.34%) and 150 mothers (89.82%) formed the treatment group.

2.3.1 Balancing

The treatment and control groups, mothers and children, are very similar on observed and predetermined characteristics, supporting the view of the empirical setup as a natural experiment.

Children's height, weight, head circumference at birth and gender are balanced between the two groups: on average children were 48cm tall, weighted 3 kg and their head circumferences was 33cm. Children are in the same grades too and in schools equally far from their houses. To check whether mothers had a different number of young children before the treatment started, we check for how many mothers had either 1, 2 or 3 younger children in 2005 (younger than the oldest one who participates in the interview). The number of the oldest interviewed child's younger siblings in 2005 is well balanced. There is a difference on child age, and that is probably due to the fact that, as we will see, control children are more likely to repeat the school grade. The F-test on all of the characteristics together is not significant, which suggests that none of the children characteristics is linearly associated to the treatment.

Mothers' characteristics are balanced in most of the dimensions: age, city of birth, province of birth, whether she is from the same place as her child's father, the number of children she had in 2005, her civil status before the child was born, the highest level of education she had completed, religion. With respect to the working condition, control mothers seem to be more likely to be employed before the interviewed child/children was/were born: 47.3% of treated mothers were working, against 60.9% of control mothers. Within the group of mothers who were working before, control mothers were more likely to be working full time. Being self-employed and working with a contract before treatment are not different characteristics between groups. The mean firm size before is also balanced. Within the mothers who were not working, the reasons why they were not doing so (because they had children, because the job was not available, because the partner did not want) are balanced (at 5% significance level). The F-test on all of the mother characteristics is significantly different from zero. This is likely to be due to the previous working condition of the mother; as anticipated, we will later control for this difference.

Table 2.2: Child Characteristics Before Treatment

	(1)		
	Treatment	Control	Difference
	Mean	Mean	in means
female	0.541	0.476	0.065 (0.050)
child age	8.346	8.843	-0.498** (0.194)
1 younger sibling in 2005	0.198	0.200	-0.002 (0.040)
2 younger siblings in 2005	0.025	0.055	-0.030 (0.019)
3 younger siblings in 2005	0.000	0.006	-0.006 (0.005)
height at birth (cm)	48.250	48.764	-0.514 (0.445)
weight at birth (gr)	3025.472	3032.370	-6.898 (71.255)
head circumference at birth (cm)	33.868	33.622	0.246 (0.374)
dummy grade 1/2	0.324	0.307	0.017 (0.047)
dummy grade 3/4	0.352	0.343	0.009 (0.048)
dummy grade 5/6	0.250	0.265	-0.015 (0.044)
dummy grade 7	0.074	0.084	-0.011 (0.027)
school distance: less than 30min	0.724	0.789	-0.065 (0.044)
school distance: more than 30 min.	0.276	0.211	0.065 (0.044)
F(11, 102) = 1.31			
Prob > F = 0.2283			
Observations	410		

Notes: Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 2.3: Mothers' Characteristics Before Treatment

	Treatment	Control	Difference
	Mean	Mean	in means
mother age	31.982	31.183	0.799 (0.727)
mum from Quito	0.563	0.496	0.067 (0.061)
mum from Pichincha	0.623	0.539	0.084 (0.060)
parents from same city	0.513	0.456	0.057 (0.064)
mother lived together w/ partner	0.796	0.817	-0.021 (0.048)
mother divorced/separated/widow	0.018	0.009	0.009 (0.014)
mother was single	0.186	0.174	0.012 (0.047)
no. of children in 2005	1.862	1.632	0.231 (0.181)
did not complete primary	0.120	0.148	-0.027 (0.041)
completed primary	0.392	0.374	0.018 (0.059)
did not complete secondary	0.295	0.304	-0.009 (0.056)
completed secondary	0.169	0.165	0.003 (0.045)
started university	0.024	0.009	0.015 (0.016)
was not religious	0.102	0.070	0.032 (0.035)
was Christian	0.874	0.896	-0.021 (0.039)
had money of her own	0.584	0.526	0.058 (0.060)
Observations	282		

Notes: Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 2.4: Mothers' Characteristics Before Treatment - continued

	Treatment Mean	Control Mean	Difference in means
was working	0.473	0.609	-0.136** (0.060)
was working full time	0.544	0.729	-0.184** (0.078)
was self-employed	0.190	0.214	-0.024 (0.066)
was working in the formal sector	0.253	0.300	-0.047 (0.074)
mean firm size	21.310	20.862	0.448 (10.600)
was not working because of children	0.331	0.252	0.079 (0.056)
was not working because there was no job	0.072	0.078	-0.006 (0.032)
was not working because partner did not want	0.072	0.052	0.020 (0.030)
was not working for other reasons	0.048	0.009	0.039* (0.021)
<hr/>			
F(18, 154) = 2.55			
Prob > F = 0.0010			
Observations	282		

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Fathers' characteristics before the treatment are well balanced between the two groups: there are no significant differences in father's age, city of birth of the father, province of birth, highest education level achieved before (primary, secondary, university), religion before and working condition before (if they were employed, if they were working full time, if they were working in the formal sector). Reassuringly, the F-test on all of the father characteristics before treatment is not significant.

Table 2.5: Fathers' Characteristics Before Treatment

	Treatment	Control	Difference
	Mean	Mean	in means
father age	35.053	33.645	1.408 (0.979)
dad from Quito	0.509	0.513	-0.004 (0.061)
dad from Pichincha	0.545	0.548	-0.003 (0.061)
primary school	0.449	0.505	-0.055 (0.063)
secondary school	0.513	0.466	0.047 (0.063)
university	0.036	0.026	0.010 (0.021)
was not religious	0.123	0.094	0.029 (0.040)
was Christian	0.857	0.887	-0.030 (0.043)
dad worked before	0.874	0.870	0.005 (0.041)
worked full time	0.938	0.880	0.058 (0.036)
was self-employed	0.171	0.162	0.010 (0.049)
worked in the formal sector	0.372	0.460	-0.088 (0.064)
mean firm size	30.939	49.299	-18.360 (12.376)
F(11, 291) = 0.83			
Prob > F = 0.6076			
Observations	282		

Notes: Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

As we will analyse intra-household decisions as an outcome variable, we also check how these decisions were taken before treatment. No differences are found in pre-treatment intra-household decisions on children's education, children's illness, children's discipline, expenses, food expenses, whether the woman in the family could work, fertility choices and use of contraceptives.

Table 2.6: Intra-household Decisions Before Treatment

	(1)		
	Treatment Mean	Control Mean	Difference in means
mum/both decided on children's education	0.887	0.875	0.013 (0.068)
mum/both decided when ill	0.951	0.968	-0.017 (0.044)
mum/both decided on discipline	0.864	0.903	-0.039 (0.070)
mum/both decided on spending	0.759	0.693	0.066 (0.054)
mum/both decided on food spending	0.753	0.789	-0.036 (0.051)
mum/both decided on mother working	0.795	0.770	0.025 (0.050)
mum/both decided on having children	0.873	0.858	0.014 (0.042)
mum/both decided on contraceptives	0.890	0.856	0.034 (0.041)
Observations	281		

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Finally, we investigate other characteristics of the household before treatment: the location of the house, the availability of a toilet inside the house and the vehicles possessed by the family are balanced between groups. The mean family monthly wage before treatment was approximately 250US\$ in both groups of families. What was not balanced before treatment was whether the family owned a house, the number of rooms and the availability of drinkable water in the house. However, few are the characteristics that were not balanced, so we interpret it as random.

Table 2.7: Household Characteristics Before Treatment

	Treatment Mean	Control Mean	Difference in means
family lived in Pisulli	0.677	0.583	0.094 (0.058)
house was owned	0.289	0.122	0.167*** (0.049)
house had drinkable water	0.771	0.878	-0.107** (0.047)
house had electricity	0.970	0.991	-0.021 (0.018)
house had toilet inside	0.428	0.383	0.045 (0.060)
average number of rooms	3.657	3.209	0.448** (0.218)
family who had no vehicles	0.946	0.913	0.033 (0.030)
family who had bicycles	0.024	0.052	-0.028 (0.022)
family who had other means of transport	0.030	0.035	-0.005 (0.021)
family average monthly wage (USD)	250.000	247.807	2.193 (17.259)
Observations	282		

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

2.3.2 Entropy Balancing

As previously mentioned, we need to take into account that the treated mothers were less likely to be working before treatment. To do it, we use entropy balancing, a method described in Hainmueller (2012) [46]. Entropy balancing is a data processing method to achieve covariate balance. It computes the means of the covariates in the treatment group and looks for a set of entropy weights so that the means in the reweighted control group match the means in the treatment group. If we wanted, we could also adjust for the 2nd and 3rd covariate moments (variance and skewness), but we limit the balancing to the 1st moment (mean) only. We implement entropy balancing for the covariates that we will include in the regressions as control variables (child characteristics, household demographics characteristics and household economics characteristics). Among

the covariates to be balanced, we also include whether mothers were working full time or not before treatment. We do it because treated mothers were also more likely to be working full time before treatment. This might influence the outcomes and we want to adjust for it.

This is the balancing that we get after reweighting the covariates for each child:

Table 2.8: Balancing after reweighting

	Treatment group		Control group			
	Mean	Variance	Skewness	Mean	Variance	Skewness
Child birth order	2.025	1.586	1.943	2.026	1.852	2.075
Child birth year	2004	3.483	-0.2814	2004	3.027	-0.128
Child with 1 young sibling in 2005	0.1975	0.1592	1.519	0.1977	0.1596	1.518
Child with 2 young siblings in 2005	0.02469	0.02418	6.126	0.02468	0.02422	6.127
Child with 3 young siblings in 2005	0	0	.	0.000123	0.000124	90.03
Mother age	31.38	52.34	-0.6453	31.39	21.85	0.6456
Father age	30.78	190	-0.7956	30.78	168	-1.39
Married before	0.3374	0.2245	0.6876	0.3373	0.2249	0.6883
Choabitated before	0.1687	0.1408	1.769	0.1689	0.1412	1.767
Mother born in Quito	0.5556	0.2479	-0.2236	0.5554	0.2484	-0.2229
Parents from the same city	0.4486	0.2484	0.2069	0.4487	0.2489	0.2062
Mother had 1 child in 2005	0.2593	0.1928	1.099	0.2591	0.1931	1.1
Mother had 2 children in 2005	0.3457	0.2271	0.649	0.3455	0.2275	0.6498
Mother had 3 children in 2005	0.1481	0.1267	1.981	0.1481	0.1269	1.982
Mother had 4 children in 2005	0.04938	0.04714	4.16	0.04948	0.04732	4.155
Mother had 5 children in 2005	0.03292	0.03197	5.235	0.0329	0.03201	5.237
Mother had 6 children in 2005	0.00823	0.008196	10.89	0.008226	0.008207	10.89
Mother had 8 children in 2005	0.00823	0.008196	10.89	0.008226	0.008207	10.89
Mother had 10 children in 2005	0.00823	0.008196	10.89	0.008226	0.008207	10.89
Mother worked before	0.465	0.2498	0.1403	0.4653	0.2503	0.1391
Mother worked full time before	0.251	0.1888	1.148	0.2514	0.1894	1.146
Father worked before	0.8765	0.1087	-2.289	0.8762	0.1091	-2.285
Mother's mean firm size before	11.14	2556	5.439	11.14	2651	5.342
Father's mean firm size before	25.85	4557	3.614	25.84	4510	3.668
Family monthly wage before	249.6	22810	1.357	249.6	21460	1.14

Notes: Mean, variance and skewness of pre-treatment covariates in control and treatment groups after reweighting with entropy balancing; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data before treatment.

Once the covariates have been reweighted, we check the balancing in the remaining pre-treatment variables. The differences in 2 out of 70 pre-treatment characteristics are significantly different from 0 at 5% level: whether the mother had started university before treatment and whether she was not working because of other reasons from the ones she was allowed to choose in the interview (i.e. children, lack of job, partner not allowing), a fact that we can interpret as random.

