The impact of a Caribbean home-visiting child development program on cognitive skills

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Abstract

This paper provides an impact evaluation of a home-visiting Early Child Development program in the Caribbean aimed at vulnerable children from birth to three years. The analysis is based on a quasi-experimental research design including approximately four hundred children in treatment and comparable control communities. The differences-in-differences methodology estimates intention-to-treat effects. One year after implementation, we do not find significant effects on the cognitive development of the average child. The program has significantly improved the Fine Motor Skills and Visual Reception scores (related to early reading and writing abilities) of the younger birth cohort, but not the older cohort. The younger cohort was aged below eighteen months at program start, pointing to an early window of opportunities. Language development has not improved for either cohort. A cost-benefit analysis shows that even modest effects of the program on future school performance may lead to high returns on investment.

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1 Introduction

A child's experiences in the first years of life lay the basis for later performance and outcomes in adolescence and adulthood (e.g. Grantham-McGregor *et al.*, 2007; Heckman, 2006; Young, 2002; Shonkoff and Phillips, 2000). Young children who lack adequate nutrition, early cognitive stimulation, or appropriate emotional bonding may suffer developmental delays that will be more difficult to overcome as the years progress. Especially children from disadvantaged households, such as poor or lowly educated families, run the risk of falling behind their more fortunate counterparts at a young age. This might result in an ever-widening gap between poor and non-poor children.

To prevent the perpetuation of this 'intergenerational cycle of poverty', early intervention programs have been set up all over the world to reach the most vulnerable children. However, rigorous evaluations of early childhood development (ECD) programs in developing countries are scarce, in particular of home-based interventions.¹ This paper provides an impact evaluation of a Caribbean home-visiting program aimed at disadvantaged children between birth and three years of age. The paper estimates the short-term program impact on cognitive child development one year after implementation.

Ample North-American evidence documents the potential benefits of center-based ECD programs. Longitudinal studies in the United States find that the impact of center-based interventions can be long-lasting and reach far into the future (e.g. Currie, 2001; Garces *et al.*, 2002; Schweinhart *et al.*, 2005). A few studies evaluate center-based interventions in Latin-America and the Caribbean, finding similar beneficial effects in for example Argentina (Berlinski *et al.*, 2009) or Bolivia (Behrman *et al.*, 2004).

Evidence on the impact of home-based interventions is more limited as well as more ambiguous. Quantitative evaluations of home-based interventions in Latin America and the Caribbean have been published for Jamaica (Powell *et al.* 2004; Walker *et al.*, 2005) and Boliva (Super *et al.*, 1990), but these studies focus on malnourished children only. They find significant effects on the overall cognitive development of children and on eye-hand coordination, but not on loco-motor development (i.e. children's increased mastery of mobility such as crawling, running, jumping). Impact on hearing and speech is inconclusive. Sweet and Applebaum (2004) conduct a meta-analysis of 60 impact studies of home-based programs in the United States. They find a significant but small average effect on cognitive

¹ Engle *et al.* (2011) and Nores and Barnett (2010) review impact evaluations of ECD programs in developing countries. Schady (2006) provides a detailed overview of the Latin American and Caribbean evidence.

and socio-emotional development. The authors comment that the small size of the benefits may not outweigh the costs of the interventions, although impact estimates may vary across subgroups of children.

This paper evaluates the Roving Caregivers Program (RCP), a home-visiting intervention that is widely implemented throughout the Caribbean. To our knowledge, this is one of only two existing impact evaluations of home-based programs in the Caribbean that target the general low-income population instead of undernourished children. Powell (2004) reports on the randomized evaluation of a similar program in Jamaica.

The evaluation is set up as a longitudinal, quasi-experimental study that follows almost four hundred children in St Lucia over time from the baseline survey in 2006 to the follow-up survey in 2008. The children were aged between birth and 24 months at the start of the study. Half of them live in communities where RCP was introduced after the baseline. The other children live in comparable communities that did not receive the intervention.

To measure program impact, the econometric analysis uses a differences-in-differences methodology with multivariate child fixed-effect regressions. This approach assumes that unobserved time-varying trends are similar for the treated and untreated communities. Their geographical proximity and strong similarities in key community variables as well as baseline child outcomes provide suggestive support for the validity of this assumption. Because participation in the program is voluntary and since there are no plausible instruments available to correct for selection bias within treated communities, the evaluation focuses on a comparison of all eligible children in the intervention communities (regardless of their enrollment status) with similar children in the non-intervention communities. Thus, the evaluation is based on an intention-to-treat approach. The analysis is complemented with a cost-benefit analysis.

One year after implementation, we do not find a program impact on the average child in treatment communities. However, the findings show substantial program effects on the younger birth cohort, equal to almost half a standard deviation, on the two subscales of the Mullen Scales of Early Learning that are related to eye-hand coordination and early reading readiness. This birth cohort was on average twelve months old at program introduction. The effects on the older birth cohort of children who were aged on average twenty-four months when the program started are not significant. Results do not show an impact of RCP on language development of either birth cohort. These findings suggest that the intervention should enroll children from an early age to enhance program effectiveness.

The cost-benefit analysis compares the annual unit costs of RCP of US\$ 594 with the future benefits of increased productivity through enhanced education. Calculations suggest that a 3 percentage point increase in primary school enrolment would yield a 32% return on investment in RCP.

Child development cannot be understood in isolation from its cultural context (Shonkoff and Phillips, 2000). Therefore the next section will start with a description of the socio-economic circumstances in St Lucia, as well as early childhood experiences and parenting practices in the Caribbean. It also describes the characteristics of RCP. Section three discusses the research design with a focus on the comparability of the treatment and the matched control group. It discusses response rates as well as the assessment tool used to measure cognitive development. The econometric strategy is explained in more detail in section 4. Section 5 shows enrollment rates in RCP and discusses targeting effectiveness as well as enrollment in alternative center-based ECD facilities. Impact results are given in section 6. Section 7 presents the cost-benefit analysis. The final section concludes.

2 The Roving Caregivers Programme in St Lucia

2.1 Social and economic circumstances in St Lucia

St Lucia has a population of 172,000 individuals. One third of the population is aged less than eighteen years and 8.7 percent are under five.² By the start of the study in 2006, 20 percent of the labor force in St Lucia was unemployed with higher values among youth³, and 28.8 percent of the population was living below the national poverty line of US\$ 158.74 per month⁴. Young children are disproportionately represented among the poor and this is reflected in low levels of intake into formal education. At the introduction of the program, the gross enrollment rate in primary school was 99 percent.⁵ However, the net intake into primary school in the study area was substantially lower at 74 percent, indicative of late enrollment of young children.⁶ Furthermore, transition rates from primary to secondary school were only 61

² "At a Glance: Saint Lucia Statistics", Unicef, 2009 http://www.unicef.org/infobycountry/stlucia_statistics.html.

³ "Economic and Social Review 2005", Ministry of Finance, International Financial Services and Economic Affairs, Government of Saint Lucia.

⁴ "The Assessment of Poverty in St Lucia", Volume I, Barbados: Caribbean Development Bank, 2006.

⁵ "Education Statistical Digest 2005: Past Trends, Present Position and Projections up to 2009/10", Ministry of Education, Government of Saint Lucia.

⁶ The internal inefficiency of the primary school system is mainly due to late enrolment instead of early enrolment or repetition: only 7% of children aged 4 or 5 in the study area were enrolled in primary school

percent. At least one third of current school-aged children in St Lucia does not get a secondary degree and remains “without certification”. Many of them will have serious problems in finding sufficiently paid employment in the future, facing a high risk of reproducing the austere living conditions of their parents.

2.2 Early childhood and parenting practices in the Caribbean

As elsewhere in the region, many St Lucian families can be characterized as matrifocal households: female-headed family units centered on living arrangements between grandmother, mother and children without resident spouse. Males are often physically absent or play a marginal role only (Barrow, 2003). Their role is to be the financial provider, whether living in the household or not, as long as they are the boyfriend of a female household member or the father of a child in the household. However, many unwed, teenaged mothers are left to provide for their children without support from the father (Augustin, 2004).

Inadequate parenting practices are symptomatic in part of poverty, lack of education and environmental factors (Williams and Brown, 2005). Nonetheless, socio-economic characteristics are not the sole determinants of a child’s development. The experiences of young children also depend to a large extent on common images of childhood and parenting, i.e. on cultural aspects, which shape the interaction patterns between parent and child.

Home-visiting programs such as RCP aim to stimulate parenting practices that enhance children’s development. The sociological and anthropological literature emphasizes some salient features of Caribbean childhood that are relevant in this respect (Barrow, 2003; Roopnarine, 2005; Williams and Brown, 2005; Williams *et al.* 2006). Young Caribbean children receive a lot of affection. However, there is also a strong need among parents to feel in control over their children. Ideally, children should be obedient and compliant. Children’s curiosity and creativity are not encouraged. This may stem in part from the fact that many parents do not see play as a learning activity. As a result, homes often lack play materials. In general, little two-way verbal communication takes place between adults and young children. The lack of stimulating interaction patterns between caregivers and children substantially reduces the opportunities for children’s reasoning and language development. Books are absent in many households. With respect to disciplining, many caregivers resort to harsh

compared to 47% percent of children aged 12 or 13 (authors’ own calculations). Average repetition rates were below 3 percent.

methods, including verbal denigration and corporal punishment. Praise or rewards for good behavior are used substantially less often.

