Improving Parental Investments in Children: Experimental Evidence from The Gambia

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Abstract

We study a large scale early childhood program taking place in two regions of the Gambia, targeting children between 0 and 3 years of age. Two versions of the program, which are experimentally assigned to different villages, are analysed along with an experimental control group. The basic version of the program provides child health and nutrition information to parents of young children, through home visits, and sporadic community meetings. The intensive version of the program enriched the home visits with added information about child stimulation, and provided more frequent and structured community meetings than the basic version. Furthermore, the group meetings in the intensive version were attended by parents and children, and include direct stimulation to children. There were moderate impacts of the intensive program on parental investments and child language development, occurring primarily in one of the regions in our study, which was more advantaged to start with. There were no detectable impacts of the basic version of the program.

[1] We thank the World Bank and the Japan Social Development Fund (JSDF) for financial support. Carneiro also thanks the support of the ESRC through a grant (RES-589-28-0001) to the Centre for Microdata Methods and Practice. We thank the Gambian Ministry of Basic and Secondary Education (MoBSE) for their active support and engagement; the National Nutrition Agency (NaNA) for the Implementation of the intervention; The Gambia Bureau of Statistics (GBOS) for organizing the data collection. Finally, we thank Yi-Kyoung Lee, Elizabeth Joof, Hervé Akinocho**,** for their guidance and support for our research. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

1. Introduction

There is extensive evidence that the early years of an individual's life greatly influence one's life trajectory. This is also a period when investments in children are mostly private, occurring within the family. Attanasio (2015), Heckman and Mosso (2014), the whole literature summarized in these papers, stress the importance of parenting, attachment, and interactions in the formation of nurturing family environments.

These papers also discuss the success of several early childhood programs. The most remarkable success stories concern very high quality pre-school programs and home visiting programs which are implemented at small scale (e.g., Walker et al, 2006, Schweinhart et al, 2005). Nevertheless, two important questions about interventions of this type remain unanswered. First, can we replicate their success in large-scale implementations of similar programs, presumably with much less fidelity to the original ideas of the individuals who originally conceived them? Second, through which mechanisms do these programs produce such transformation in the lives of children, lasting for many years, long after no program is still in place? These two issues are related, since understanding the main mechanisms through which these programs operate will help us identifying the main dimensions of early childhood programs driving their success, and consider the extent to which they can be implemented in large scale programs.

For example, Attanasio et al (2015) have recently shown that a large scale home visiting program implemented in Colombia was able to produce significant developmental gains in young children. Moreover, the main mechanism through which this occurred was an increase in parental investments in children. In contrast, the productivity of parental investments did not increase for those parents receiving the home visits relative to those parents not receiving them. Therefore, it is possible that, as a result of the home visits, parents became more aware of the importance and productivity of investments in their children, and responded by increasing those investments. Such a conclusion would also be consistent with recent work by Cunha (2015) showing that socio-economic differences in parental preferences and beliefs about the productivity of investments in children play an important role in explaining socio-economic gaps in these investments.

Building on this literature, our paper studies a large scale parenting and child stimulation program implemented in the Gambia, through a randomized control trial (RCT). We focus not only on the impact of the program on child health, motor, and language development, but also on its impacts on parental investments in time and goods. There are two versions of the program, one targeting child health and nutrition practices, and another which adds to this a focus on child stimulation. Therefore, the RCT we study has two study arms (corresponding to the two versions of the program) and a control arm.

This program was implemented in Regions 2 and 6 of The Gambia, and jointly designed by the National Nutrition Agency and the Ministry of Basic and Secondary Education. The basic version of this program, called BFCI (Baby Friendly Community Initiative), is a comprehensive health and nutrition program (running since 1995), providing parenting education to mothers/fathers and other caregivers by providing parenting education through a mixture of home visits and community meetings, administered by trained community members. There are four components which are stressed in the delivery of the program: Maternal Nutrition, Infant and Young Child Nutrition, Personal/Environmental Sanitation, and Growth monitoring.

The enriched version of the BFCI, including early cognitive stimulation to ensure the holistic development of the child, was called BFCI+, and implemented in the same two regions. Activities involving parenting education and direct child stimulation were scheduled to take place three times per week under a shed especially built for this purpose in each community. Therefore, BFCI+ provided a richer message than BFCI, as well as a more intense schedule of activities.