At the end of the chapter we will check whether results hold also when we weight the observations with entropy balancing.

2.4 Empirical Strategy and Results

2.4.1 Empirical Strategy

We can now estimate the effect of participating in the program on the outcomes with the following specification:

$$y_{ic} = \beta_0 + \beta_1 Treatment_i + \beta_2 ChildCharacteristics_i + \beta_3 HouseholdDemographics_i + \beta_4 HouseholdEconomics_i + \beta_5 TimeFE_t + \varepsilon_{it}$$

where i is the individual and t is time. y_{it} are the children or maternal outcomes of interest. $Treatment_i$ is a dummy equal to 1 when mother and child participated in the *PelCa* program and 0 otherwise.

$ChildCharacteristics_i$ are child characteristics. They include the birth year of the interviewed child, his/her birth order in the family and how many young children he/she had in 2005, i.e. before the program took place in Quito. When we consider children outcomes we also include child's gender. School fixed effects are added in $ChildCharacteristics_i$ when we look at schooling outcomes.

$HouseholdDemographics_i$ are household demographic characteristics: they consist of the age of the mother, the age of the father, their civil status before the interviewed child was born (whether they were married, whether they lived together, whether the mother was single), a dummy if the mother was born in Quito, a dummy if the parents came from the same city, the number of children the mother had in 2005. $HouseholdEconomics_i$ are household economic characteristics: they include whether the mother worked before treatment, whether the father worked, the mean firm size of the mother and that of the father, and the average monthly family wage before treatment. $TimeFE_t$ is a dummy equal to 1 when the observation corresponds to the year 2013, 0 if 2012; ε_{it} is the error term, clustered at the mother level when we analyse children outcomes and when we run the regressions pooling the observations in the two years together.

2.4.2 Results: Impacts on Schooling Outcomes

We now explore the effect that the treatment had on child outcomes.

Firstly, we will focus our analysis on schooling outcomes.

Primary school grades in Ecuador went from 0 to 20 in 2012. The overall final school grade was the average of grades in several subjects, but which subjects were selected to construct the average depended on the school: sometimes core subjects were the only ones taken into account, sometimes optional modules

were also considered, but which varied once more across schools. Given these differences, we do not compare children on the overall final school grade, but on the final Spanish and mathematics grades only, which we standardized by the child’s school grade. When we regress the standardized grades on the treatment dummy we also add school fixed effects in the child controls to take into account the different types of evaluation methods that can be used by the different schools.

We find that the *PelCa* program significantly increased average grades of treated children by 0.295 standard deviations in mathematics in 2012. It also increased average grades of treated children by 0.115 standard deviations in Spanish language in 2012, but the change is not significantly different from zero. The non-significance might also be due to the fact that we do not have the report cards for all children, so observations are few: out of 410 children, we have the final school grades for half of them only.

Table 2.9: Impacts on Schooling Outcomes

	(1)	(2)	(3)	(4)
	School	School	School	School
	maths grade	maths grade	maths grade	maths grade
	2012	2012	2012	2012
Treatment	0.243*	0.207	0.312*	0.295*
	(0.146)	(0.154)	(0.160)	(0.160)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.0144	0.409	0.490	0.528
Observations	212	212	212	212

	(1)	(2)	(3)	(4)
	School	School	School	School
	language grade	language grade	language grade	language grade
	2012	2012	2012	2012
Treatment	0.222	0.146	0.185	0.115
	(0.175)	(0.155)	(0.155)	(0.156)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.0118	0.460	0.525	0.552
Observations	202	202	202	202

Notes: School grades are standardized by school year. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. School Fixed Effects are added in Child Controls. Data 2012.

Interestingly, children who were educated in the *PelCa* program are almost 5% less likely to repeat the grade because they failed the year and 4.3% less

likely (but not significantly) to leave school temporarily. Overall, *PelCa* children are 7.6% less likely to either repeat the grade or leave school temporarily.

Table 2.10: Impacts on Schooling Outcomes - Continued

	(1)	(2)	(3)	(4)
	Repeats at least once	Repeats at least once	Repeats at least once	Repeats at least once
Treatment	-0.0624** (0.0248)	-0.0326 (0.0252)	-0.0435* (0.0242)	-0.0480* (0.0258)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.0202	0.303	0.374	0.381
Observations	382	382	382	382

	(1)	(2)	(3)	(4)
	Child temporarily leaves	Child temporarily leaves	Child temporarily leaves	Child temporarily leaves
Treatment	-0.0350 (0.0235)	-0.0369 (0.0249)	-0.0404 (0.0254)	-0.0431 (0.0263)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.0107	0.273	0.340	0.351
Observations	382	382	382	382

	(1)	(2)	(3)	(4)
	Child repeats/ temporarily leaves	Child repeats/ temporarily leaves	Child repeats/ temporarily leaves	Child repeats/ temporarily leaves
Treatment	-0.0731** (0.0310)	-0.0516 (0.0333)	-0.0683** (0.0337)	-0.0764** (0.0350)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.0206	0.302	0.369	0.379
Observations	382	382	382	382

Notes: Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. School Fixed Effects are added in Child Controls. Data 2012.

Differently from 2012, in 2013 final school grades went from 0 to 10. In most of the 2013 report cards the final grades by subject were not reported anymore: only the final grade was reported, as an average of all the other subjects. Therefore, we cannot compare children on Spanish language and mathematics

Table 2.11: Impacts on Schooling Outcomes 2013

	(1)	(2)	(3)	(4)
	School	School	School	School
	final grade	final grade	final grade	final grade
	2013	2013	2013	2013
Treatment	-0.0811	0.0292	0.168	0.181
	(0.166)	(0.190)	(0.253)	(0.273)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00165	0.437	0.497	0.519
Observations	173	173	173	173

Notes: Final school grades are standardized by child's school year. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. School Fixed Effects are added in Child Controls. Data 2012.

separately, but on the overall final grade only. We standardize it by grade and when we regress it against treatment we add school fixed effects in the child controls: at the end of the 2013 school year, treated children score higher than control children by 0.181 standard deviations (not significantly).

All children took a test in Spanish language and mathematics when they came for the interview. Their scores have been standardized by grade. *PelCa* children score 0.137 and 0.166 standard deviations higher in the language and mathematics tests respectively, but the estimates are not significantly different from zero. In the evaluation of these tests, we consider children from the second grade onward only. We exclude first graders because their tests did not have separate Spanish and mathematics components, so we cannot compare them.

Table 2.12: Impacts on Tests 2012

	(1)	(2)	(3)	(4)
	Language test 2012	Language test 2012	Language test 2012	Language test 2012
Treatment	0.134 (0.122)	0.0743 (0.140)	0.113 (0.150)	0.137 (0.160)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00465	0.255	0.330	0.350
Observations	323	322	322	322
	(1)	(2)	(3)	(4)
	Maths test 2012	Maths test 2012	Maths test 2012	Maths test 2012
Treatment	0.0879 (0.126)	0.132 (0.144)	0.208 (0.155)	0.166 (0.162)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00188	0.260	0.339	0.366
Observations	324	323	323	323

Notes: Scores are standardized by child's school grade. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. School Fixed Effects are added in Child Controls. Data 2012.

In 2013 children sat for the language and mathematics tests again: *PelCa* children scored 0.0846 standard deviations lower than the others, but they kept the same better performance in mathematics, scoring 0.167 standard deviations higher than control children. However, neither estimate is significantly different from zero.

Table 2.13: Impacts on Tests 2013

	(1)	(2)	(3)	(4)
	Language Test 2013	Language Test 2013	Language Test 2013	Language Test 2013
Treatment	-0.0971 (0.126)	-0.0939 (0.162)	-0.0593 (0.184)	-0.0846 (0.180)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00235	0.261	0.305	0.329
Observations	299	299	299	299

	(1)	(2)	(3)	(4)
	Maths Test 2013	Maths Test 2013	Maths Test 2013	Maths Test 2013
Treatment	0.00184 (0.132)	0.141 (0.170)	0.202 (0.186)	0.167 (0.199)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.000000825	0.206	0.255	0.265
Observations	299	299	299	299

Notes: Scores are standardized by child's school grade. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. School Fixed Effects are added in Child Controls. Data 2013.

When we pool the two years of observations together, treated children perform better in mathematics (by 0.0599 standard deviations), but worse in Spanish language (by 0.0284 standard deviations). However, neither estimate is significant. The non-significance could also be due to the fact that the tests that we built were not the most appropriate to capture the child's performance.

Table 2.14: Impacts on Language and Maths Tests - Pooled Years

	(1)	(2)	(3)	(4)	(5)
	Language Test	Language Test	Language Test	Language Test	Language Test
Treatment	-0.0504 (0.108)	-0.0503 (0.108)	-0.0928 (0.127)	-0.0658 (0.140)	-0.0643 (0.142)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
R-sqr	0.000638	0.00136	0.201	0.234	0.239
Observations	620	620	620	620	620

	(1)	(2)	(3)	(4)	(5)
	Maths Test	Maths Test	Maths Test	Maths Test	Maths Test
Treatment	-0.00867 (0.102)	-0.00895 (0.102)	0.0399 (0.115)	0.0615 (0.127)	0.0412 (0.131)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0000183	0.000676	0.147	0.167	0.177
Observations	621	621	621	621	621

Notes: Scores are standardized by child's school grade. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. School Fixed Effects are added in Child Controls. Pooled data, 2012-3.

At the end of the interviews in 2012 children were offered to bring home a gift as a reward for the time that the family had given us. They could choose between a book and a toy: treated children were 2.6% more likely to choose a book as a gift, but the estimate is not significant. In 2013 there was no reward for participating in the interview.

Table 2.15: Impacts on Choice of Gift

	(1)	(2)	(3)	(4)
	Child chose a book as gift	Child chose a book as gift	Child chose a book as gift	Child chose a book as gift
Treatment	0.0302 (0.0455)	0.0115 (0.0505)	0.0288 (0.0551)	0.0281 (0.0562)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00125	0.295	0.330	0.351
Observations	371	370	370	370

Notes: The outcome dummy is equal to 1 if the child chose a book instead of a toy at the end of the interview in 2012. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

2.4.3 Results: Impacts on Mothers' Attitudes towards the Child

Next, we analyse whether the program succeeds in helping mothers to raise their children, by looking at the time and care they provide the child with. We find that treated mothers are significantly (at 1% level) more likely to give attention to their children. The effect persists also when we control for each set of characteristics.

In addition, on average treated mothers help their children almost 40 minutes more per week, even though the estimate is not significant.

Table 2.16: Impacts on Care towards the Child

	(1)	(2)	(3)	(4)
	Mother's care towards child	Mother's care towards child	Mother's care towards child	Mother's care towards child
Treatment	0.0446** (0.0176)	0.0397** (0.0199)	0.0484** (0.0197)	0.0566*** (0.0200)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.0280	0.242	0.372	0.386
Observations	384	383	383	383

Notes: The mothers were asked how often they listen to their child reading aloud, how often they talk with their child, talk with, their child about what he/she is reading on his/her own, discuss their child's classroom reading work with him/her, go to the library or a bookstore with their child, play with their child, dance with their child. Mothers could choose an answer among "Every day or almost every day", "Once or twice a week", "Once or twice a month" and "Never or almost never". As the first two answers are very different from the last two, we create a dummy equal to 1 when the mother answers either "Every day or almost every day" or "Once or twice a week". Then we construct an index of mother's care towards the child as the average of these dummies, which is the outcome shown in the table. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

	(1)	(2)	(3)	(4)
	Weekly help from mother (minutes)	Weekly help from mother (minutes)	Weekly help from mother (minutes)	Weekly help from mother (minutes)
Treatment	27.48 (47.21)	0.565 (52.41)	19.34 (55.00)	38.57 (56.57)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00117	0.243	0.286	0.308
Observations	371	370	370	370

Notes: Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

However, when we ask the children if they feel that their mother is helping them (e.g. with homework), we find no significant differences between treated and control children.