Another risk factor commonly found to affect healthy child development in the Caribbean is parental stress caused by poor health, depression, isolation or limited spousal support (Samms-Vaughan, 2004). Parental stress is often related to difficulties in making ends meet. The practice of “child-shifting” from relatives to relatives may cause its own problems for children’s development (Barrow, 2003; Roopnarine, 2005). Such practices are mostly due to a parent’s migration in search of employment.

2.3 Center-based interventions in St Lucia

Early childhood services in the Caribbean mostly take the form of center-based facilities such as daycare centers or preschools. Notwithstanding an increasing number of facilities in St Lucia, access to appropriate ECD services remains very limited. National enrolment rates are a mere 15 percent among the birth to two years age cohort that is eligible for daycare facilities, and 48 percent of the children between three and five attend preschool (Charles, 2004). Access is especially problematic for the poorest children. Low-income mothers usually cannot afford to pay for ECD services even when these are provided in their community.⁷ However, children growing up in low-income families are precisely the ones who are most likely to benefit from ECD interventions.

Another problem is that not all children enroll in the center that is most appropriate for their age in terms of facilities, activities and training of staff. Of all children in the age group from birth to two years old who attend an ECD facility, only 48 percent is enrolled in a daycare center. The remaining 52 percent attends a preschool (Charles, 2004). An important reason thereof is the limited (geographical) access to a facility of a certain type.

2.4 Description of the Roving Caregivers Programme

The Roving Caregivers Programme (RCP) is a Caribbean home-visiting program targeted at vulnerable families with children in the age group from birth to three years old. It aims to change parenting practices in order to enhance healthy child development. RCP has been implemented in Jamaica since 1993. Since 2002, the program has been extended to Belize as well as four Eastern Caribbean islands: St Lucia, St Vincent and the Grenadines,

⁷ Average monthly fees range from US\$ 55 to US\$ 200. Source: Government of Saint Lucia, "Poverty Assessment Report St. Lucia -- Executive Summary", 1995.

Grenada and Dominica. RCP was introduced in the north and east of St Lucia in 2004. This impact study concentrates on the program's expansion to the south and the west of the island in January 2007.

The program focuses on children living in poor communities with little access to alternative ECD services. Twice per week for a maximum period of three years, an RCP facilitator, the so-called "Rover", visits the home of the child for 45 minutes. In the presence of the child's caregiver the Rover engages in age-appropriate stimulating activities with the child through play, such as singing songs or playing with blocks, shapes and colors. The caregiver is expected to join in the activities such that she or he is able to continue the interaction also beyond the Rover visits. In addition, the Rover discusses developmental topics with the caregiver such as issues pertaining to disciplining. An additional component of RCP are the monthly parenting meetings in local community centers.

RCP in St Lucia targets children from birth to 36 months of age, and applies three main eligibility criteria: vulnerability in socio-economic terms, little access to alternative ECD services, and presence of the caregiver during the Rover visit. To reach the most vulnerable children, RCP focuses on communities with above-average poverty rates. Within selected communities, all children in the eligible age range can join. The objective of RCP is to fill in the gap caused by a lack of access to other ECD services aimed at young children; not to substitute for them. Lack of access can be due either to the absence of ECD services in the community, or because daycare services are too expensive. Once the child enrolls in daycare or preschool, the child is supposed to exit the program. At 36 months, the child graduates from RCP.

Due to the requirement that the child's caregiver must be present during the Rover visits, most of the mothers who participate in RCP are not employed. This condition, motivated from a practical and programmatic point of view, may have the unintended side-effect of providing an incentive to remain unemployed if the program is highly valued. Given the poverty levels in RCP communities, it seems unlikely however that many parents would forego employment in order to remain eligible for RCP. If another person such as the grandmother takes care of the child during the day, then she can participate in the Rover visits.

3 Research methodology

3.1 Evaluation design

In the absence of a randomized evaluation design, this short-term impact evaluation is set up as a quasi-experimental study that follows children in a selection of fifteen communities over time. Eight of the communities were assigned to the program group in which RCP was introduced after the baseline survey in 2006. The remaining seven matched communities are included in the study as control group. The fifteen communities are located in two districts that were designated for expansion of the program: the southern Vieux-Fort district and the western Anse-la-Rayé district.

The first stage in the research design consisted of the selection of communities into the sample. Sixteen potential intervention communities were selected from the full list of communities in the two districts based on two main RCP selection criteria: a high poverty rate and a large number of young children. In both districts, the average poverty index was calculated using the official community-level poverty rates.⁸ Precise numbers on children aged between birth and three were not available. As a proxy, the eight largest communities below the poverty line in each district were included in the sample using the population totals from the latest Census 2001. The third official RCP selection criterion –lack of ECD facilities in the community, was not used for the selection process. Enrollment in center-based care was so low in the South and West region, that RCP management did not consider the actual presence of an ECD facility as a good indicator of accessibility or a relevant criterion for the in- or exclusion of communities in their program. The final number of sampled communities is fifteen instead of sixteen because two of the selected communities turned out to be administratively separate but fully merged in practice.

The second stage concerned the assignment of the selected communities to a treatment and a control group. Communities were assigned to a group such that: a) in each district there were four program communities and four control communities, and b) comparability of the program group and the control group was maximized with respect to the RCP selection criteria, weighted for population size. The two groups were subsequently compared on a large number of other community characteristics to verify that they were also similar in other respects: presence of community facilities (e.g. health centers, daycare

⁸ "Core Welfare Indicators Questionnaire Survey (CWIQ): A Pilot Study in St. Lucia", Statistical Office, Government of Saint Lucia, 2004.

centers, shops, public transport), the prevalence of social and environmental problems (crime, alcoholism, drugs, prostitution, flooding, lack of sanitation), the number of community organizations (such as women's groups, credit groups, sports clubs) and geographic characteristics (distance to main road, and so on). Appendix A provides detailed data on the matching criteria and the additional community characteristics.

As a complication to the research design, four of the communities had been promised the program in an earlier consultation stage (Augustin, 2004). These were the two most populous communities in each district. They were included in the treatment group. To avoid confounding effects due to discrepancies in village population size, we included for each district an additional large and equally poor community that was located geographically close but just outside the administrative boundaries. A regression of baseline child outcomes on a dummy variable for prior earmarking as well as a number of control variables indicates that there were no significant differences in child outcomes between the four earmarked communities and the rest of the communities prior to program introduction.

All children in the treatment communities were eligible to enroll in RCP. However, not all of them did. Given the voluntary nature of enrollment in RCP, a comparison of participants in treatment communities with the population in control communities would give a biased estimate of the average treatment effect on the treated. Unfortunately, there are no instrumental variables available to plausibly account for the selection bias. Therefore, the analysis focuses on a comparison of all children in the treatment group with all children in the control group, yielding the intention-to-treat (ITT) effect. Section 5 analyses uptake and participation rates in more detail.

3.2 Data collection and measurement instruments

Each survey round consisted of two components. The first was a structured interview with the child's primary caregiver conducted by interviewers from the St Lucia Statistical Office. The second component was a child assessment at the local health center, including cognitive and socio-emotional development assessments as well as a measurement of anthropometrics, conducted by trained nurses. Participants received a reimbursement for their transportation costs to the health centers as well as a small cash gift to buy snacks and a food hamper as a token of appreciation.⁹

⁹ Participants in the treatment communities did not receive the food hamper at baseline. Since the hamper was not distributed until after conclusion of the assessment and its value was modest (US\$15), this is not likely to have affected outcomes of the child assessments at baseline or the follow-up two years later.

To measure a child's cognitive ability and loco-motor development, the study uses the Mullen Scales of Early Learning (Mullen, 1995). This test is an individually administered, comprehensive measure of cognitive functioning. It assesses the child's visual, hearing, speech and motor skills, and distinguishes between receptive and expressive processing. It is an age-standardized tool based on a North-American reference population for children from birth through 68 months.¹⁰

The Mullen Scales provide normative scores for five subscales as well as a single composite summary score. The Gross Motor subscale assesses such skills as head control, sitting, walking; i.e. strength, control and balance in the major muscle groups. Motor control and mobility play an important role in the development of cognitive skills and abilities, as they enable the child to experience and experiment with new schemas, objects and people (Mullen, 1995, pp.10-11). The Visual Reception subscale tests a child's performance in processing visual patterns. The main ability areas covered in this scale are visual discrimination and visual memory. It involves spatial awareness, including concepts of position, shape, and size. These abilities are at the basis of reading readiness (through letter recognition) and are a prerequisite for fine motor skills and eye-hand coordination. The Fine Motor subscale measures visual-motor ability. It reflects the expressive side of visual organization and discrimination. The primary ability areas covered in the assessment are fine motor control and writing readiness. The Receptive Language subscale measures a child's ability to process linguistic input, i.e. auditory comprehension and auditory memory. The Expressive Language subscale measures a child's ability to use language productively, in particular speaking ability and language formation including the ability to verbalize concepts. Each subscale has a standardized average score of 50 points and a standard deviation of 10 points. The average standardized composite score is 100 points with a standard deviation of 15 points.

3.3 *Survey response rates*

The sample consists of a complete census of children living in the fifteen study communities who were aged 0 to 24 months at baseline. Overall, 461 children born between July 1st, 2004 and July 1st, 2006 were identified, 229 in the program group and 232 in the control group (Table 1). In total, 419 children participated in the baseline child assessment, 197 in program communities and 222 in control communities, at an overall participation rate

¹⁰ As section 6.4 will discuss, the Mullen Scales behave as expected in relation to relevant child and household characteristics such as sex, age, maternal education and wealth, for the St Lucian sample.

of 90.1 percent. Baseline participation rates were higher in the control communities at 95.7 percent than in the program communities at 86.0 percent. This was most likely an unforeseen effect of the emphasis on the link between the survey and the (initially unknown) program in treatment communities.

< TABLE 1 ABOUT HERE >

Only the 419 children who were assessed at baseline were revisited in 2008. Of them, 410 were tracked at follow-up (97.9 %). Nine children, all living in treatment communities, had migrated and could not be tracked. Participation rates among those tracked in the follow-up survey were very high in both treatment and control communities at 95.4 percent on average. The analysis focuses on the 389 children with child assessment information in both the baseline and the follow-up survey. This represents 84.4% of the originally identified children.

Virtually all families on the child list in 2006 participated in the caregiver interview, but only 90.1 percent participated also in the child tests. This allows for an investigation of the extent of non-response bias by comparing the socio-economic household characteristics of children who were and who were not assessed at baseline. As shown in Appendix B columns (1) to (3), the observed differences between the children who did and who did not participate in the assessment are not statistically significant. This suggests that non-response bias is limited.

Another source of bias may arise if the children who dropped out from the sample over time were significantly different from those who remained in the sample. In total, 9 children or 2 percent of baseline participants could not be tracked in 2008. Of the ones who were tracked an additional 4.6 percent did not fully participate in the study. As Appendix B columns (4) to (6) show, there are some differences between the children who did and did not participate at follow-up. Boys are more likely to have dropped out compared to girls. Also, drop-out is more common for children in smaller households whose caregiver is employed, perhaps reflecting time constraints in attending the child assessment. Moreover, attrition from the sample is more likely among households with a lower wealth indicator. On the other hand, differences in baseline child outcomes are not very pronounced. The only scale significantly related to attrition is the Gross Motor Skills scale that was higher at baseline among children who subsequently dropped from the sample. This could be explained by the fact that boys are more likely to drop out while they also outperform girls in terms of gross

motor development. Given these modest effects and the low number of drop-outs from the survey, attrition bias is most likely to be small.

3.4 Comparison of the treatment and control group at baseline

This section investigates the comparability of the two treatment groups. Table 2, Panel a. shows that there are no baseline differences between the treatment and the control group with respect to the children's sex or the average age in months. The percentage of children attending center-based daycare at baseline was similar in the two groups and much lower at an average of 2.9 percent than the national average of 15 percent. Household demographics (household size, number of children, sex of the head of household, age of the caregiver) are also very comparable. There is a statistically significant difference in socio-economic characteristics between the treatment and the control group. In particular, the income index is significantly lower for treatment families although the absolute size of the difference is limited.¹¹ The range of the income index is similar across the treated and the control group which allows controlling for income differences in the regression analysis. Differences across the two groups in terms of education or employment status of the caregiver are not significant.

<TABLE 2 ABOUT HERE>

Panel b. compares the child outcomes at baseline. As the descriptive statistics show, child development status at baseline is highly comparable across the treatment and the control group.¹² The average scores are high compared to the reference population due to the fact that some items of the tool were adjusted during the nurse training in order to better reflect local circumstances. Moreover, young Caribbean children generally outperform North-American children in terms of gross motor skills (e.g. Samms-Vaughan, 2004).

To further analyze the comparability of the treatment and the control group, the child development outcomes at baseline are regressed on a dummy variable indicating whether the child lives in a treated or a non-treated community, both without and with a large number of control variables in columns (1) and (2) respectively (Table 2 Panel c.). The coefficient on

¹¹ The income indicator is calculated based on the first loading of a factor analysis of dwelling characteristics (such as quality of the roof, walls and floor, number of rooms, presence of inside kitchen/bathroom/toilet facilities) and the possession of a large number of assets. This indicator is normalized to have mean zero and standard deviation equal to one.

¹² This also holds if we correct the descriptive statistics for interviewer effects.

the RCP variable is not significantly different from zero for any of the scales, providing further evidence of the comparability of the two groups.

4 Econometric estimation methods

To estimate the impact of RCP on child outcomes, we use a Differences-in-Differences estimator. This estimator compares outcome changes over time between the treatment and the control children. It has the advantage that it eliminates unobserved time-invariant heterogeneity between the treatment and the control group. It yields consistent impact estimates of RCP as long as unobserved individual differences do not change over time (such as innate ability), as long as external factors affect both groups to the same extent (such as price rises, fluctuating employment rates, hurricanes, fertility trends); and new policies and interventions aimed at young children are not systematically favoring the treatment group over the control group or vice versa. Although it is impossible to completely rule out the presence of unobserved time-varying differences, this assumption seems warranted given the geographical proximity of the communities as well as their similarities in key community characteristics and child indicators at baseline. Especially the comparability of child outcomes is reassuring as they reflect the cumulative effect of both observed and unobserved environmental factors until baseline that may be of influence on child development.

To estimate program impact we estimate the following econometric regression equation:

$$Y_t^i = \alpha + \beta P^i + \gamma P^i * T_t + \delta T_t + \theta X_t^i + \eta_t^i$$

where Y_t^i measures child outcome Y for child i at time t (with $t = 0$ for the baseline in 2006 and $t = 1$ for the impact round in 2008). P^i is a dummy variable equal to 1 if child i lives in a community assigned to the program and 0 if the child lives in a community assigned to the control group. The coefficient β captures any baseline differences between the program and the control communities. Given the comparability of treatment and control communities, we expect this variable not to be significantly different from zero. T_t is a dummy variable equal to 0 for the baseline survey and equal to 1 for the follow-up survey in 2008. The coefficient δ captures any time trends in child outcomes and environmental factors that are common to the treatment and the control group, e.g. general economic trends in St Lucia, the aging of the children, the changing team of child testers.

The term $P^i * T_t$ measures program introduction after the baseline survey. It is equal to 0 for all children in 2006 as well as for control children in 2008; and equal to 1 for children living in treatment communities in 2008. In other words, the coefficient γ will capture the impact of RCP on children living in a community where RCP was implemented after the baseline. The coefficient γ is an “intention-to-treat” (ITT) impact estimator. It measures the effect of living in an RCP community irrespective of whether the child actually participated in RCP or not. It represents a lower bound on the average treatment effect on the treated (ATET) of RCP on the children who actually enrolled in the program.

X_t^i is a vector of explanatory variables that measure individual child and household characteristics for child i at time t . As child characteristics, it includes the sex and the age in months. For household characteristics, it includes household size, the number of children and the gender of the head of household; the age, the education and the employment status of the primary caregiver; and a measure of household income. District dummy variables capture time-invariant differences between the Anse-la-Raye district in the west and the Vieux-Fort district in the south.

The analysis also includes categorical variables to identify the interviewers who tested the children. The child scores show that some testers gave systematically higher or lower scores than the others. Within districts testers were randomly assigned to children, hence these deviations are not caused by real differences in child developmental status. Rather, they must be related to interviewer differences, for example in the interpersonal contact with the child. During the field work, each tester was assigned to an approximately equal number of treatment and control children. This allows us to control for differences across testers unrelated to actual cognitive development through the inclusion of interviewer ID-codes in all regressions.

Finally, η_t^i is an unobserved component for child i at time t . The analysis assumes that $\eta_t^i = \mu^i + \varepsilon_t^i$, i.e. that it consists of a fixed component μ^i that captures child-specific effects that do not vary over time (such as innate ability) and a random term ε_t^i . Clustering standard errors at the community level reduces the size of the standard errors, indicating that variation within communities is larger than between communities. Given the census-nature of the data, we show results with the more conservative unclustered standard errors. This does not qualitatively change the impact results.

5 Enrolment in RCP after baseline

The RCP program was introduced into the treatment communities in January 2007, six months after the start of the baseline. At that time, children in the study were aged between 6 and 30 months. The balanced sample in treatment communities consists of 182 children. The majority of them (142, or 78%) enrolled in RCP (Table 3 Panel a.). Twenty two percent of caregivers in the RCP communities decided *not* to enroll their child in the program. In total 68 children (37.4% of enrollees) were still enrolled at the time of the follow-up survey in 2008.¹³ Twenty-seven children had been enrolled in RCP but had reached the age limit and graduated from the program. Approximately one third had dropped out of RCP before reaching 36 months of age.

<TABLE 3 ABOUT HERE>

The average age-at-enrolment for children in the study is 17.6 months, while the average length-of-enrolment at the time of the follow-up survey in 2008 is slightly more than a year (13.2 months). On average, children who graduated from RCP because they reached the age limit of 36 months, had been participating for 11 months, while children who dropped out before reaching 36 months had been enrolled for 10.5 months.

Column (1) in Table 4 takes a closer look at the probability that eligible children in treatment communities enroll in the program. Girls are equally likely to enroll in RCP as boys. Children who were younger at the start of the study are significantly more likely to have enrolled. Each additional month of age at baseline decreases the probability of participation with 1.0 percent. We do not find a significant relation between the likelihood of participation in RCP and household size, number of children in the household or the gender of the household head.