Table 2.17: Impacts on Care towards the Child - Children's Perspective

	(1)	(2)	(3)	(4)
	Child feels mother helps	Child feels mother helps	Child feels mother helps	Child feels mother helps
Treatment	-0.0953 (0.104)	-0.131 (0.133)	-0.0962 (0.141)	-0.0810 (0.144)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00236	0.177	0.223	0.239
Observations	366	366	366	366

Notes: We ask children if they feel that their mothers are helping them (e.g. with homework). Children could answer this question with a score from 1 ("No") to 4 ("Always"). Scores are standardized by child's year of birth. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

We also verify whether treatment has an impact on maternal expectations and beliefs on the child's schooling performance. When mothers are asked whether they would like their children to reach university as their highest level of education, there is no difference between control and treatment group. However, treated mothers are 7.97% more likely to believe that their children will actually reach university.

Table 2.18: Impacts on Mothers' Attitudes towards Children

	(1)	(2)	(3)	(4)
	Mother would like child to reach University	Mother would like child to reach University	Mother would like child to reach University	Mother would like child to reach University
Treatment	0.0304 (0.0344)	0.0000374 (0.0319)	0.00610 (0.0340)	0.00427 (0.0307)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00478	0.336	0.403	0.424
Observations	382	382	382	382

	(1)	(2)	(3)	(4)
	Mother believes child will reach University	Mother believes child will reach University	Mother believes child will reach University	Mother believes child will reach University
Treatment	0.0818 (0.0531)	0.0409 (0.0587)	0.0576 (0.0615)	0.0797 (0.0621)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00990	0.214	0.276	0.290
Observations	382	382	382	382

Notes: Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

Finally, when we ask children if there are precise rules in the house, we find that treated children answer significantly more negatively than control children.

Table 2.19: Impacts on Mothers' Attitudes towards Children - Children's Perspective

	(1)	(2)	(3)	(4)
	Rules in the house	Rules in the house	Rules in the house	Rules in the house
Treatment	-0.145 (0.104)	-0.173 (0.109)	-0.212* (0.108)	-0.218** (0.108)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00528	0.0266	0.0868	0.105
Observations	366	366	366	366

Notes: Children answered to the question: "Are there precise rules in the house?" with a score from 1 ("No") to 4 ("Always"). The index is standardized by child's birth year. Standard errors clustered at the mother level in parentheses; ** $p < 0.1$, * $p < 0.05$, *** $p < 0.01$. Data 2012.

2.4.4 Results: Impacts on Child's Health

We now see whether the *PelCa* preschool program has effects on children's health.

A measure of child's health is child's height, which can reflect nutrition. We find that in 2012 treated children are 1.5 centimetres significantly taller. In 2013 the height is measured by each interviewer at the child's home: we do not find evidence of children being taller anymore. The 2013 data contradict the 2012 data. Given the non-realistic differences from one year to the other, we conclude that the children's height measures provided in the current analysis are not reliable. Data on weight are not consistent either. Therefore, we will not take children's height and weight into account.

With respect to other measures of child's health, in 2013 treated children seem more likely to have been sick in the last month, but the estimate is not significant at any level. Now we limit the sample to the children who have not been sick in the last month and we ask mothers if they brought him to the doctor for a medical check anyway: we do not find significant differences between the two groups.

Table 2.20: Impacts on Child's Health

	(1)	(2)	(3)	(4)
	Child's height (cm)	Child's height (cm)	Child's height (cm)	Child's height (cm)
Treatment	-1.009 (1.200)	1.519* (0.778)	1.432* (0.826)	1.517* (0.823)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00187	0.684	0.702	0.708
Observations	377	376	376	376

Notes: Standard errors clustered at the mother level in parentheses;" ** p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

	(1)	(2)	(3)	(4)
	Child ill in the last month	Child ill in the last month	Child ill in the last month	Child ill in the last month
Treatment	0.0576 (0.0677)	0.0553 (0.0671)	0.0753 (0.0671)	0.0878 (0.0690)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00320	0.0666	0.139	0.162
Observations	325	325	325	325

Notes: We asked whether the child was sick in the last month. Standard errors clustered at the mother level in parentheses;" ** p < 0.1, ** p < 0.05, *** p < 0.01. Data 2013.

	(1)	(2)	(3)	(4)
	Medical checks in the last month	Medical checks in the last month	Medical checks in the last month	Medical checks in the last month
Treatment	-0.0492 (0.0989)	-0.0589 (0.104)	-0.0260 (0.104)	-0.0336 (0.113)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00238	0.0751	0.181	0.198
Observations	160	160	160	160

Notes: This sample is reduced to children who were not ill in the last month. Standard errors clustered at the mother level in parentheses;" ** p < 0.1, ** p < 0.05, *** p < 0.01. Data 2013.

Finally, by looking at the report cards from 2012, it seems that treated children are less likely to be absent from school by three quarters of a day, but the estimated coefficient is not sufficiently significant to suggest that children from any of the two groups are healthier than the others.

Table 2.21: Impacts on Child’s Health - continued

	(1)	(2)	(3)	(4)
	School	School	School	School
	absences	absences	absences	absences
	2012	2012	2012	2012
Treatment	-0.628	-0.378	-0.517	-0.766
	(0.708)	(0.831)	(0.941)	(1.104)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00420	0.321	0.406	0.435
Observations	222	222	222	222

Notes: Standard errors clustered at the mother level in parentheses;

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

School Fixed Effects are added in Child Controls. Data 2012.

2.4.5 Results: Impacts on Non-Cognitive Skills

We now analyse the effect of treatment on non-cognitive skills.

Our main measure of non-cognitive skills is the Harter scale. When we look at the impact on the Harter Scale, we consider the answers by children older than 8 years old only: according to the creators of the test, children below 8 years old should not take it, as it is too difficult for them to understand. We see that treated children above 8 years old score almost half a point higher (0.400) than control children, but the estimate is not significant.

Table 2.22: Impacts on Non-Cognitive Skills

	(1)	(2)	(3)	(4)
	Harter scale	Harter scale	Harter scale	Harter scale
Treatment	0.339	0.240	0.354	0.400
	(1.543)	(1.687)	(1.863)	(1.943)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.000207	0.0368	0.0892	0.101
Observations	249	249	249	249

Notes: The Harter scale is formed by 24 questions, 6 per each of the following domains: self-worth, social skills, cognitive skills and behavioural skills. Each answer is given a score from 1 to 4 (maximum competence in that domain). Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Only children above 8 years old are considered. Data 2012.

We then decompose the Harter scale in its different domains to check if

there is any variation between groups. We find that treated children score much higher in the self-worth domain (0.346 points higher on average, even though not significant). In the other domains (child's self-perceived school performance, social skills and behaviour), treated and control children do not differ much.

Table 2.23: Impacts on Non-Cognitive Skills - Harter Scale disentangled

	(1)	(2)	(3)	(4)
	Harter scale	Harter scale	Harter scale	Harter scale
	School subscale	School subscale	School subscale	School subscale
Treatment	0.400 (0.541)	0.310 (0.580)	0.0608 (0.626)	0.0543 (0.636)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00221	0.0631	0.128	0.154
Observations	249	249	249	249

	(1)	(2)	(3)	(4)
	Harter scale	Harter scale	Harter scale	Harter scale
	Social subscale	Social subscale	Social subscale	Social subscale
Treatment	-0.324 (0.453)	-0.346 (0.494)	-0.167 (0.556)	0.0391 (0.586)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00193	0.0307	0.0904	0.111
Observations	249	249	249	249

	(1)	(2)	(3)	(4)
	Harter scale	Harter scale	Harter scale	Harter scale
	Behaviour subscale	Behaviour subscale	Behaviour subscale	Behaviour subscale
Treatment	0.198 (0.507)	0.0817 (0.556)	0.169 (0.598)	-0.0384 (0.629)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.000666	0.0452	0.105	0.128
Observations	249	249	249	249

	(1)	(2)	(3)	(4)
	Harter scale	Harter scale	Harter scale	Harter scale
	Selfworth subscale	Selfworth subscale	Selfworth subscale	Selfworth subscale
Treatment	0.0443 (0.557)	0.183 (0.595)	0.289 (0.672)	0.346 (0.693)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.0000268	0.0585	0.112	0.144
Observations	249	249	249	249

Notes: Each domain of the Harter scale is formed by 6 questions. Each answer by the child is given a score from 1 to 4 (maximum competence in that domain). Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

When we ask the mother about child's attitudes and behaviours (whether he/she enjoys school, whether he/she pretends to be sick to skip school, whether he/she is independent, sociable, curious), treated mothers report a significantly

more positive perceived behaviour (the index on child's attitudes as perceived by the mother is 0.409 standard deviations higher in the treatment group).

Table 2.24: Child's attitudes as perceived by the mothers

	(1)	(2)	(3)	(4)
	Child's attitudes	Child's attitudes	Child's attitudes	Child's attitudes
Treatment	0.347*** (0.127)	0.323** (0.156)	0.369** (0.152)	0.405** (0.160)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.0296	0.234	0.305	0.340
Observations	377	377	377	377

Notes: The index is built as an average of the answers that mothers give to the questions on the behaviours and attitudes of children (e.g. if the child is independent, curious, sociable, likes schooling, etc.). The mother can give a score from 1 ("Never") to 4 ("Always") to each question. An average of all answers is taken and the index is standardized by child's birth year. School fixed effects are included in children controls. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

When we ask the child directly on how much he/she enjoys school³, we also find that treated children exhibit a more positive attitude towards schooling.

Table 2.25: Children's attitudes towards schooling (as perceived by them)

	(1)	(2)	(3)	(4)
	Child likes school	Child likes school	Child likes school	Child likes school
Treatment	0.0468 (0.108)	-0.0239 (0.134)	0.0290 (0.148)	0.0429 (0.153)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.000559	0.237	0.308	0.324
Observations	363	363	363	363

Notes: This index is the standardized (by child's year of birth) average answer that children give to the questions: "do you like to go to school?" "Do you think that school is boring?" "Do you like to learn new things? How much time do you dedicate to homework daily?". Each child could give an answer from 1 ("No") to 4 ("A lot"). Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

2.5 Robustness Checks

We now verify if all the effects on children outcomes are still present once we take into account the difference in the previous working condition of mothers by reweighting the sample with entropy balancing.

³This index is the average answer that children give to the questions "do you like to go to school", "do you think that school is boring", "do you like to learn new things", "how much time do you give to homework daily", standardized by child's birth year. Each child could give an answer from 1 ("No") to 4 ("A lot").

We only show the results from regressions with the full set of controls.

First, let us look at cognitive outcomes. Once the sample is reweighted, we find an even higher and more significant effect on the final mathematics school grade in 2012, and the effect on the final language grade in 2012 is also still positive, but not significant.

Table 2.26: Impacts on Schooling Outcomes 2012 - Reweighted Sample

	(1) School maths grade 2012		(1) School language grade 2012
Treatment	0.406*** (0.111)	Treatment	0.188 (0.116)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.583	R-sqr	0.613
Observations	212	Observations	202

Notes: School Fixed Effects are added in Child Controls. Sample reweighted with entropy balancing. The mathematics and language grades are standardized by school grade. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

The treatment effect on the final grade is even greater and more significant in 2013.

Table 2.27: Impacts on Schooling Outcomes 2013 - Reweighted Sample

	(1) School final grade 2013
Treatment	0.414* (0.223)
Child Controls	Yes
Household Demographics	Yes
Household Economics	Yes
R-sqr	0.528
Observations	173

Notes: School Fixed Effects are added in Child Controls. Sample reweighted with entropy balancing. The final grade is standardized by school grade. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2013.

Treated children are 4.14% less likely to repeat the year, and 6.96% less likely to either repeat the year or leave school temporarily. Both estimates are statistically significant.

Table 2.28: Impacts on Schooling Outcomes 2012 - Reweighted Sample - Continued

	(1)		(1)
	Repeats at least once		Child temporarily leaves
Treatment	-0.0414* (0.0214)	Treatment	-0.0407 (0.0247)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.338	R-sqr	0.336
Observations	382	Observations	382
	(1)		
	Child repeats/ temporarily leaves		
Treatment	-0.0696** (0.0314)		
Child Controls	Yes		
Household Demographics	Yes		
Household Economics	Yes		
R-sqr	0.384		
Observations	382		

Notes: School Fixed Effects are added in Child Controls. Sample reweighted with entropy balancing. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

We also get the same positive but non-significant effects on the Spanish language and mathematics tests in 2012.

Table 2.29: Impacts on Tests 2012 - Reweighted Sample

	(1) Language Test 2012		(1) Maths Test 2012
Treatment	0.149 (0.146)	Treatment	0.215 (0.137)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.382	R-sqr	0.395
Observations	322	Observations	323

Notes: School Fixed Effects are added in Child Controls. Scores are standardized by school grade. Sample reweighted with entropy balancing. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

The treatment effect on the language test in 2013 is close to zero, but the effect on the mathematics test becomes larger and more significant.

Table 2.30: Impacts on Tests 2013 - Reweighted Sample

	(1) Language Test 2013		(1) Maths Test 2013
Treatment	0.0292 (0.154)	Treatment	0.259* (0.152)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.397	R-sqr	0.364
Observations	299	Observations	299

Notes: School Fixed Effects are added in Child Controls. Scores are standardized by school grade. Sample reweighted with entropy balancing. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2013.

Once we pool the two years together, we do not see an effect on the Spanish language test, while the impact on the mathematics test is positive, but not significant anymore.

Table 2.31: Impacts on Tests 2012-3 - Reweighted Sample

	(1) Language Test 2012-3		(1) Maths Tests 2012-3
Treatment	0.0162 (0.0957)	Treatment	0.110 (0.102)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.111	R-sqr	0.0888
Observations	620	Observations	621

Notes: Sample reweighted with entropy balancing. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. School Fixed Effects are added in Child Controls. Scores are standardized by school grade. Data 2012-3.

The treatment has no effect on children’s choice of a gift at the end of the interview: treated and control children are equally likely to pick either a book or a toy.

Table 2.32: Impacts on Choice of Gift - Reweighted Sample

	(1) Child chose a book as gift
Treatment	-0.0151 (0.0536)
Child Controls	Yes
Household Demographics	Yes
Household Economics	Yes
R-sqr	0.238
Observations	370

Notes: Sample reweighted with entropy balancing. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

Let us now focus on the attention that mothers give to their children. Treated mothers are significantly more likely to give attentive care to their children and to help them with their homework. However, once we ask the children, we do not observe a significant difference in the reported care received by their mothers.

Table 2.33: Impacts on Care towards the Child - Reweighted Sample

	(1) Mother's care towards child		(1) Weekly help from mother (minutes)
Treatment	0.0739*** (0.0201)	Treatment	83.34* (48.26)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.358	R-sqr	0.192
Observations	383	Observations	370

Notes: Sample reweighted with entropy balancing. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

Table 2.34: Impacts on Care towards the Child - Children's Perspective - Reweighted Sample

	(1) Child feels mother helps
Treatment	-0.0295 (0.126)
Child Controls	Yes
Household Demographics	Yes
Household Economics	Yes
R-sqr	0.0829
Observations	366

Notes: Sample reweighted with entropy balancing. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

As before, treated and control mothers are equally likely to desire their children to reach university, but treated mothers are more likely to believe that their children will actually reach university, even though not significantly.

Table 2.35: Impacts on Mother’s Attitudes towards Children - Reweighted Sample

	(1)		(1)
	Mother would like child to reach University		Mother believes child will reach University
Treatment	0.00154 (0.0265)	Treatment	0.0831 (0.0562)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.170	R-sqr	0.172
Observations	382	Observations	382

Notes: Sample reweighted with entropy balancing. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

As before, we see that the channel through which treated mother’s behaviour improves is not the use of more precise rules in the house, at least it does not seem so in children’s perspective.

Table 2.36: Impacts on Mother’s Attitudes towards Children - Children’s Perspective - Reweighted Sample

	(1)
	Rules in the house
Treatment	-0.237** (0.104)
Child Controls	Yes
Household Demographics	Yes
Household Economics	Yes
R-sqr	0.137
Observations	366

Notes: Sample reweighted with entropy balancing. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

Once the sample is reweighted, we find no health differences between the two groups of children in the last month. In spite of this, control mothers seem significantly more likely to bring their children to the hospital for a medical check, but treated children are significantly less absent from school, by 2.25 days per year.

Table 2.37: Impacts on School Absences 2012 - Reweighted Sample

	(1)
	School absences 2012
Treatment	-2.247*** (0.840)
Child Controls	Yes
Household Demographics	Yes
Household Economics	Yes
R-sqr	0.585
Observations	223

Notes: Sample reweighted with entropy balancing. School fixed effects included in children controls. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

If we analyse the treatment effect on the Harter Scale, we still find that treated children score higher, but not significantly so. When we investigate which is the domain that is most positively affected by the treatment, we still find that it is the self-worth domain that improves the most.

Table 2.38: Impacts on Non-Cognitive Skills - Reweighted Sample

	(1)
	Harter scale
Treatment	1.808 (2.153)
Child Controls	Yes
Household Demographics	Yes
Household Economics	Yes
R-sqr	0.178
Observations	249

Notes: Sample reweighted with entropy balancing. Only children above 8 years old are included in the sample. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

Table 2.39: Impacts on Non-Cognitive Skills - Continued - Reweighted Sample

	(1)		(1)
	Harter scale School subscale		Harter scale Social subscale
Treatment	0.566 (0.705)	Treatment	0.311 (0.542)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.195	R-sqr	0.159
Observations	249	Observations	249
	(1)		(1)
	Harter scale Behaviour subscale		Harter scale Selfworth subscale
Treatment	0.131 (0.655)	Treatment	0.795 (0.749)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.213	R-sqr	0.163
Observations	249	Observations	249

Notes: Sample reweighted with entropy balancing. Only children above 8 years old are included in the sample. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

Finally, when we ask mothers about child's attitude and behaviours (whether he/she enjoys school, whether he/she pretends to be sick to skip school, whether he/she is independent, sociable, curious), treated mothers still report a more positive behaviour. When we ask children, the effect is positive but not significant, as before.

Table 2.40: Impacts on Children’s Attitudes 2012 - Reweighted Sample

	(1) Child’s attitudes perceived by mother		(1) Child’s attitudes Self-Reported
Treatment	0.418*** (0.143)	Treatment	0.125 (0.139)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.424	R-sqr	0.370
Observations	377	Observations	363

Notes: Sample reweighted with entropy balancing. School fixed effects included in children controls. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

Overall, we find the same treatment effects in the reweighted sample as in the non-reweighted one. If anything, we find these treatment effects slightly larger once entropy balancing is implemented. This corroborates the validity of the results found in the analysis.

2.6 Conclusion

In conclusion, we see that a preschool program that involves mothers in the education of their children, like the *PelCa* program, can improve children outcomes in various dimensions.

With respect to cognitive outcomes, we find that treated children perform better at school in 2012 (by 0.115 standard deviations in Spanish language, not significantly, and by 0.295 standard deviations in mathematics, significantly at 10%), as well as in the overall final grade in 2013 (by 0.181 standard deviations, not significantly estimated). When we examine the children’s performance in the Spanish and mathematics tests that we constructed, we still find some evidence of gains in both mathematics and language in 2012, that do not hold anymore for Spanish language in 2013.

The *PelCa* preschool program also affects positively the mothers’ attitudes towards their children: treated mothers seem to give more attention to their children and dedicate more time helping them with their homework (on average 40 minutes more per week). The better grades of treated children may reflect this too. However, when we ask children themselves about the help that

they receive from their mothers, we do not find significant differences anymore. Certainly a more attentive behaviour of mothers towards their children is not perceived by the children in the existence of precise rules in the house.

With respect to the child's health, we cannot conclude much as height and weight were not correctly measured. By examining the report cards we also see that treated children are less likely to be absent from school, which could indicate better child's health, but the estimated coefficients are not significantly different from zero. We do not find evidence on other health outcomes either.

The Harter scale also suggests better non-cognitive outcomes for treated children, especially on the self-esteem component. Moreover, on average treated mothers see their children as more sociable, independent, curious and willing to go to school than control mothers. Treated children themselves report higher enjoyment from going to school, even though this estimate is not significant.

The results still hold when we reweight the sample with entropy balancing.

Chapter 3

The *PelCa* Program - Effect on Mothers

3.1 Introduction

As we have seen in the first chapter, nowadays gender equity and women's empowerment are perceived as values in themselves and also as pushing factors of development and economic growth. In the last decades much effort has been put by women's movements, international organizations and national governments to achieve these goals. Which are the most effective ways to reach these goals is still unclear. We propose an innovative method that can help women to gain more power and independence, making a step towards gender equity: preschool programs that involve mothers, asking them to be protagonists of their children's education.

The *PelCa* program (Preescolar en la Casa – preschool at home) is a home preschool intervention based on group parenting sessions that is implemented in Pisullí, a disadvantaged urban neighbourhood in the northwest of Quito, Ecuador. The program was opened by the AVSI NGO in 2005. Currently there are approximately 250 children in the *PelCa* preschool program and approximately 250 children who participated in the *PelCa* preschool program and now participate in school programs in the NGO. This policy setting offers us the opportunity to evaluate an example of early childhood development intervention based on group parenting sessions. The objective of this chapter is to study the effects of this early childhood development intervention on mother outcomes.

We will evaluate whether the treatment empowers women in different domains: favouring their entry in the labour market, corroborating their independence, changing their perception with respect to domestic violence, modifying the allocation of power in the house, affecting fertility choices, changing their involvement in the community, improving the overall family conditions.

3.2 Background and Design

We will first give a more detailed picture of the *PelCa* program; we will then go through the design used to evaluate it, focusing primarily on the construction of the control group.

3.2.1 Background

AVSI, the Association of Volunteers in International Service, is an international not-for-profit, non-governmental organisation (NGO) based in Italy. It was founded in 1972. Today it operates in 35 countries in Eastern Europe, Africa, Latin America and the Middle East, directing more than 80 long term projects that have beneficial effects on more than 90,000 people. It reached Ecuador in 2001. Since the beginnings, it has been working in close collaboration with the Vicariate of Education, aiming at the development of the rural communities around Portoviejo, a small city on the coast, in the province of Manabí. The main activities relate to infant and child development and education. In 2005 one AVSI branch was opened in Pisullí, a disadvantaged urban neighbourhood to the northwest of Quito. Thanks to the joint work with Fundación Sembrar, a local non-profit organization, and the local parish, AVSI funded a community development centre where it implemented a modified version of *PelCa* (Preescolar en la casa - home preschool), the program we will analyse. The NGO rapidly expanded: it now includes afterschool programs and other services offered to more than 700 children, youth and their families. There are more than 50 members in the local staff. Financial support is guaranteed by grants and donations from the CEI (Italian Bishop Conference Charity) (2006-2008), the MAE (Italian Ministry of Foreign Affairs) (2009-2011), the CAM (Comunidad de Madrid) (2009-2012), and several private donors.

Table 3.1: Current children involved in the pre-school, school and afterschool programs

	<i>Quito</i>	<i>Portoviejo</i>
<i>Pre-school area</i>	<i>329</i>	<i>283</i>
<i>School area</i>	<i>250</i>	<i>Na</i>
<i>Afterschool activities</i>	<i>162</i>	<i>684</i>

At the centre of our analysis there is *PelCa*, the main activity of the AVSI NGO in Ecuador, the one that provides the educative method for the other activities. The *PelCa* program in the preschool area is targeted to parents of children from 0 to 5 years old. Fortnightly meetings are held in small groups (usually 6-7 mothers -or other guardians like grandmothers or fathers- with their children), under the guidance of a family advisor. In the first part of the meeting, children socialize among them playing on a carpet with games and didactic materials, while parents read and discuss about some leaflets on family education. In the second part of the meeting, parents and children work together: they are taught dynamics, ring-a-ring-a-roses, songs, learning games and various activities that parents can reproduce at home (building games and didactic material, reading to their children, puppets, etc.). In the last part of the meeting, the family advisors verify the tasks assigned to the mothers in the previous two weeks. A notebook of activities is given to every child according to his age, where parents can find activities focused on the development of different areas. The family advisors verify the learning of children one by one, then they assign them reinforcement activities or further learning to each parent. The assigned tasks have to be completed at home by the parent and child involved in the two weeks following. Advice on extra and personalized activities is also given. In the rural area (Manabí Province), the frequency of the meetings has been recently increased, changing them from fortnightly to weekly.