Caregivers who are employed are significantly less likely to participate in RCP with their child. This is in line with the program requirement that a caregiver should be present during the Rover visit. Age, education level of the caregiver, and household income are not significantly correlated with RCP participation. The lack of a significant correlation with education or income is a reflection of the targeting approach of RCP in St Lucia. The

¹³ The total number of children enrolled in RCP in the study communities is much larger due to the enrolment of children born after the baseline survey who are not included in the study.

program selects poor communities but it does not specifically target the children most at risk *within* the selected communities.

<TABLE 4 ABOUT HERE>

The regression also includes cognitive development status at baseline in 2006. This allows examining whether RCP would attract especially those children who start off with relatively high or instead low scores. As the results show, none of the baseline cognitive skills are significantly related to subsequent RCP enrolment, neither individually nor jointly.

6 Impact results

6.1 Average Intention-To-Treat effects

The impact results of the child fixed-effects regressions are given in Table 5. The table only shows the coefficients for the treatment variable. Panel a. shows the main impact estimates for the total sample, without controls¹⁴ and with controls respectively. The impact estimates are small compared to the average standardized scores of 50 for the subscales and 100 for the summary scale. They range from minus 2,524 points on the Expressive Language score to plus 1,252 points on the Receptive Language scale in the estimations with controls. Except for one, none of the impact estimates is statistically significant. The coefficient on the Expressive Language score is negative and becomes significant at the 10% level once controls are included.

<TABLE 5 ABOUT HERE>

6.2 Treatment heterogeneity by child sex and age

Panels b. and c. in Table 5 examine potential heterogeneity in treatment effects by sex and age of the child. It estimates the fixed-effects model for four different subsamples: (i) girls, (ii) boys, (iii) younger birth cohort, and (iv) older birth cohort. The younger cohort is defined as the group of children who were between 0 and 12 months old on July 1st 2006. They were between 6 and 18 months old at program start in January 2007. The older cohort

¹⁴ All regressions correct for independent interviewer effects.

includes the children who were between 18 and 30 months at program start. The two estimations compare the respective birth cohorts in RCP communities with similar birth cohorts in control communities. The impact on Gross Motor skills is not calculated for the older age cohort because the scale ends at 36 months.

Table 5 Panel b. shows no evidence of heterogeneous effects of RCP by sex. The results in Panel c. suggest that the program has been effective in enhancing cognitive development among the younger age cohort but not the older age cohort. The scores on Visual Reception and Fine Motor Skills have increased significantly more for children below 18 months at program start in the RCP communities versus children in non-RCP communities with 4.237 points and 4.558 points respectively. These are sizeable increases, equal to almost half a standard deviation. The impact estimates on both the Receptive and Expressive Language scales are not statistically significant. None of the impact estimates for the older birth cohort are statistically significant.

The difference by cohort does not seem to be related to the mean length-of-enrolment. Table 3 Panels a. and b. showed that the younger birth cohort has been enrolled for 13.8 months on average compared to 12.2 months for the older cohort. These results also suggest that vanishing gains over time cannot fully explain the lack of impact on the older children since the time elapsed since drop-out does not substantially differ at follow-up between cohorts.

The Visual Reception scale captures abilities that reflect aspects of school readiness at an early age. Children become able to discriminate and memorize in growing detail the spatial characteristics of drawings, pictures and geometric forms as well as printed letters and words (Mullen, 1995, p. 17). Similarly, from the age of 3 onwards, Fine Motor control is related to drawing and writing skills. During this period children become more skilled at pencil and paper tasks (e.g. copying geometric figures or letter patterns), and at such tasks as using scissors, folding paper, and the independent but coordinated use of fingers. These findings suggest that RCP may have a longer-lasting effect once the children enter primary school, as long as the improvements can be sustained into the future.

In sum, the findings from the basic fixed-effects model suggest that there is no significant *average* impact of RCP on the cognitive outcomes of eligible children in RCP communities one year after the program was introduced to their communities. However, the positive impact on the Visual Reception and Fine Motor skills of the *younger* age cohort is substantial in size. This may reflect windows of opportunity at an early age when children are particularly sensitive to early interventions. The absence of a positive effect on language

development is noteworthy. Personal communication suggests that the lack of impact on hearing and speech is due to relatively little focus of the Rovers on language stimulation in their activities with parent and child.¹⁵ A randomized controlled evaluation of RCP in Jamaica finds similar positive effects on eye-hand coordination and no effect on hearing and speech (Powell, 2004).

6.3 Daycare and preschool enrollment

As all real-world programs, RCP is not implemented in a vacuum but within a broader context of ECD-related services and economic development. After 2006, there was a steep and unexpected rise in job opportunities in many of the study communities. This has led to a general increase throughout the region in both the demand for daycare as well as the financial means to pay for it. In 2006, only fifteen out of every hundred children aged birth to five years old in our study households (i.e. study children plus their siblings) were enrolled in a center-based ECD facility. By 2008, enrollment in center-based care had more than doubled to 36.9 percent of children aged 0 to 5 years. Differences in enrolment rates between RCP and non-RCP communities are not statistically significant, neither at baseline nor at follow-up.

One of the most important reasons for children to prematurely drop out of RCP is to enroll in daycare or preschool. Table 4 column (2) analyses which child and household characteristics at baseline are correlated with daycare or preschool enrollment in 2008. The first row indicates that there is no significant difference in subsequent daycare enrollment between children living in treatment communities and children living in control communities. We find that children in the younger age group from male-headed, poorer, unemployed households are *least* likely to attend a center-based facility. There are no differences in enrollment rates between low and high educated families. This suggests that the decision to enroll a child is mostly financially motivated. Finally, the findings in column (2) indicate that enrollment in daycare is unrelated to child developmental outcomes at baseline.

To further explore the impact of RCP on more disadvantaged children, we restrict the analysis to the subsample of children who were not enrolled in a center-based facility at follow-up. Panel d. in Table 5 shows the results of an estimation that excludes children in both treatment and control communities who were enrolled in daycare or preschool in 2008. Again, the coefficients on the RCP treatment variable for the average child and the older birth cohort are not significantly different from zero. However, the size of the coefficients

¹⁵ Based on discussions with program coordinator and program manager.

increases for the Summary score, the Visual Reception subscale and the Fine Motor subscale for the total sample as well as the birth cohorts separately, especially for the youngest cohort. Although these estimates cannot be interpreted as impact effects due to the selective nature of the sample, these results suggest that RCP may be more beneficial for those children who do not benefit from center-based services, representing precisely the target group of the program.¹⁶

Panel e. in Table 5 shows the estimates of a fixed-effects regression model using the same basic specification as the impact regressions, but replacing the RCP enrollment variable with a center-based ECD enrollment variable, either daycare (for the majority of the younger cohort) or preschool (for the majority of the older cohort). Here too, it should be noted that the estimates do not reflect causal effects because of the self-selection into ECD centers. The coefficients on the daycare/preschool enrollment variable are large and statistically significant for the Cognitive Summary Score as well as the Visual Reception and the Fine Motor Skills subscales. That is, the average child who is enrolled in an ECD center at the time of the follow-up survey shows substantially higher scores on three of the child development scales. This effect is entirely driven by the oldest birth cohort. Daycare attendance of the youngest children is not correlated with cognitive outcomes.

In other words, the additional analyses suggest that RCP is more beneficial for children without access to center-based care, although results are significant only for children who enroll at a young age. Whereas daycare attendance among the younger birth cohort is not correlated with improved child outcomes, preschool attendance among the older birth cohort is strongly correlated with higher cognitive scores, regardless of children's prior enrolment in RCP. These results should be interpreted with caution as they are based on selective subsamples.

6.4 Risk factors

Especially vulnerable children who face a multitude of risk factors and adverse circumstances may not be able to develop to their full potential. To investigate which child, caregiver and household characteristics are correlated with cognitive child outcomes, Appendix C shows the results from a random effects panel regression.¹⁷ The insignificant

¹⁶ We do not find evidence that RCP reinforces beneficial effects of preschool for children previously enrolled in RCP. Including a center-based ECD variable and its interaction with RCP does not yield significant positive interaction effects.

¹⁷ The coefficients and standard errors of the interviewer dummy variables, the year variables and the constant are difficult to interpret as their size depends on the omitted interviewer in each survey year. The choice of

coefficients on the ‘selection into treatment (RCP community)’ variable provide additional support for the validity of the control group as counterfactual.

The findings clearly point to a number of strong and significant correlations of cognitive outcomes with exogenous characteristics, in particular with the sex and age of the child, maternal education and household wealth. First, girls generally outperform boys on all subscales except for Gross Motor development. Second, scores steadily decline compared to the North-American reference population with the age of the child. The drop in cognitive scores since baseline is about half a standard deviation for most scales. Only Gross Motor Skills have improved. This pattern of decreasing standardized cognitive development over time with the exception of gross motor development has also been found in other Latin-American and Caribbean studies (e.g. Samms-Vaughan, 2004; Paxson and Schady, 2006). Third, higher income is significantly related to higher cognitive development scores. Finally, higher female levels of education have a positive effect on cognitive development in addition to the wealth effect. Especially the effects of income and female education may be important indicators for improved targeting.