Families usually acquire knowledge about the program through a poster hung outside the NGO and by word of mouth in the neighbourhood. Once they express interest, they are asked about their names and contact information. AVSI employees visit the family at home in order to collect data on the family circumstances, observe life conditions in the house, evaluate the real need of support and identify family weaknesses and strengths. To be eligible the child must be younger than 3 years old (so that he/she can participate for at least two years in the program) and the parent must commit to participate in fortnightly meetings and perform at home the tasks assigned for the two weeks interval

between meetings. AVSI's policy requires the involved parent to spend many hours at home with the child and therefore they ask this parent not to work while in the preschool *PelCa* program. General wealth and closeness to the NGO buildings are also taken into account in the selection process. Parents of children above the preschool age (i.e. from 5 to 11 years old) can still remain in the *PelCa* school programs in the NGO. Depending on their characteristics, they will be offered to participate in one of these three options:

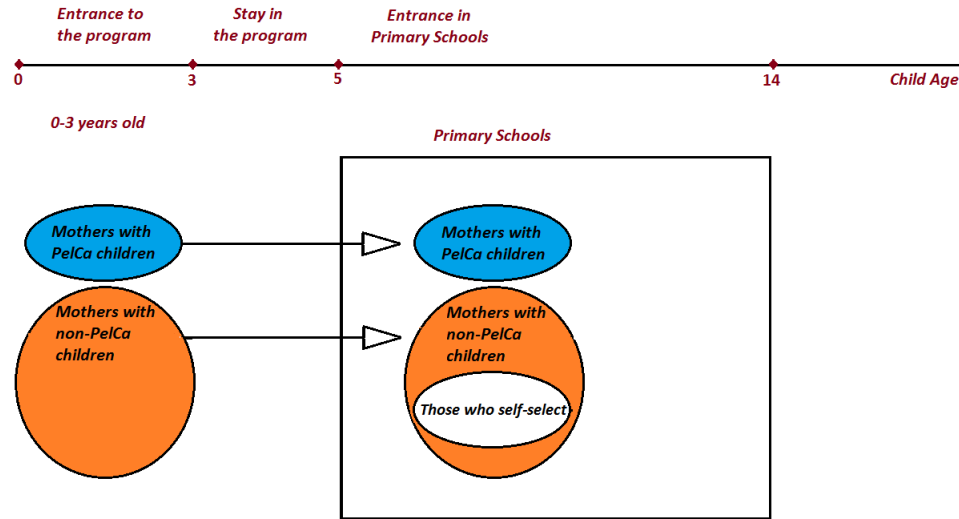
1. Fortnightly meetings structured as in the preschool area (where topics and activities are adapted to the older age of the children);
2. Fortnightly meetings for "mixed" families (i.e. families with at least one child in the school area program and one in the preschool program);
3. Monthly meetings for full time workers; here children come daily to the AVSI centre to be helped in their daily homework; for this reason they do not need to attend the meetings with the parents.

Every year the application to the program starts at the end of April. The demand for nurseries and similar programs in the area is high: the NGO receives various applications within two weeks only. Among the applicants 50 families are selected to start the program in September and the application process ends then.

3.2.2 Design

How to compare mothers and children who participated in the program with mothers and children who did not? A comparison that does not take into consideration self-selection in the program would lead to biased results. As we can see from the picture below, when they are 5 years old *PelCa* children and non-*Pelca* children go to the same primary schools in the area.

Figure 3.1: Identification Strategy



The entire population of children in primary schools who did not participate in the program (represented by the orange circle in the picture) cannot form the control group because of selection bias. Therefore, we select in the control group only those mothers whose primary school children did not participate in the *PelCa* preschool program when younger, but who would like their younger preschool age child to enter the program now (represented by the white circle in the picture). This way we get rid of selection bias, because both treatment and control groups self-selected into the program.

How was the control group formed?

The control group was formed through the regular process that AVSI uses to select the new families that will enter the program. However, the period during which families are allowed to apply to the program was extended to two months in order to be able to reach more control families with the required characteristics.

AVSI aimed at selecting to the program their regular quota of about 50 families who would have started the intervention in September 2012. Families with at least one child who attends school were chosen from the pool of all applicants to form the control group. These families were invited to an interview

in June-July 2012, where the mother participated in a structured interview with us, the child took tests of cognitive and non-cognitive skills and his/her height and weight were measured. The mother was asked to bring the child's vaccination certificate (where children's height, weight and head circumference at birth are measured) and the child's school report cards of the previous and current year. A local employee was responsible for selecting from among the applicants the families with a school age older sibling and guide them about the documents they needed to bring to the interview in June-July 2012. The treatment and control groups were interviewed again in 2013.

As previously mentioned, due to the high time commitment of mothers during the program, treated mothers are asked not to work during the program. For most this condition is irrelevant but some may have to leave the labour force. We will take this difference into account during the analysis.

Comparing the outcomes of the *PelCa* mothers of *PelCa* primary school age children with those of mothers of primary school age children who did not participate in *PelCa* but who chose to enrol in the program with a younger preschool age child in 2012 will allow an estimation of the long term impact of the program.

3.3 Data

Children and mothers were interviewed both in summer 2012 and 2013, following a questionnaire that was created specifically for the evaluation.

The survey questionnaire was tested in a pilot in January 2012, when we interviewed 23 mothers from the program: 12 of them with a school age child who participated in the *PelCa* preschool program and 11 of them with a school age child who did not participate to any program associated with the NGO. These interviews contributed to a better understanding of how to improve the questionnaire.

The final version of the 2012 survey questionnaire provided data on pre-treatment characteristics and outcomes. The person to be interviewed was always reassured about the confidentiality of the information she would have provided.

In 2012 we conducted personally a structured interview with each mother.

Among the pre-treatment characteristics, we asked for the date of birth of each component of the family, the birth place of both parents, why the child

had not been enrolled in the program if they belonged to the control group, how they got to know about the program if they belonged to the treated group, and if the child suffered from any health problem. The majority of the questions on outcome variables were also asked retrospectively and served as pre-treatment measures, i.e. the questions were asked in 2012 but they referred to a point in time before the treatment took place. As these questions needed to be asked to both control and treatment mothers, and as control mothers could not be asked about a specific behaviour “before treatment” as they had never been treated, the wording of the question was “before your child was born”, e.g. “do you have electricity in your house?” becomes “did you have electricity before your child was born?”. This was the best way we could think of to make sure that the answers given referred to a pre-treatment point in time.

Among the outcomes, we asked specific questions on:

- Time inputs and quality of care of parents to children¹;
- How often mothers bring their child to the doctor;
- Number of people in the house and who they are;
- Whether the father lives at home;
- Beliefs and expectations on the child schooling path;
- The actual schooling path of the child (current grade, if he/she ever repeated a grade or abandoned school temporarily, child’s school attendance);
- How satisfied she sees her child with respect to schooling;
- Current civil status;
- Current school level of both parents;
- Working condition of both parents;
- Religious beliefs;

¹Most of these questions were taken from the PIRLS (Progress in International Reading Literacy Study) home surveys. PIRLS is an international study of reading skills for children in their fourth grade. It was assessed for the first time in 2001. It is performed every 5 years since then, allowing countries to monitor their children. Together with the children’s test, PIRLS provides background questionnaires for the parents, for the students, for the teachers, and for the schools. The background questionnaire for the parents from PIRLS 2006 is the one that we used to build the survey questionnaire.

- Characteristics of the house (whether it is owned, rented, borrowed or shared, how many rooms it has, whether it has electricity, drinkable water, a toilet inside or outside);
- Possession of vehicles (cars, motorbikes, bicycles, etc.);
- Intra-household family decision-making (who decides on the education of the child, on what to do if the child is sick, on children's discipline, on how to spend money, on money spent on food, on whether the mother can work or not, on fertility choices).

The long series of questions gave us the time to become a bit more familiar with the mother interviewed. At this point we could introduce two questions on domestic violence:

- First, by a very general question on whether she had ever heard of a friend who had been beaten;
- Second, what she would do if her partner beat her.

Afterwards there were questions on:

- Social commitment;
- Whether she had money of her own that she only could decide how to spend;
- The average monthly family wage;
- Whether the family needed help from somebody else to cover the expenses.

The interview lasted approximately 45 minutes.

Afterwards, the mother took the Big Five Personality Test and the Rosenberg self-esteem scale.

The Big Five Test² evaluates five broad traits of personality through a series of questions:

1. Openness to experience, which is a sign of intellectual curiosity, willingness to try new things, appreciation of art and beauty (10 questions);

²The Big Five Personality Test is the fruit of decades of research that discovered and clarified the Big Five dimensions. In 1981 these factors became known as the "Big Five" to indicate the broad dimensions they refer to. It has been used intensely, and it shows consistency.

2. Conscientiousness, which shows self-discipline, organization, hard-working attitudes (9 questions);
3. Extraversion, which exhibits sociability and great engagement with the external world (8 questions);
4. Agreeableness, a trait of people who are interested in others and sympathize with others' feelings (9 questions);
5. Neuroticism, which shows emotional instability and the tendency to experience anger, anxiety, or depression (8 questions).

To each of the questions, the mother could choose among five possible answers (from strongly disagree to strongly agree).

The Rosenberg test³ is used to evaluate the self-esteem of an individual. It is formed by ten Likert-type questions with four possible answers each (from strongly agree to strongly disagree).

Meanwhile, each child was taking a test of cognitive and non-cognitive skills and his height and weight were measured by two assistants from Pisulli. Data on weight, height and head circumference at birth of the school age children were gathered through vaccination certificates. Not everybody was able to bring us the vaccination certificate and sometimes, even if they brought it, it was not fully completed. Eventually we managed to collect data on height at birth for 44% of the children, weight at birth for almost 41%, and head circumference at birth for almost 38%.

The mother was also asked to bring the child's school report cards of 2010-11, 2011-12, and a time-survey. She was asked to complete the time survey during one day of the weekend and during another day of the week. In the time survey the mother was asked to write down all the activities she had pursued during the day, at what time she had started the activity and by what time she had finished. The time surveys have not been analysed yet.

In 2012, 166 children and 115 mothers formed the control group, while 244 children and 167 mothers formed the treatment group: 410 children and 282 mothers in total. Some grandmothers who participated in the program instead of the mothers were also interviewed. However, the families where the grand-

³It was created by Dr. Morris Rosenberg in 1965 and today is widely used by psychologists, sociologists, and social scientists. Currently it has been translated in various languages, such as French, Norwegian, Spanish, Portuguese, Chinese, and Italian. It is a scale with high ratings in reliability areas.

mother was the one interviewed are not taken into account in the analysis as there is no comparison group for them.

In summer 2013, a follow-up research was conducted.

The questionnaire used to interview the mothers was very similar to the one used in 2012, in order to make answers comparable and have a follow-up on the most relevant items. Some other questions were also included to gain a better picture of the situation and understand some puzzles that were found in 2012. The new areas that were explored relate to:

- Possession of TV, books, computer, internet;
- Mother's health (whether she suffers from a serious illness, whether she is insured, if she suffered from some illness or accident in the last month, whether she went to the hospital or not for that and why, whether she is vaccinated against tetanus or measles, whether she knows about her rights from the Free Maternity Act, if she ever experienced a miscarriage, how many children she lost, if she gave her last birth with the help of a midwife, a doctor or somebody else, if she ever took a smear test; her height was also measured);
- How she overcomes new difficulties;
- Satisfaction (if in the last week she felt to be as worthy as the others, hopeful about the future, happy, enjoyed life, etc.; she was also asked to define her level of satisfaction from 1 to 10);
- Evaluation of the NGO (mothers were asked if they felt the program was empowering them and through which channels).