7 Cost-benefit analysis

The Visual Reception and Fine Motor Skills scales reflect abilities that are important for a smooth transition to a school setting. If the improvements in cognitive development are sustained into primary school age, RCP may have a longer-term impact on schooling. This section calculates potential benefit-to-cost ratios of the program by comparing the actual costs of implementing RCP with the projected net benefits of RCP under different scenarios as a result of enhanced future productivity through increased education. Van Spijk *et al.* (2010) provide details.

The unit costs of RCP are calculated as the sum of annual recurrent costs and depreciated start-up costs divided by the total number of children participating in RCP in 2008.¹⁸ The 2008 unit costs of RCP in St Lucia are estimated at US\$ 594 per child per year. This is comparable to the annual unit costs of RCP in Grenada (US\$ 650) and Saint Vincent and the Grenadines (US\$ 416), but substantially below unit costs in Dominica (US\$ 900) and

omitted category does not affect the coefficients of the other variables. The significant differences in average outcomes by interviewer warrant controlling for interviewer effects.

¹⁸ Recurrent costs consist of the regular costs of implementation, such as salaries and stipends of staff, Rover trainings, amenities and materials. Start-up costs include pre-implementation costs such as a needs assessment, orientation visits of staff to other islands, and awareness raising in the communities.

above unit costs in Jamaica (US\$ 50). Four factors explain most of the variations in costs: economies of scale of the program (the number of enrolled children is 1,410 in Jamaica, 294 in St Lucia and 187 in Dominica); the geography of the island which influences ease of transport and the number of families that a Rover can visit per day (St Lucia and Dominica are both rugged, mountainous islands); income and price levels (annual per capita income is US\$ 9,190 in St. Lucia compared to US\$ 7,360 in Jamaica) and integration in other programs or the government which enables cost sharing.

The little information that is available on alternative ECD services suggests that the costs of RCP compare favorably to the costs of other interventions in the region. Average unit costs of (public) daycare and (private) preschool in St Lucia are US\$ 990 and US\$ 1,611 respectively. Private daycare and preschools in St Vincent cost US\$ 1,367 on average, while community-based (public) preschools in Jamaica cost US\$ 272 per child.

Our analysis concentrates on the potential benefits for individual children as reflected in their increased productivity as a result of increased years of education through enhanced learning. Calculations are based on so-called 'age-earnings profiles' as developed in the ECD calculator by Van der Gaag and Tan (1998).¹⁹ Using data from the St Lucia Labor Force Survey 2009 we estimate a wage equation of the following form:

$$\ln W = \alpha + \beta_1 S_1 + \beta_2 S_2 + \beta_3 S_3 + \gamma_1 E + \gamma_2 E^2 + \varepsilon$$

The variable $\ln W$ is the logarithm of the wage rate. The term α is a constant term reflecting the average (log) wage level for individuals without schooling or experience. S_1 , S_2 and S_3 are dummy variables equal to 1 if the highest level of completed schooling is primary, secondary or tertiary education respectively; and 0 otherwise. E (E^2) equals the years of working experience (squared). ε is an individual error term. The estimated coefficients (with standard errors in parentheses below) are:

$$\ln W = 7.954 + 0.257 S_1 + 0.546 S_2 + 1.235 S_3 + 0.055 E - 0.001 E^2$$

(0.289) (0.105) (0.114) (0.120) (0.014) (0.000)

Earnings are calculated over the age range from 15 to 65. The annual costs of schooling are US\$ 885 for primary school, US\$ 1,069 for secondary school and US\$ 3,226 for tertiary education.²⁰ Opportunity costs in terms of foregone wages are calculated from age 15 onwards.

¹⁹ Spreadsheet available on request.

²⁰ Based on the "Education Statistical Digest 2008" published by the Ministry of Education, Human Resource Development, Youth and Sports of the Government of Saint Lucia.

We first look at the current performance of the school system. In 2008, the gross enrolment rate in primary school is 93 percent, net enrolment is 87 percent. Gross and net enrolment rates in secondary school are 90 and 80 percent respectively. Approximately 15 percent of students continue to a tertiary education institution after finishing secondary school. Official repetition and drop-out rates are very low at 2.5% and 0.1% respectively at the primary level, 0.2% and 0.9% at the secondary level, and 0.0% respectively 2.3% at the tertiary level. Using a discount rate of 7 percent and assuming that children who are enrolled in school do not earn wages yet, the Net Present Value (NPV) of the current school system is calculated to be US\$ 72,862,097 for a cohort of 1,000 children.

No information exists on the long-term impact of RCP on subsequent school enrolment rates. Evidence from other countries suggests that impact may be substantial, with improvements in schooling indicators of up to forty percent (Nores and Barnett, 2010). Given the uncertainties regarding longer term impact, we calculate benefit-to-cost ratios of RCP starting with very conservative assumptions regarding the potential effect of the program and gradually increasing enrolment rates.

Table 6 shows that a small increase in school enrolment due to RCP can lead to large returns. In order to break even the program would have to increase primary enrolment with just over 2 percentage points (Panel a.), or both primary and secondary enrolment with just over 1 percentage point (Panel b.). If the program were able to induce a 3 percentage point increase in primary school enrolment, this would yield a return on investment of 32%: The NPV of the school system for a cohort of 1,000 children would increase with US\$ 2,350,390 whereas the cost of providing RCP for three years is US\$ 1,782 per child or US\$ 1,782,000 for the cohort. If RCP would affect not only primary but also secondary school enrolment with a 3 percentage point increase, the benefit-to-cost ratio jumps to 2.67.

<TABLE 6 ABOUT HERE>

Another way of putting it is to see by how much the costs of RCP should decrease to break even in case of only modest effects on enrolment. If RCP results in a 1 percentage point increase in primary enrolment, the program would break even with unit costs of US\$ 261. That is, the current annual costs of RCP should decrease with 56% to match the gains of the school system. However, if RCP can increase enrolment with 2 percentage points, a decrease of only 12% of unit costs to US\$ 522 is necessary to break even.

It is important to note that these estimates of the cost-benefit analysis only include (projected) benefits related to enhanced future productivity due to improved education, i.e. to benefits in the formal and informal labor market and increased “household productivity”. The analysis does not take into account other benefits, such as those related to improved social and emotional development, a reduced burden of disease later in life, and so on. Society-wide benefits such as enhanced economic growth, or reductions in crime and social dependency are also left out of consideration. As such, the results present a lower bound to the overall benefits-to-cost ratio that might be expected from investments in a home-visiting program like RCP.

8 Discussion and conclusion

This paper provides a short-term impact evaluation of the Roving Caregivers Programme, a home-visiting early childhood development program in the Caribbean. To our knowledge, this is one of the few existing impact evaluations of home-based interventions in the region that is targeted at the general low-income population instead of malnourished children only. Ideally, the program would be evaluated through a randomized control trial. However, as most programs in the real world, RCP was not randomized at implementation. The evaluation consists of a baseline and a follow-up survey among a census of children in eight RCP communities and seven comparable, matched control communities allowing for an estimation of intention-to-treat effects using a differences-in-differences methodology. The validity of the results rests on the absence of unobserved time-varying differences between the treated and untreated communities, which appears to be a plausible assumption given the strong similarities in key indicators between the two groups. From a policy perspective it is crucial to extend the scope of evaluations beyond randomized designs and include existing child development programs in order to increase understanding of potential impacts and add to the, as of yet limited, knowledge base for low-income countries.

One year after program implementation, we do not find an impact on the average child in treatment communities. Results show sizable and significant effects on the cognitive development of children aged between 6 and 18 months at program start, but not for the older birth cohort aged 18 to 30 months. In particular, the scores of the younger birth cohort on the Visual Reception and Fine Motor Skills scales show substantial increases that are almost half a standard deviation higher than changes over time in the control group. These two scales are closely related to visual discrimination and the cognitive processing of abstract concepts such

as space and distance, as well as to eye-hand coordination. Such skills are at the basis of early reading and writing abilities. Impact on language development is not significant for either birth cohort. Medium- and longer-term evaluations of the program are necessary to shed light on the sustainability of the cognitive gains among the youngest cohort.

These findings suggest that there are windows of opportunity for improving child development at an early age. A home-visiting intervention that aims to enhance appropriate parenting practices may therefore opt to enrol caregivers as soon as possible after birth of their child. A more detailed analysis of the data suggests that RCP may be more beneficial for disadvantaged children without access to center-based care, although coefficients remain statistically insignificant for the average child and the older birth cohort.

The favourable economic climate after baseline allowed an unexpectedly high proportion of children to enrol in daycare or preschool. Especially preschool attendance among the older birth cohort is correlated with high cognitive outcomes. After the follow-up survey in 2008 however, the world financial crisis hit St Lucia particularly hard due to its economic dependence on tourism. If caregivers of young children lost their employment again, this may have fuelled the need for alternative and low cost home-based services such as RCP that target precisely those children in poor communities that are most disadvantaged.

A cost analysis of the program shows that the costs of providing RCP to one child for one year are US\$ 594. A comparison of these costs to potential future benefits in terms of increased school performance and labour productivity suggests that substantial returns on investments can be earned from the program. If RCP would yield an increase of 3 percentage points in primary school enrolment, the benefit-to-cost ratio is calculated to be 1.32. With an additional increase of 3 percentage points in secondary school enrolment, the benefit-to-cost ratio would jump to 2.67.