Other areas that had already been explored in 2012 were enriched with more detailed questions. This happened for:

- Child's health and how the mother takes care of it;
- Child's schooling (the exact grades when the child repeated the year or left school temporarily);
- Mother's current level of education (not only the general level, but the more precise grade was asked);
- Fertility choices (whether the mother is pregnant, if she would like to have another child, if so whether she would prefer either a boy or a girl, whether the partner would like to have another child);

- Intra-household decisions (who decides on the most expensive items in the house, on mother's health, on whether the mother can visit relatives or friends);
- Domestic violence (each mother was asked if she thought that a husband is justified in beating his wife if he suspects she is not loyal, if he does not respect him, if she leaves the house without telling him, if she neglects the children, if she doesn't prepare the meals properly; she was also asked if she needs her partner's permission to visit the market, friends or relatives);
- Social commitment (whether she is involved in voluntary social activities, if she voted for a female candidate in the last elections, if she voted the same candidate as her partner's);
- Economic situation (the weekly wage was disentangled by mother and father, the mother was also asked if she was engaged in some kind of ROSCA⁴ group or if she borrowed money from a moneylender at a high interest rate in the last two years).

All the new questions were also asked retrospectively.

In order to make the collection of data in a shorter period and to lower the burden for the participating families, a team of 10 interviewers was sent to each of the houses. Each interviewer was female and from the place, so that mothers could feel more at ease when interviewed. The interviews followed the questionnaire above described.

Mothers were also asked to bring the vaccination certificates again (as many were missing in the previous year) and the school reports of the child for the year 2012/13.

The interviewers also made sure that the child was completing a cognitive test in Spanish and mathematics, adequate for his/her grade. The children's height was measured by the interviewers, but not the weight, as it would have been complicated for the interviewers to carry a scale around the area.

In the follow up we reached 138 control children (83.13%) and 98 control mothers (85.22%), while 218 children (89.34%) and 150 mothers (89.82%) formed the treatment group.

⁴ROSCAs are Rotating Savings and Credit Associations where a group of people decide to save and borrow together for a certain period of time. They are usually present in Asia (e.g. in India, Pakistan, Sri Lanka, Korea, Indonesia) and Africa (e.g. Southern Africa, Ethiopia, Democratic Republic of the Congo, Mozambique).

3.3.1 Balancing

The treatment and control groups, mothers and children, are very similar on observed and predetermined characteristics, supporting the view of the empirical setup as a natural experiment.

Children's height, weight, head circumference at birth and gender are balanced between the two groups: on average children were 48cm tall, weighted 3 kg and their head circumferences was 33cm. Children are in the same grades too and in schools equally far from their houses. To check whether mothers had a different number of young children before the treatment started, we check for how many mothers had either 1, 2 or 3 younger children in 2005 (younger than the oldest one who participates in the interview). The number of the oldest interviewed child's younger siblings in 2005 is well balanced. There is a difference on child age, and that is probably due to the fact that, as we will see, control children are more likely to repeat the school grade. The F-test on all of the characteristics together is not significant, which suggests that none of the children characteristics is linearly associated to the treatment.

Mothers' characteristics are balanced in most of the dimensions: age, city of birth, province of birth, whether she is from the same place as her child's father, the number of children she had in 2005, her civil status before the child was born, the highest level of education she had completed, religion. With respect to the working condition, control mothers seem to be more likely to be employed before the interviewed child/children was/were born: 47.3% of treated mothers were working, against 60.9% of control mothers. Within the group of mothers who were working before, control mothers were more likely to be working full time. Being self-employed and working with a contract before treatment are not different characteristics between groups. The mean firm size before is also balanced. Within the mothers who were not working, the reasons why they were not doing so (because they had children, because the job was not available, because the partner did not want) are balanced (at 5% significance level). The F-test on all of the mother characteristics is significantly different from zero. This is likely to be due to the previous working condition of the mother; as anticipated, we will later control for this difference.

Table 3.2: Child Characteristics Before Treatment

	(1)		
	Treatment	Control	Difference
	Mean	Mean	in means
female	0.541	0.476	0.065 (0.050)
child age	8.346	8.843	-0.498** (0.194)
1 younger sibling in 2005	0.198	0.200	-0.002 (0.040)
2 younger siblings in 2005	0.025	0.055	-0.030 (0.019)
3 younger siblings in 2005	0.000	0.006	-0.006 (0.005)
height at birth (cm)	48.250	48.764	-0.514 (0.445)
weight at birth (gr)	3025.472	3032.370	-6.898 (71.255)
head circumference at birth (cm)	33.868	33.622	0.246 (0.374)
dummy grade 1/2	0.324	0.307	0.017 (0.047)
dummy grade 3/4	0.352	0.343	0.009 (0.048)
dummy grade 5/6	0.250	0.265	-0.015 (0.044)
dummy grade 7	0.074	0.084	-0.011 (0.027)
school distance: less than 30min	0.724	0.789	-0.065 (0.044)
school distance: more than 30 min.	0.276	0.211	0.065 (0.044)
F(11, 102) = 1.31			
Prob > F = 0.2283			
Observations	410		

Notes: Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 3.3: Mothers' Characteristics Before Treatment

	Treatment	Control	Difference
	Mean	Mean	in means
mother age	31.982	31.183	0.799 (0.727)
mum from Quito	0.563	0.496	0.067 (0.061)
mum from Pichincha	0.623	0.539	0.084 (0.060)
parents from same city	0.513	0.456	0.057 (0.064)
mother lived together w/ partner	0.796	0.817	-0.021 (0.048)
mother divorced/separated/widow	0.018	0.009	0.009 (0.014)
mother was single	0.186	0.174	0.012 (0.047)
no. of children in 2005	1.862	1.632	0.231 (0.181)
did not complete primary	0.120	0.148	-0.027 (0.041)
completed primary	0.392	0.374	0.018 (0.059)
did not complete secondary	0.295	0.304	-0.009 (0.056)
completed secondary	0.169	0.165	0.003 (0.045)
started university	0.024	0.009	0.015 (0.016)
was not religious	0.102	0.070	0.032 (0.035)
was Christian	0.874	0.896	-0.021 (0.039)
had money of her own	0.584	0.526	0.058 (0.060)
Observations	282		

Notes: Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 3.4: Mothers' Characteristics Before Treatment - continued

	Treatment Mean	Control Mean	Difference in means
was working	0.473	0.609	-0.136** (0.060)
was working full time	0.544	0.729	-0.184** (0.078)
was self-employed	0.190	0.214	-0.024 (0.066)
was working in the formal sector	0.253	0.300	-0.047 (0.074)
mean firm size	21.310	20.862	0.448 (10.600)
was not working because of children	0.331	0.252	0.079 (0.056)
was not working because there was no job	0.072	0.078	-0.006 (0.032)
was not working because partner did not want	0.072	0.052	0.020 (0.030)
was not working for other reasons	0.048	0.009	0.039* (0.021)
F(18, 154) = 2.55			
Prob > F = 0.0010			
Observations	282		

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Fathers' characteristics before the treatment are well balanced between the two groups: there are no significant differences in father's age, city of birth of the father, province of birth, highest education level achieved before (primary, secondary, university), religion before and working condition before (if they were employed, if they were working full time, if they were working in the formal sector). Reassuringly, the F-test on all of the father characteristics before treatment is not significant.

Table 3.5: Fathers' Characteristics Before Treatment

	Treatment	Control	Difference
	Mean	Mean	in means
father age	35.053	33.645	1.408 (0.979)
dad from Quito	0.509	0.513	-0.004 (0.061)
dad from Pichincha	0.545	0.548	-0.003 (0.061)
primary school	0.449	0.505	-0.055 (0.063)
secondary school	0.513	0.466	0.047 (0.063)
university	0.036	0.026	0.010 (0.021)
was not religious	0.123	0.094	0.029 (0.040)
was Christian	0.857	0.887	-0.030 (0.043)
dad worked before	0.874	0.870	0.005 (0.041)
worked full time	0.938	0.880	0.058 (0.036)
was self-employed	0.171	0.162	0.010 (0.049)
worked in the formal sector	0.372	0.460	-0.088 (0.064)
mean firm size	30.939	49.299	-18.360 (12.376)
F(11, 291) = 0.83			
Prob > F = 0.6076			
Observations	282		

Notes: Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

As we will analyse intra-household decisions as an outcome variable, we also check how these decisions were taken before treatment. No differences are found in pre-treatment intra-household decisions on children's education, children's illness, children's discipline, expenses, food expenses, whether the woman in the family could work, fertility choices and use of contraceptives.

Table 3.6: Intra-household Decisions Before Treatment

	(1)		
	Treatment Mean	Control Mean	Difference in means
mum/both decided on children's education	0.887	0.875	0.013 (0.068)
mum/both decided when ill	0.951	0.968	-0.017 (0.044)
mum/both decided on discipline	0.864	0.903	-0.039 (0.070)
mum/both decided on spending	0.759	0.693	0.066 (0.054)
mum/both decided on food spending	0.753	0.789	-0.036 (0.051)
mum/both decided on mother working	0.795	0.770	0.025 (0.050)
mum/both decided on having children	0.873	0.858	0.014 (0.042)
mum/both decided on contraceptives	0.890	0.856	0.034 (0.041)
Observations	281		

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Finally, we investigate other characteristics of the household before treatment: the location of the house, the availability of a toilet inside the house and the vehicles possessed by the family are balanced between groups. The mean family monthly wage before treatment was approximately 250US\$ in both groups of families. What was not balanced before treatment was whether the family owned a house, the number of rooms and the availability of drinkable water in the house. However, few are the characteristics that were not balanced, so we interpret it as random.

Table 3.7: Household Characteristics Before Treatment

	Treatment Mean	Control Mean	Difference in means
family lived in Pisulli	0.677	0.583	0.094 (0.058)
house was owned	0.289	0.122	0.167*** (0.049)
house had drinkable water	0.771	0.878	-0.107** (0.047)
house had electricity	0.970	0.991	-0.021 (0.018)
house had toilet inside	0.428	0.383	0.045 (0.060)
average number of rooms	3.657	3.209	0.448** (0.218)
family who had no vehicles	0.946	0.913	0.033 (0.030)
family who had bicycles	0.024	0.052	-0.028 (0.022)
family who had other means of transport	0.030	0.035	-0.005 (0.021)
family average monthly wage (USD)	250.000	247.807	2.193 (17.259)
Observations	282		

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3.3.2 Entropy Balancing

As previously mentioned, we need to take into account that the treated mothers were less likely to be working before treatment. To do it, we use entropy balancing, a method described in Hainmueller (2012) [46]. Entropy balancing is a data processing method to achieve covariate balance. It computes the means of the covariates in the treatment group and looks for a set of entropy reweights so that the means in the reweighted control group match the means in the treatment group. If we wanted, we could also adjust for the 2nd and 3rd covariate moments (variance and skewness), but we only limit the balancing to the 1st moment (mean). We implement entropy balancing for the covariates that we usually include in the fixed effects (child characteristics, household demographics characteristics and household economics characteristics). Among

Table 3.8: Balancing after reweighting

	Treat			Control		
	mean	variance	skewness	mean	variance	skewness
child birth order	1.838	1.438	2.291	1.838	1.374	2.297
child birth year	2003	3.479	-0.1931	2003	3.775	0.08722
child had 1 young sibling in 2005	0.2455	0.1864	1.183	0.2454	0.1868	1.183
child had 2 young siblings in 2005	0.02994	0.02922	5.516	0.02991	0.02927	5.519
child had 3 young siblings in 2005	31.98	41.78	0.9829	31.98	26.14	0.4356
mother age	31.69	165.6	-0.796	31.68	156.2	-1.195
father age	0.4551	0.2495	0.1804	0.4549	0.2501	0.181
parents were married	0.3413	0.2262	0.6693	0.3413	0.2268	0.6696
parents cohabited	0.1856	0.1521	1.617	0.1859	0.1527	1.615
mother from Quito	0.5629	0.2475	-0.2535	0.5628	0.2482	-0.2534
parents from the same city	0.4731	0.2508	0.1079	0.4733	0.2515	0.107
mother had 1 child in 2005	0.2216	0.1735	1.341	0.2222	0.1743	1.337
mother had 2 children in 2005	0.3473	0.228	0.6414	0.3469	0.2285	0.6434
mother had 3 children in 2005	0.1497	0.1281	1.964	0.1495	0.1283	1.966
mother had 4 children in 2005	0.05389	0.0513	3.951	0.05381	0.05136	3.955
mother had 5 children in 2005	0.02994	0.02922	5.516	0.02989	0.02925	5.522
mother had 8 children in 2005	0.01198	0.0119	8.973	0.01195	0.01191	8.981
mother had 10 children in 2005	0	0	.	0.000123	0.000124	90.08
mother worked before	0.4731	0.2508	0.1079	0.4734	0.2515	0.1064
mother worked full time	0.2575	0.1923	1.109	0.2577	0.193	1.108
father worked before	0.8743	0.1106	-2.257	0.8741	0.111	-2.255
mother's mean firm size	10.08	2157	5.924	10.07	2479	5.613
father's mean firm size	17.27	2284	5.11	17.26	1959	5.507
family monthly wage	248.5	20404	1.31	248.5	20325	0.8404

Notes: Mean, variance and skewness of pre-treatment covariates in control and treatment groups after reweighting with entropy balancing; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data before treatment.

these covariates, we also include whether mothers were working full time or not before treatment. We do this also because treated mothers were more likely to be working full time before treatment and we want to adjust for that as this might influence the outcomes.