The study also highlights a number of child characteristics and risk factors that are significantly correlated with lower cognitive development. First, girls consistently outperform boys on all cognitive scales except for the Gross Motor Skills subscale. Next, compared to the North American reference population, cognitive scores steadily decline as the children grow older, again with the exception of Gross Motor Skills which strengthen over time. Finally, cognitive outcomes are consistently lower for children growing up in families with few financial means and for children whose mother is lowly educated. That is, within disadvantaged communities, some groups of children are more disadvantaged than others. Currently, the program does not distinguish between them. These results call for more effective targeting of the most vulnerable children.

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References

- Augustin, Martina. 2004. "Parenting Support and Early Childhood Intervention: A Replication Plan for Saint Lucia", Barbados: Caribbean Child Support Initiative (CCSI).
- Barrow, Christine. 2003. "Child Rearing and Socialisation Approaches in the Caribbean -- Phase I: Trinidad; Phase II: Dominica ", Barbados: Caribbean Child Support Initiative (CCSI).
- Berlinksi, Samuel, Sebastian Galiani and Paul Gertler. 2009. "The effect of pre-primary education on primary school performance", in: *Journal of Public Economics*, Vol. 93, pp. 219-234.
- Behrman, Jere R., Yingmei Cheng and Petra E. Todd. 2004. "Evaluating Preschool Programs when Length of Exposure to the Program Varies: A Nonparametric Approach", *Review of Economics and Statistics*, 86(1): 108-132.
- Charles, Leon. 2004. "Early Childhood Policy", Castries, Saint Lucia: Government of Saint Lucia.
- Currie, Janet (2001), "Early Childhood Education Programs", *Journal of Economic Perspectives*, 15(2): 213-238.
- Engle, Patrice, Lia Fernald, Harold Alderman, Jere Behrman, Chloe O’Gara, Aisha Yousafzai, Meena Cabral de Mello, Melissa Hidrobo, Nurper Ulkuer, Ilgi Ertem, Selim Iltus, and the Global Child Development Steering Group. 2011. "Strategies for reducing inequalities and improving developmental outcomes for young children in low-income and middle-income countries", in: *The Lancet*, Vol. 378, pp. 1339-1353.
- Garces, Eliana, Duncan Thomas and Janet Currie. 2002. "Longer-Term Effects of Head Start", *American Economic Review*, 92(4): 999-1012.
- Grantham-McGregor, Sally M., Yin B. Cheung, Santiago Cueto, Paul Glewwe, Linda Richter, Barbara Strupp and the International Child Development Steering Group. 2007. "Developmental Potential in the First 5 Years for Children in Developing Countries", *Lancet*, 369: 60-70.

Heckman, James J. 2006. "Skill Formation and the Economics of Investing in Disadvantaged Children", *Science*, 312(5782): 1900-1902

Mullen, Eileen M. 1995. *Mullen Scales of Early Learning, AGS Edition: Manual*, Circle Pines, MN: American Guidance Service (AGS), Inc.

Nores, Milagros and W. Steven Barnett. 2010. "Benefits of early childhood interventions across the world: (Under) Investing in the very young", *Economics of Education Review*, Vol. 19, pp. 271-282.

Paxson, Christina and Norbert Schady (2007), "Cognitive development among young children in Ecuador: The Roles of Wealth, Health and Parenting", *Journal of Human Resources*, Vol. 42(1): 49-84.

Powell, Christine A. 2004. "An Evaluation of the Roving Caregivers Programme of the Rural Family Support Organisation", Tropical Medicine Research Institute, Kingston, Jamaica: University of the West Indies, Mona.

Powell, Christine A., Helen Baker-Henningham, Susan Walker, Jacqueline Gernay and Sally Grantham-McGregor. 2004. "Feasibility of integrating early stimulation into primary care for undernourished Jamaican children: cluster randomized controlled trial", in: *British Medical Journal*, Vol. 329(89).

Roopnarine, Jaipaul L. 2005. "The Roving Caregivers Program in Jamaica: Its Theoretical and Research Foundations and Efficacy", Report submitted to the Bernard van Leer Foundation, June 2005: Syracuse University.

Samms-Vaughan, Maureen. 2004. "Profiles -- The Jamaican Pre-School Child: The Status of Early Childhood Development in Jamaica", Kingston, Jamaica: Planning Institute of Jamaica.

Schady, Norbert. 2006. "Early Childhood Development in Latin America and the Caribbean", in: *Economía*, Vol. 6(2): 185-225.

Schweinhart, Lawrence Jeanne Montie, Zongping Xiang, W. Steven Barnett, Clive Belfield and Milagros Nores. 2005. *Lifetime Effects: The High/Scope Perry Preschool Study through age 40*. Monographs of the High/Scope Educational Research Foundation 14.

Shonkoff, Jack P. and Deborah A. Phillips (eds.). 2000. *From Neurons to Neighborhoods: The Science of Early Childhood Development*, Washington, DC: National Academy Press.

Super, Charles M., M. Guillermo Herrera and Jost O. Mora. 1990. "Long-term effects of food supplementation and psychosocial intervention on the physical growth of Colombian infants at risk of malnutrition", *Child Development*, Vol. 61(1): 29-49.

Sweet, Monica A. and Mark I. Appelbaum. 2004. "Is Home Visiting an Effective Strategy? A Meta-Analytic Review of Home Visiting Programs for Families with Young Children", *Child Development*, 75(5): 1435-1456.

Van der Gaag, Jan and J.P. Tan. 1998. The benefits of early childhood development programs: an economic analysis, education, human development network, Washington DC: World Bank.

Walker, Susan P., Susan M. Chang, Christine A. Powell and Sally M. Grantham-McGregor. 2005. "Effects of early childhood psychosocial stimulation and nutritional supplementation on cognition and education in growth-retarded Jamaican children: prospective cohort study", *The Lancet*, Vol. 366(9499), p.1804-1807.

Williams, Sian and Janet Brown (2005), "Research Approaches and Findings on Childrearing and Socialisation of Young Children (Birth to Eight Years of Age) in the Caribbean", Bridgetown, Barbados: Caribbean Child Support Initiative (CCSI).

Williams, Sian, Janet Brown and Jaipaul Roopnarine (2006), "Child Rearing in the Caribbean: A Literature Review", Kingston, Jamaica: Digital Solution.

Young, Mary Eming (ed.) (2002), *From Early Child Development to Human Development*, Washington, DC: World Bank.

Table 1. Overview of the children in the sample

	BASELINE 2006/2007			FOLLOW-UP 2008			BALANCED 06/07-08		
	Total	Control	Treat	Total	Control	Treat	Total	Control	Treat
Total # of children on list	461	232	229	410[†]	217 [†]	193 [†]	461	232	229
# children who participated in cognitive test	419	222	197	391	207	184	389	207	182
Participation rate in cognitive test (%)	90.9	95.7	86.0	95.4	95.4	95.3	84.4	89.2	79.5

[†] The follow-up child list in 2008 only includes children who participated in the cognitive test at baseline *and* whose caregiver participated in the caregiver interview at baseline.

Table 2. Baseline comparison of treatment and the control group (2006/2007)

	Total # obs	Total mean	Total min	Total max	Total s.d.	Control mean	Treat mean	p-value
PANEL A Child and household characteristics at baseline								
Child characteristics								
Sex (% female)	389	54.0	0.0	100.0	49.9	50.2	58.2	0.115
Age (in months)	389	15.7	1.1	38.1	8.2	15.6	15.9	0.685
Enrolled in center-based daycare (%)	377	2.9	0.0	100.0	16.9	3.4	2.3	0.544
Household characteristics								
Household size	382	5.9	2.0	16.0	2.5	6.0	5.8	0.386
# of children 0-17	382	3.1	1.0	9.0	1.7	3.1	3.2	0.700
Female head of household (%)	377	42.4	0.0	100.0	49.5	44.6	40.0	0.374
Age of caregiver	372	27.8	6.0	62.0	7.5	28.2	27.2	0.201
Income index	380	0.0	-2.2	3.5	1.0	0.1	-0.2	0.001***
Education of caregiver	365	10.9	0.0	25.0	4.0	11.1	10.6	0.180
Employment of caregiver (%)	377	34.2	0.0	100.0	47.5	37.9	29.9	0.101
PANEL B. Cognitive child outcomes at baseline : Mullen Scales of Early Learning								
SUMMARY SCORE	389	106.2	49.0	155.0	16.1	105.9	106.5	0.690
Gross motor	377	59.1	21.0	80.0	11.0	58.9	59.3	0.723
Visual Reception	389	54.3	20.0	80.0	10.3	54.7	53.9	0.439
Fine motor	389	51.3	20.0	80.0	11.6	50.7	52.0	0.277
Receptive language	389	52.8	20.0	80.0	10.9	52.8	52.8	0.968
Expressive language	389	53.7	20.0	80.0	10.6	53.2	54.2	0.341
PANEL C. Regression analysis of baseline differences in cognitive child outcomes								
	Without controls (1)[†]		With controls (2)					
	Coef.	s.e.	Coef.	s.e.				
SUMMARY SCORE	-0.401	1.610	-0.584	1.721				
Gross motor	-0.356	1.115	-0.077	1.190				
Visual Reception	-1.221	1.057	-1.597	1.125				
Fine motor	-0.309	1.149	-0.382	1.225				
Receptive language	-0.787	1.101	-0.145	1.222				
Expressive language	0.913	1.049	0.883	1.144				

[†]Regression corrects for interviewer effects. The in- or exclusion of interviewer ID codes does not qualitatively affect the results

Table 3: Enrolment rates in RCP among eligible children in RCP communities

Ever enrolled in RCP?	#	%	Age-at-enrollment			Length-of-enrollment		
			Mean	Min	Max.	Mean	Min.	Max.
Panel a. Total population								
Yes	142	78.0	17.6	5.8	33.4	13.2	0.0	19.4
<i>Yes, currently enrolled</i>	68	37.4	15.8	6.1	33.4	15.6	4.1	19.4
<i>Yes, but graduated</i>	27	14.8	25.0	7.3	32.9	11.0	2.4	17.4
<i>Yes, but dropped out</i>	47	25.8	16.2	5.8	27.0	10.5	0.0	17.2
No	40	22.0						
Total	182	100.0						
Panel b. Youngest birth cohort only								
Yes	83	86.5	12.6	5.8	24.6	13.8	0	19.4
<i>Yes, currently enrolled</i>	48	50.0	12.6	6.13	24.6	15.5	4.1	19.4
<i>Yes, but graduated</i>	4	4.2	13.0	7.63	15.73	10.3	10.1	10.5
<i>Yes, but dropped out</i>	31	32.3	12.6	5.8	17.86	11.3	0	17.2
No	13	13.5						
Total	96							
Panel c. Oldest birth cohort only								
Yes	59	68.6	24.8	17.3	33.4	12.2	2.4	19.4
<i>Yes, currently enrolled</i>	20	23.3	23.6	17.4	33.4	15.7	12.1	19.4
<i>Yes, but graduated</i>	23	26.7	27.0	19.6	32.9	11.1	2.4	17.4
<i>Yes, but dropped out</i>	16	18.6	23.1	17.3	27.0	8.8	4.0	13.9
No	27	31.4						
Total	86							

NB: This table only includes children who participated in the child assessment both in the baseline and in the follow-up survey.

Table 4. Probability of enrollment in ECD programs in 2008

Dependent variable:	Likelihood of participation in RCP	Likelihood of enrollment in daycare
Sample	RCP communities only (1)	Total sample (2)
Child lives in an RCP community		-0.037 (0.061)
Sex (male=0. female=1)	0.025 (0.072)	0.036 (0.058)
Age in months (2006)	-0.009* (0.005)	0.024*** (0.005)
# of children in the household (2006)	0.013 (0.040)	-0.033 (0.031)
Household size (2006)	-0.004 (0.026)	-0.001 (0.021)
Female head of household (2006)	-0.037 (0.074)	0.154** (0.061)
Age of the caregiver (2006)	0.007 (0.005)	-0.002 (0.004)
Years of education of caregiver (2006)	0.005 (0.010)	-0.002 (0.008)
Employment of caregiver (2006)	-0.166* (0.089)	0.146** (0.064)
Income indicator (2006)	-0.057 (0.043)	0.093** (0.036)
Vieux-Fort district	0.106 (0.119)	-0.164 (0.101)
Gross motor skills (2006)	0.000 (0.004)	-0.002 (0.003)
Visual reception (2006)	0.008* (0.005)	0.001 (0.004)
Fine motor skills (2006)	0.003 (0.004)	-0.002 (0.003)
Receptive language (2006)	-0.005 (0.004)	0.004 (0.003)
Expressive language (2006)	-0.001 (0.004)	0.002 (0.003)
Child tester ID-codes	Included	Included
Joint test of child outcomes: Chi2-stat (p-value)	26.42 (0.150)	96.68 (.210)

The reported coefficients are marginal effects (the percentage change in probability related to a one point change at the mean of each explanatory variable). Standard errors are given in parentheses. *: p-value<.100; **: p-value<.050; ***: p-value<.010

Table 5: Impact of RCP on cognitive child development (child fixed-effects model)

Changes in child development outcomes:	Summary score	Gross Motor	Visual reception	Fine Motor	Receptive Language	Expressive Language
(a) Basic impact regression (full sample)						
Impact of RCP (without controls)	-1.043 (1.914)	-0.774 (1.928)	0.155 (1.313)	-0.220 (1.626)	-0.004 (1.276)	-1.982 (1.235)
Impact of RCP (with controls)	-1.179 (2.268)	0.381 (2.049)	-0.370 (1.553)	-0.560 (1.911)	1.252 (1.472)	-2.524* (1.448)
(b) Treatment heterogeneity by sex						
Impact of RCP (girls only)	-0,242 (3,231)	1,470 (3,041)	0,982 (2,123)	1,366 (2,744)	0,745 (1,960)	-3,136 (2,017)
Impact of RCP (boys only)	-2,162 (3,431)	-2,147 (2,845)	-2,530 (2,451)	-3,061 (2,729)	2,327 (2,374)	-1,259 (2,220)
(c) Treatment heterogeneity by birth cohort						
Impact of RCP (<18 months at start)	3,683 (2,897)	1,260 (2,101)	4,237** (2,088)	4,558** (2,251)	1,131 (2,032)	-2,346 (2,041)
Impact of RCP (>=18 months at start)	-1,699 (3,198)		-2,659 (2,229)	-1,844 (2,791)	1,743 (2,110)	-0,388 (1,990)
(d) Exclusion of children enrolled in center-based care						
Impact of RCP	0.446 (2.848)	-0.297 (2.497)	0.950 (2.068)	1.930 (2.130)	1.214 (1.846)	-2.782 (1.865)
Impact of RCP (<18 months at start)	6.577* (3.570)	0.649 (2.559)	6.155** (2.621)	5.846** (2.736)	3.080 (2.431)	-1.170 (2.417)
Impact of RCP (>=18 months at start)	-0.011 (4.671)		-1.578 (3.552)	1.243 (3.467)	2.237 (3.199)	-1.364 (3.110)
(e) Correlation of child outcomes with center-based enrollment						
Daycare/preschool enrolment (full sample)	6.717*** (2.350)	-3.155 (2.696)	4.410*** (1.610)	9.892*** (1.929)	-1.642 (1.547)	1.160 (1.506)
Daycare/preschool enrolment (<18 months at start)	0.885 (3.559)	-3.239 (2.747)	1.850 (2.529)	-0.758 (2.774)	0.320 (2.503)	0.708 (2.501)
Daycare/preschool enrolment (>=18 months at start)	7.154** (3.178)		5.337** (2.221)	13.156*** (2.602)	-1.507 (2.128)	-1.967 (1.982)

Standard errors are given in parentheses. *: p-value<.100; **: p-value<.050; ***: p-value<.010. All regressions control for interviewer effects. Additional control variables: sex and age of the child; household size, nr of children, female head; age, education and employment of caregiver; household income; district indicator; dummy variable for assignment to treatment group at baseline; dummy variable for 2007 and 2008.

Table 6. Benefit-to-cost ratios of RCP for different scenario's

	Increase in primary enrollment*	Primary enrollment rate	Increase in secondary enrollment*	Secondary enrollment rate	New NPV of the education system** (US\$)	Net gain due to RCP** (US\$)	Benefit- to-cost ratio
Panel A. Impact only on enrolment in primary school							
(i)	1 %	94 %			73,645,561	783,463	0.44
(ii)	2 %	95 %			74,429,025	1,566,927	0.88
(iii)	3 %	96 %			75,212,488	2,350,390	1.32
(iv)	4 %	97 %			75,995,952	3,133,854	1.77
(v)	5 %	98 %			76,779,415	3,917,317	2.21
(vi)	6 %	99 %			77,562,878	4,700,781	2.65
(vii)	7 %	100 %			78,346,342	5,484,244	3.09
Panel B. Impact on enrolment in both primary and secondary school							
(i)	1 %	94 %	1 %	91 %	74,426,920	1,564,822	0.88
(ii)	2 %	95 %	2 %	92 %	76,008,367	3,146,269	1.77
(iii)	3 %	96 %	3 %	93 %	77,606,439	4,744,341	2.67
(iv)	4 %	97 %	4 %	94 %	79,221,135	6,359,037	3.58
(v)	5 %	98 %	5 %	95 %	80,852,456	7,990,358	4.50
(vi)	6 %	99 %	6 %	96 %	82,500,402	9,638,304	5.43
(vii)	7 %	100 %	7 %	97 %	84,164,972	11,302,874	6.37

* with respect to primary school gross enrollment rate of 93% in 2008

** for a cohort of 1,000 children

APPENDIX A. Comparison of community characteristics between the treatment and the control group