This is the balancing that we get once we apply this method:

Now that observations have been reweighted, I check the balancing in the remaining pre-treatment variables: I do not find any difference between control and treatment group significant at 5%, with the only exception of two variables (whether the mother had started university before treatment and whether she was not working because of other reasons from the ones she was allowed to choose in the interview, i.e. children, lack of job, partner not allowing), a fact that I interpret as random.

3.4 Empirical Strategy and Results

3.4.1 Empirical Strategy

We can now estimate the effect of participating in the program on the outcomes with the following specification:

$$y_{ic} = \beta_0 + \beta_1 Treatment_i + \beta_2 ChildCharacteristics_i + \beta_3 HouseholdDemographics_i + \beta_4 HouseholdEconomics_i + \beta_5 TimeFE_t + \varepsilon_{it}$$

where i is the individual and t is time. y_{it} are the maternal outcomes of interest. $Treatment_i$ is a dummy equal to 1 when mother and child participated in the *PelCa* program and 0 otherwise.

$ChildCharacteristics_i$ are child characteristics. They include the birth year of the interviewed child, his/her birth order in the family and how many young children he/she had in 2005, i.e. before the program took place in Quito.

$HouseholdDemographics_i$ are household demographic characteristics: they consist of the age of the mother, the age of the father, their civil status before the interviewed child was born (whether they were married, whether they lived together, whether the mother was single), a dummy if the mother was born in Quito, a dummy if the parents came from the same city, the number of children the mother had in 2005. $HouseholdEconomics_i$ are household economic characteristics: they include whether the mother worked before treatment, whether the father worked, the mean firm size of the mother and that of the father, and the average monthly family wage before treatment. $TimeFE_t$ is a dummy equal to 1 when the observation corresponds to the year 2013, 0 if 2012; ε_{it} is the error term, clustered at the mother level when we run the regressions pooling the observations in the two years together.

3.4.2 Results: Impacts on Labour Force

Let us first analyse the full sample without reweighting any covariate.

In 2012 treated mothers are 19.70% more likely to be working, 22.30% more likely to be working full time and 20% more likely to be working in the formal sector. In 2013, these results hold. When we pool 2012 and 2013 observations together and we cluster the standard errors at the mother level, we find that treated mothers are still 20.30% more likely to be working than control mothers. As we can see in the table below, these coefficients are significantly different from zero at 1% significance level and they are not affected by adding any of the

control variables in the regression. Treated mothers are also 21.10% significantly (at 1%) more likely to be working full time and 18% significantly (at 1%) more likely to be working in the formal sector.

Table 3.9: Impact on Labour Force

	(1)	(2)	(3)	(4)	(5)
	she works	she works	she works	she works	she works
treatment	0.221***	0.221***	0.223***	0.200***	0.203***
	(0.0562)	(0.0563)	(0.0571)	(0.0632)	(0.0628)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0535	0.0651	0.112	0.158	0.219
Observations	496	496	496	496	496

	(1)	(2)	(3)	(4)	(5)
	full time	full time	full time	full time	full time
treatment	0.217***	0.217***	0.221***	0.212***	0.211***
	(0.0487)	(0.0488)	(0.0492)	(0.0513)	(0.0523)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0509	0.0584	0.113	0.175	0.214
Observations	492	492	492	492	492

	(1)	(2)	(3)	(4)	(5)
	formal	formal	formal	formal	formal
treatment	0.190***	0.190***	0.191***	0.190***	0.180***
	(0.0379)	(0.0379)	(0.0385)	(0.0388)	(0.0393)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0549	0.0549	0.0649	0.152	0.172
Observations	494	494	494	494	494

Notes: Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Pooled years, data 2012-3.

These estimates reflect the fact that 67.44% of the treated mothers are working in 2012 and 67.78% in 2013, while 32.56% and 32.22% of the control mothers are working in 2012 and 2013 respectively. This constitutes a massive improvement if we recall that 47.60% of treated mothers were working against 60.30% of control mothers (before treatment).

We also check whether the mothers who are working are the same ones in

2012 and 2013. We find that treated mothers are the ones with a more stable employment condition: 69.33% of treated mothers are working in both 2012 and 2013, whereas 48.97% of control mothers only are working in both 2012 and 2013.

3.4.3 Results: Impacts on Independence

We decided to group the following outcome variables in the category of independence, because each of them is a sign of it.

First of all, we look at the economic independence of a woman: treated mothers are 24.80% significantly (at 1%) more likely to have their own money that they only can decide how to spend in 2012. When we pool the two years together, this result holds: mothers are 20.50% more likely to have their own money that they only can decide how to spend, and the effect is unchanged when we add each set of controls.

Another sign of emancipation can be whether a woman wants to engage in learning and does engage in learning: treated mothers are 5.66% more likely to be currently studying. This estimate is significant at 10% and holds once we add all the necessary control variables. 6.71% of treated mothers are studying in both 2012 and 2013, whereas only one control mother is studying in both years.

A relevant problem in the neighbourhood is that fathers do not want their spouses to be working. When we ask mothers who decides whether they can work, treated mothers are 14.30% more likely to answer that either themselves or themselves together with their partner decide in 2012. This holds true when we pool the two years together: treated mothers are 10.50% more likely to take part in this decision. We interpret this as another sign of stronger independence. No effect is found on mothers engaging in social activities.

Finally, treated mothers are more often willing to have more children. We are not sure of how to interpret this.

Table 3.10: Impacts on Independence

	(1)	(2)	(3)	(4)	(5)
	mother	mother	mother	mother	mother
	own money	own money	own money	own money	own money
treatment	0.194*** (0.0498)	0.194*** (0.0498)	0.201*** (0.0512)	0.216*** (0.0541)	0.205*** (0.0541)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0376	0.0397	0.0705	0.108	0.143
Observations	491	491	491	491	491

	(1)	(2)	(3)	(4)	(5)
	mother	mother	mother	mother	mother
	studying	studying	studying	studying	studying
treatment	0.0627** (0.0284)	0.0627** (0.0285)	0.0639** (0.0295)	0.0577* (0.0310)	0.0566* (0.0310)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0116	0.0124	0.0405	0.0717	0.0969
Observations	495	495	495	495	495

	(1)	(2)	(3)	(4)	(5)
	mother	mother	mother	mother	mother
	or both	or both	or both	or both	or both
	decide	decide	decide	decide	decide
	if she	if she	if she	if she	if she
	works	works	works	works	works
treatment	0.0852*** (0.0286)	0.0857*** (0.0287)	0.0846*** (0.0295)	0.0989*** (0.0330)	0.105*** (0.0327)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0243	0.0360	0.0769	0.0993	0.127
Observations	492	492	492	492	492

	(1)	(2)	(3)	(4)	(5)
	social	social	social	social	social
	activities	activities	activities	activities	activities
treatment	0.0339 (0.0501)	0.0305 (0.0501)	0.0200 (0.0507)	0.0607 (0.0549)	0.0669 (0.0549)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.00110	0.00740	0.0331	0.0791	0.0908
Observations	452	452	452	452	452

Notes: Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Pooled years, data 2012-3.

3.4.4 Results: Impacts on Household decision-making

When we ask a mother who is the decision-maker within the household on a wide range of topics, we find that a treated mother is more likely to answer that either herself or herself together with her partner is the decision-maker on children's education (6.83% significant at 5%) and on discipline (9.20% significant at 1%). These effects remain unchanged when we add controls.

In other domains, such as taking a decision on what to do when the child is ill, on spending money on food, on having children or on the use of contraceptives, control and treated mothers give the same answers.

Either the mother or the mother together with her partner also seems to take the decision on spending money on items other than food. This coefficient becomes significant at 10% only when we add household demographic and household economic controls.

In the follow-up in 2013 other questions on household decision-making were included (relative to spending on the most relevant items, to maternal health, to women's freedom in visiting family and friends), but we do not find any significant differences in these domains.

Table 3.11: Impacts on Household decision-making

	(1)	(2)	(3)	(4)	(5)
	mother or both decide on children's education	mother or both decide on children's education	mother or both decide on children's education	mother or both decide on children's education	mother or both decide on children's education
treatment	0.0756*** (0.0249)	0.0757*** (0.0249)	0.0603** (0.0241)	0.0661** (0.0264)	0.0683** (0.0277)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0255	0.0362	0.0771	0.0972	0.112
Observations	492	492	492	492	492
	(1)	(2)	(3)	(4)	(5)
	mother or both decide on children's discipline	mother or both decide on children's discipline	mother or both decide on children's discipline	mother or both decide on children's discipline	mother or both decide on children's discipline
treatment	0.0828** (0.0328)	0.0831** (0.0328)	0.0748** (0.0316)	0.0920*** (0.0335)	0.0920*** (0.0354)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0193	0.0289	0.0660	0.120	0.137
Observations	491	491	491	491	491
	(1)	(2)	(3)	(4)	(5)
	mother or both decide when ill	mother or both decide when ill	mother or both decide when ill	mother or both decide when ill	mother or both decide when ill
treatment	0.0255 (0.0315)	0.0255 (0.0315)	0.0130 (0.0327)	0.00281 (0.0348)	0.00233 (0.0323)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.00290	0.00290	0.0552	0.0854	0.109
Observations	494	494	494	494	494

Notes: Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Pooled years, data 2012-3.

Table 3.12: Impacts on Household decision-making - continued

	(1)	(2)	(3)	(4)	(5)
	mother	mother	mother	mother	mother
	or both	or both	or both	or both	or both
	decide on	decide on	decide on	decide on	decide on
	spending	spending	spending	spending	spending
treatment	0.0868	0.0868	0.0758	0.106*	0.106*
	(0.0551)	(0.0552)	(0.0574)	(0.0617)	(0.0636)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0107	0.0107	0.0397	0.122	0.148
Observations	492	492	492	492	492
	(1)	(2)	(3)	(4)	(5)
	mother	mother	mother	mother	mother
	or both	or both	or both	or both	or both
	decide on	decide on	decide on	decide on	decide on
	food	food	food	food	food
	spending	spending	spending	spending	spending
treatment	0.0329	0.0329	0.0353	0.00571	0.0281
	(0.0516)	(0.0516)	(0.0538)	(0.0590)	(0.0596)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.00170	0.00170	0.0298	0.137	0.169
Observations	494	494	494	494	494

Notes: Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Pooled years, data 2012-3.

3.4.5 Results: Impacts on Family Wage

We now examine whether treatment has an impact on the economic wellbeing of the family.