Variable	Average	St. dev.	Min	Max	TOTAL (weighted average)	CONTROL (weighted average)	TREAT (weighted average)
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
PANEL A. Poverty							
Poverty index	7.80	.68	6.82	9.49	8.08	8.19	7.97
% unemployment	22	7	12	41	20	19	22
PANEL B. Demographics							
Total number of children 0-3 in community	81	53	11	183	109	119	98
Total community population size	889	642	224	2403	1322	1488	1159
PANEL C. ECD services in the community (0 = no; 1 = yes)							
Presence of at least one ECD facility in community	.80	.41	0	1	.93	.91	.95
- Public daycare	.33	.49	0	1	.28	.05	.50
- Private daycare	.33	.49	0	1	.51	.48	.53
- Preschool	.53	.52	0	1	.77	.73	.81
PANEL D. Presence of other facilities (0 = no; 1 = yes)							
Primary school	.60	.51	0	1	.83	.85	.81
Health center	.47	.52	0	1	.70	.70	.69
Playground	.67	.49	0	1	.86	.85	.86
Sport facilities	.53	.52	0	1	.76	.70	.81
Church	.73	.46	0	1	.86	.85	.87
Public transport	.93	.26	0	1	.94	1.00	.87
Police station	.13	.35	0	1	.28	.36	.19
Post office	.53	.52	0	1	.74	.73	.74
Bank	.20	.41	0	1	.43	.36	.48
General store	.67	.49	0	1	.81	.89	.74
NELP Centers	.33	.49	0	1	.40	.48	.33
PANEL E. Security and social issues							
Is ... a problem in the community? (0 = no; 1 = yes)							
Flooding / natural hazards	.67	.49	0	1	.61	.72	.51
Bad hygiene and lack of sanitation	.40	.51	0	1	.55	.40	.70
Drugs	.80	.41	0	1	.90	.94	.86
Alcohol	.80	.41	0	1	.90	.95	.86
Prostitution	.13	.35	0	1	.06	.03	.09
Crime and violence	.93	.26	0	1	.82	.64	1.00
<i>How severe is the problem? (1 = no problem; 2 = it happens but is not a problem; 3 = minor problem; 4 = fairly big problem; 5 = big problem)</i>							
Flooding / natural hazards	3.20	1.57	1	5	3.13	3.18	3.08
Bad hygiene and lack of sanitation	2.13	1.51	1	5	2.34	1.86	2.81
Drugs	3.40	1.40	1	5	3.64	3.43	3.85
Alcohol	3.53	0.99	2	5	3.80	3.86	3.73
Prostitution	1.80	1.08	1	5	1.71	1.62	1.80
Crime and violence	3.87	0.99	2	5	3.59	3.16	4.02
PANEL F. Community organizations (0 = not present in community; 1 = present in community)							
Total number of community	17	12	0	36	22	22	22

groups

Mother's and Father's Group	.67	.49	0	1	.53	.57	.49
Women's groups	.40	.51	0	1	.46	.36	.55
Parent-teacher association	.60	.51	0	1	.79	.85	.73
Youth groups	.87	.35	0	1	.94	.89	1.00
Sports group	.67	.49	0	1	.66	.37	.95
Cultural Group (e.g. music, theater, dance)	.67	.49	0	1	.72	.66	.78
Religious / charity groups	.73	.46	0	1	.86	.77	.95
Elderly group	.20	.41	0	1	.20	.12	.28
Farmers or Agricultural Groups	.33	.49	0	1	.44	.49	.40
Business or professional groups	.00	.00	0	0	.00	.00	.00
Savings and credit group	.20	.41	0	1	.43	.36	.48
Development Committee	.60	.51	0	1	.65	.89	.42
Self-help group	.47	.52	0	1	.42	.26	.56
Disaster preparedness group	.53	.52	0	1	.74	.89	.59
Other groups	.27	.46	0	1	.26	.12	.41

PANEL G. Accessibility and mobility

Community along main road (0 = no; 1 = yes)	.33	.49	0	1	.43	.55	.32
Community along coast (0 = no; 1 = yes)	.20	.41	0	1	.34	.36	.32
Road quality (1= bad, 2 = fair, 3 = good)	2.40	.63	1	3	2.33	2.20	2.46
Geographic spread of houses (0 = spread out over large area; 1 = close to each other)	.53	.52	0	1	.65	.55	.75

Source of panels A and B: Statistical Office St Lucia, based on the Census 2001.

Source of panels C to G: Own data collection (2006).

APPENDIX B: Non-response and attrition bias

	Children with child test (respondents)	Children without child test (non- respondents)	P-Value with vs. without child test	Respondents in both 2006/07 and 2008	Respondents only in 2006/07 (drop-outs)	P-value 2006 survey vs. both surveys
	(1)	(2)	(3)	(4)	(5)	(6)
PANEL A. Baseline socio-economic characteristics 2006/07						
Sex of the child (% of girls)	53,96	55,56	0,895	53,98	38,46	0,035**
Age of the child (in months)	15,72	17,07	0,509	15,73	17,61	0,398
Household size	5,90	5,78	0,845	5,87	5,06	0,028**
Child dependency ratio	0,77	0,67	0,423	0,77	0,76	0,864
Years of education of primary caregiver	10,89	10,44	0,664	10,88	11,38	0,423
Age of caregiver	27,72	29,47	0,358	27,76	28,06	0,794
Employment status of caregiver	34,04	44,44	0,365	34,22	48,98	0,043**
Monthly per capita consumption (EC\$)	216,86	216,13	0,986	216,83	231,42	0,600
Income indicator	-0,02	-0,10	0,745	-0,02	-0,37	0,023**
PANEL B. Baseline child development scores 2006/07						
Cognitive summary score				106,18	106,29	0,981
Gross Motor Skills				59,10	65,21	0,042**
Visual reception				54,30	53,86	0,874
Fine Motor Skills				51,32	53,57	0,479
Receptive Language (hearing)				52,81	51,36	0,626
Expressive Language (speech)				53,67	53,79	0,969
Socio-emotional summary score				102,66	107,29	0,210
Interpersonal relationships				99,78	102,86	0,323
Play and leisure				102,05	106,00	0,276

Appendix C. Random effects

	Summary score	Gross Motor Skills	Visual reception	Fine Motor Skills	Receptive Language	Expressive Language
Selection into treatment (RCP community)	-1,514 (2,142)	0,191 (1,709)	-0,666 (1,464)	-0,703 (1,773)	0,677 (1,381)	-2,180 (1,362)
Impact of RCP	-0,794 (1,611)	-0,524 (1,087)	-1,700 (1,084)	-0,310 (1,272)	-0,486 (1,036)	0,867 (0,991)
Year 2008=1	-0,014 (2,969)	-7,579*** (2,236)	5,904*** (2,003)	-4,822** (2,360)	4,409** (1,909)	-4,532** (1,836)
Year 2007=1	0,407 (3,440)	4,114* (2,436)	-0,552 (2,322)	-0,343 (2,735)	2,724 (2,213)	-0,126 (2,128)
Sex of the child (male = 0, female=1)	5,502*** (1,182)	0,590 (0,910)	4,042*** (0,785)	2,292** (0,897)	2,002*** (0,758)	3,084*** (0,708)
Age in months	-0,363*** (0,081)	0,235*** (0,069)	-0,232*** (0,054)	-0,082 (0,062)	-0,340*** (0,052)	-0,099** (0,048)
Number of children (0-17)	0,626 (0,554)	-0,543 (0,439)	0,881** (0,371)	0,894** (0,431)	-0,264 (0,356)	-0,104 (0,337)
Household size	-0,283 (0,348)	0,036 (0,276)	-0,486** (0,233)	-0,269 (0,268)	0,166 (0,224)	-0,064 (0,211)
Females among head of the household	1,233 (1,210)	2,110** (0,935)	0,181 (0,807)	0,346 (0,927)	1,240 (0,776)	0,912 (0,729)
Age of the primary caregiver	-0,088 (0,084)	0,002 (0,067)	-0,064 (0,056)	-0,085 (0,064)	0,009 (0,054)	-0,037 (0,050)
Income indicator	2,222*** (0,719)	1,344** (0,560)	1,269*** (0,481)	0,969* (0,556)	1,516*** (0,462)	0,895** (0,436)
Years of education of primary caregiver	0,323** (0,162)	-0,139 (0,124)	0,210* (0,108)	0,148 (0,125)	0,171* (0,104)	0,167* (0,098)
Employment status of primary caregiver	1,722 (1,217)	1,321 (0,946)	0,845 (0,816)	1,842* (0,951)	-0,427 (0,782)	1,116 (0,744)
District (Anse-la-Ray=0, Vieux-Fort=1)	-1,838 (1,570)	0,345 (1,304)	-1,931* (1,050)	-1,066 (1,214)	0,231 (1,008)	-1,243 (0,952)
Interviewer b	-9,999*** (2,371)	-6,448*** (1,581)	1,063 (1,600)	-7,649*** (1,886)	-3,767** (1,525)	-9,892*** (1,467)
Interviewer c	2,395 (2,727)	-2,111 (1,885)	3,278* (1,846)	1,240 (2,188)	5,708*** (1,755)	-4,882*** (1,698)
Interviewer d	-3,560 (2,690)	0,943 (1,861)	-1,329 (1,821)	-0,289 (2,158)	2,890* (1,731)	-7,958*** (1,674)
Interviewer e	0,853 (2,416)	3,349** (1,610)	2,266 (1,630)	2,186 (1,921)	1,934 (1,554)	-3,868*** (1,495)
Interviewer g	-6,027*** (2,297)	9,703*** (2,094)	-6,480*** (1,550)	-0,904 (1,828)	-1,571 (1,477)	-3,199** (1,422)
Interviewer h	2,673 (2,254)	-1,617 (2,124)	-1,041 (1,522)	4,098** (1,796)	0,125 (1,450)	1,542 (1,397)
Interviewer i	-7,482*** (2,224)	1,635 (2,015)	-8,013*** (1,501)	-0,923 (1,770)	-2,966** (1,431)	-3,631*** (1,377)
Constant	109,939*** (4,199)	57,412*** (3,231)	55,837*** (2,809)	51,818*** (3,252)	53,080*** (2,696)	58,452*** (2,550)
# of observations	686	514	686	686	686	686