We find that the average monthly wage is greater by more than 40\$ in treated families in 2012 already. If we keep in mind that the average wage of people in the neighbourhood is the minimum wage, and that the minimum wage in Ecuador is 318\$, we understand that 40\$ extra per month (12.5% of the minimum wage) represents a significant gain. However, in 2012 we could not disentangle whether this higher wage was earned either by the mother or the father. Therefore, in 2013 we asked for that specific information.

The data shows that in 2013 the economic wellbeing of the family has improved further and we find evidence that the mothers are the members of the

Table 3.13: Impacts on Family Monthly Wage (2012)

	(1)	(2)	(3)	(4)
	monthly wage	monthly wage	monthly wage	monthly wage
treatment	43.98** (20.49)	43.45** (21.44)	35.41 (22.34)	42.24* (21.50)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.0163	0.0574	0.164	0.293
Observations	280	280	280	280

Notes: The family monthly wage is measured in USD. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

family responsible for the increase in wages: treated mothers earn 17\$ more per week than control mothers, which can be translated in more than 70\$ extra per month. On the contrary, fathers' wages are not significantly different in the two groups.

Table 3.14: Impacts on Mother's Weekly Wage and Hours Worked (2013)

	(1)	(2)	(3)	(4)	(5)
	weekly wage	weekly wage	weekly wage	weekly wage	weekly wage
treatment	18.17*** (4.404)	18.17*** (4.404)	19.05*** (4.776)	18.42*** (5.028)	17.12*** (4.930)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0745	0.0745	0.125	0.181	0.272
Observations	208	208	208	208	208

	(1)	(2)	(3)	(4)	(5)
	weekly hours	weekly hours	weekly hours	weekly hours	weekly hours
treatment	8.770*** (2.661)	8.770*** (2.661)	8.786*** (2.802)	8.612*** (3.136)	8.797*** (3.041)
Time Dummy	No	Yes	Yes	Yes	Yes
Child Controls	No	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes
Household Economics	No	No	No	No	Yes
R-sqr	0.0522	0.0522	0.104	0.133	0.237
Observations	206	206	206	206	206

Notes: The mother's weekly wage is measured in USD. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2013.

3.5 Mechanisms

The mechanisms by which mothers are empowered are not fully clear. As we can see from the tables below, we do not find any evidence on greater self-confidence or other changes in personality traits through the Rosenberg and Big Five tests.

Table 3.15: Rosenberg Test

	(1)	(2)	(3)	(4)
	Rosenberg	Rosenberg	Rosenberg	Rosenberg
treatment	0.0308 (0.0560)	0.00552 (0.0585)	0.0307 (0.0628)	0.0155 (0.0648)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00111	0.0440	0.105	0.132
Observations	273	273	273	273

Notes: The Rosenberg Test is formed by 10 questions. To each answer a score from 1 to 4 (maximum self-esteem) is given. The final outcome that we use is the average of the scores in all the 10 questions. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

Table 3.16: Big Five Test

	(1)	(2)	(3)	(4)
	Extraversion	Extraversion	Extraversion	Extraversion
treatment	-0.0867 (0.0660)	-0.101 (0.0673)	-0.0984 (0.0731)	-0.0782 (0.0749)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00631	0.0954	0.137	0.171
Observations	274	274	274	274
	(1)	(2)	(3)	(4)
	Agreeableness	Agreeableness	Agreeableness	Agreeableness
treatment	-0.0125 (0.0666)	-0.0448 (0.0672)	-0.0814 (0.0704)	-0.0811 (0.0723)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.000130	0.110	0.209	0.238
Observations	274	274	274	274
	(1)	(2)	(3)	(4)
	Conscientious.	Conscientious.	Conscientious.	Conscientious.
treatment	0.000310 (0.0788)	-0.0630 (0.0794)	-0.0370 (0.0843)	-0.0547 (0.0853)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	5.70e-08	0.111	0.191	0.242
Observations	273	273	273	273

Table 3.17: Big Five Test - continued

	(1)	(2)	(3)	(4)
	Neuroticism	Neuroticism	Neuroticism	Neuroticism
treatment	0.0864 (0.0701)	0.107 (0.0715)	0.0946 (0.0762)	0.104 (0.0789)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00557	0.0949	0.170	0.187
Observations	273	273	273	273

	(1)	(2)	(3)	(4)
	Openness	Openness	Openness	Openness
treatment	0.0637 (0.0743)	0.0569 (0.0771)	0.0456 (0.0808)	0.0424 (0.0816)
Child Controls	No	Yes	Yes	Yes
Household Demographics	No	No	Yes	Yes
Household Economics	No	No	No	Yes
R-sqr	0.00270	0.0590	0.163	0.222
Observations	274	274	274	274

Notes: The Big Five Test can be divided in 5 subscales: Openness to experience (10 questions), conscientiousness (9 questions), extraversion (8 questions), agreeableness (9 questions), neuroticism (9 questions). Each answer that the mother gives is assigned a score from 1 ("strongly disagree") to 5 ("strongly agree"). The final score of a subscale is the average of the scores gained in the answers given in that subscale. Standard errors clustered at the mother level in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Data 2012.

As we previously showed, we find an effect of the treatment on engagement in schooling. More education acquired might have facilitated the entry in the labour market, and consequently led to an increase in wage earned by mothers and to their greater independence, exemplified in more power in the intra-household decision-making and in more money owned by them. However, we cannot be 100% sure that education is the channel that brings to the increase in labour force participation. So far it seems that we can exclude the channel of greater self-esteem. Another potential channel that we checked concerned the possession of TV and internet, but we did not find significant differences in the use of these technologies between the two groups either.

In 2013 we checked for treatment effects on life satisfaction, maternal health, how women overcome new difficulties, their behaviour in political elections and in savings, but we do not find any change, so we exclude them as potential channels too.

More understanding on the exact mechanisms that take place in this context is still needed.

3.6 Robustness Checks

We now check if the treatment effects on maternal outcomes remain even when we reweight the sample with entropy balancing, to see whether results still hold once we account for the imbalance in the pre-treatment working condition of mothers. Including the fixed effects in the regressions does not change the estimated coefficients, but it gives more precision. Therefore, here we show the results on each subset of maternal outcomes when all the fixed effects are added.

The estimates on the working condition of the mother remain roughly the same: treated mothers are 23.50% more likely to be working (the coefficient in the reweighted sample is slightly higher than in the sample without reweighting, where we found 20.30%), 20.70% more likely to be working full time (before we found 21.10%), and 20.30% more likely to be working in the formal sector (before we had found 18%). All the estimates are, as before, significant at 1%.

Table 3.18: Impacts on Labour Force - Reweighted Sample

	(1)		(1)
	she works		full time
treatment	0.235*** (0.0574)	treatment	0.207*** (0.0522)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.280	R-sqr	0.235
Observations	496	Observations	492
	(1)		
	formal		
treatment	0.203*** (0.0299)		
Child Controls	Yes		
Household Demographics	Yes		
Household Economics	Yes		
R-sqr	0.200		
Observations	494		

Notes: Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012-3.

Let us now look at the measures for independence. Treated mothers are 22.10% more likely to own money that they only decide how to spend. This is consistent with the 20.50% we had previously found. The impacts on the other measures are also similar: treated mothers in the reweighted sample are 7.98%

more likely to be studying either in 2012 or 2013 (or both), 12.9% more likely to take part in the decision to work, and we find no change in the engagement in social voluntary activities.

Table 3.19: Impacts on Independence - Reweighted Sample

(1)		(1)	
	own money		mother studying
treatment	0.221*** (0.0632)	treatment	0.0798*** (0.0250)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.153	R-sqr	0.119
Observations	491	Observations	495

(1)		(1)	
	mum/both decide if she works		social activities
treatment	0.129*** (0.0396)	treatment	0.0744 (0.0659)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.266	R-sqr	0.155
Observations	492	Observations	452

Notes: Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012-3.

With respect to the impact on intra-household decision-making, we still find an effect on the mother's power in the decisions on children's education, children's discipline and overall spending. As before, there is no effect on decisions in other domains, but differently from before, we find a small negative impact on the use of contraceptives.

Table 3.20: Impacts on Intra-Household Decisions - Reweighted Sample

(1) mum/both decide on child's education		(1) mum/both decide when ill		(1) mum/both decide on discipline	
treatment	0.105** (0.0442)	treatment	-0.0106 (0.0193)	treatment	0.188*** (0.0470)
Child Controls	Yes	Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes	Household Economics	Yes
R-sqr	0.155	R-sqr	0.120	R-sqr	0.300
Observations	492	Observations	494	Observations	491
(1) mum/both decide on spending		(1) mum/both decide on food spending			
treatment	0.186*** (0.0505)	treatment	0.0435 (0.0439)		
Child Controls	Yes	Child Controls	Yes		
Household Demographics	Yes	Household Demographics	Yes		
Household Economics	Yes	Household Economics	Yes		
R-sqr	0.299	R-sqr	0.288		
Observations	492	Observations	494		

Table 3.21: Impacts on Intra-Hh Decisions - Reweighted Sample - continued

	(1) mum/both decide on having children		(1) mum/both decide on contraceptives
treatment	0.00490 (0.0183)	treatment	-0.0461** (0.0185)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.316	R-sqr	0.171
Observations	488	Observations	482

Notes: The outcomes are dummies that take value 1 if it is either the woman or the woman together with her partner to take the different decisions. Standard errors clustered at the mother level in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012-3.

Finally, when we focus on the economic wellbeing of the family, we still find an increase in the average monthly family wage in 2012, as in women's wage and hours worked in 2013.

Table 3.22: Impact on Family Wage 2012 - Reweighted Sample

	(1) average family wage
treatment	58.00*** (13.34)
Child Controls	Yes
Household Demographics	Yes
Household Economics	Yes
R-sqr	0.415
Observations	494

Notes: The monthly family wage is measured in USD. Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2012.

Table 3.23: Impact on Mother Wage 2013 - Reweighted Sample

	(1) weekly wage		(1) weekly hours
treatment	20.17*** (5.144)	treatment	11.11*** (2.459)
Child Controls	Yes	Child Controls	Yes
Household Demographics	Yes	Household Demographics	Yes
Household Economics	Yes	Household Economics	Yes
R-sqr	0.343	R-sqr	0.384
Observations	208	Observations	206

Notes: The weekly mother's wage is measured in USD. Standard errors in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01. Data 2013.

We also check if the improved women's condition does not hinder men's condition in the family. However, we do not find evidence of a change in the economic status of fathers.

3.7 Conclusion

Throughout the chapter we have analysed an innovative method to empower women: a preschool program that involves mothers, putting them at the centre of their children's education. We exploit a quasi-natural experiment that takes place in the *PelCa* program in Quito, Ecuador.

We find an effect of the program across different domains of women's empowerment.

First, we see that the intervention facilitates women's entry in the labour market: treated mothers are 20.30% more likely to be working, 21.10% more likely to be working full time and 18% more likely to be working in the formal sector. All of these estimates are significantly different from 0 at 1% and robust to the inclusion of covariates.

Moreover, treated mothers seem to be more independent: they are 20.50% more likely to possess their own money that they only can decide how to spend, 5.66% more likely to be studying, and 10.50% more likely to decide whether they can work. Treatment effects do not affect the willingness to participate in voluntary social activities in the community.

The treatment modifies the allocation of power in the house: mothers become 6.83% more likely to take part in the decisions on children's education, 9.20% on children's discipline and spending. No effects are found in the decisions on

what to do when the child is ill, on food spending, on having children and the use of contraceptives.

Finally, we find evidence of an improvement in the economic wellbeing of the family: the family monthly wage increases by 42.24\$ in 2012, and women's weekly wage is 17.12\$ higher in 2013. Consistently, women's hours of work also rise after treatment.

All of the above results hold when we implement entropy balancing to perfectly adjust for differences in pre-treatment covariates.

Data on domestic violence and from time surveys still need to be fully analysed.

Overall, there is evidence that preschool programs that help mothers to raise their children have also the effect of empowering these women in society and within their household.

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