We find that the most intensive version of the program, addressing both health and cognitive stimulation, lead to moderate increases in parental investments in children in time and goods. The increase in time investments occurred primarily in Region 2, which was the more advantaged region to start with. We cannot reject that the increase in time with the child was the same in both regions, although the point estimates are larger for Region 6. In terms of child outcomes, we find that there are moderate impacts of the intensive version of the program on the language skills of children only Region2, which could be a result of the additional parental investments in goods occurring in that region, an increase in the productivity of times and goods investments for parents living in that region, or higher productivity of the direct stimulation activities provided by the program in that region. There are no significant program impacts on fine motor skills nor on the health of children. The least intensive version of the program, focusing only on child health and nutrition, did not show substantial impacts on any dimension of parental knowledge, parental investments, or child development.

Our study is important because there is a lack of research about the impacts of large scale early childhood programs in very poor settings. The type of setting we study is typical of what is found in many parts of Sub-Saharan Africa, where most of the world's poorest children reside. In these areas children face very challenging environments, and therefore, these programs can be particularly important for their development.

However, early childhood services are generally not available for very young children residing in these areas. Even when such services are offered, they often have low quality, and do not necessarily provide adequate environments for the development of infants and toddlers. As a result, there are potentially very high returns to supporting poor families and their investments in children.

Among the options to directly support poor families' investments in children, the traditional emphasis has been on financial resources. We now recognize that this approach is largely insufficient. Poor parents do suffer from a lack of resources, but even when these are made available their use greatly depends on parental preferences (and attitudes) towards alternative uses of resources (both time and money), information on the best use of resources, and expectations of returns to investments in children. The program we study in this paper has the potential to affect all these factors.

Another reason why this study is important is that it takes place in a setting where the implementation of a program of this type faces significant constraints. Because of the severe scarcity of government resources, and the need to serve a large number of families, the program has to be implemented by residents of the communities (who receive some training), not by professional social or health workers. Many of these community workers may lack the education and preparation needed for an effective application of the program's guidelines, and because of competing activities, they may not be able to devote to the program the necessary time to guarantee that all families and children are adequately served.

Finally, at least on paper, one component of this program, the BFCI+, was designed to be delivered with particularly high intensity, and therefore, a relatively high cost. The sheds where the early stimulation activities took place had to be constructed in every village participating in BFCI+ required a significant capital investment. In addition, the home visits, in combination with the frequent and long sessions taking place in the village sheds, required a substantial time investment by the parents and the program workers. Our findings of only moderate and localized program impacts are therefore somewhat disappointing, and important to report.

The experimental design of the program guarantees that the two treatment and control groups are comparable, and therefore our study provides reliable measures of program impacts. The sample design also guaranteed that the reason why we do not find strong program impacts across a large variety of child and parent outcomes is not lack of statistical power, but the fact that these impacts are not large.

We contribute to a growing literature examining early childhood investments in poor countries. There is considerable evidence that there are very high returns to investments in the early years (see, for example, the evidence reviewed in Attanasio, 2015, Heckman and Mosso, 2014, or Berlinski and Schady, 2015). The focus on the early years has become very natural across the world. There are, however, a variety of possible intervention strategies. Engle et al (2011) provide a comprehensive review of strategies to promote child development, including a few parenting and parent-child interventions, although they are mostly implemented at low scale. They conclude that parenting programs combined with home visits and/or that involve direct opportunities for skill building and practices with the children are more effective than just providing information to parents in enhancing child development outcomes.

Large scale programs such as BFCI+ have not been adequately evaluated in spite of their promise, and this study aims to fill that knowledge gap. Another example of an experimental study of the impacts of a large scale parenting program is Bedregal et al (2016). They estimate the medium term impacts of a national parenting program of relatively short duration, taking place in Chile (Nadie Es Perfecto), which is a much wealthier country than the Gambia, and offers its population a much more generous set of social services. Therefore, the conditions under which this program is implemented are very different from the ones observed in our study (and the program is also different). Nevertheless, as in our study, Bedregal et al (2016) document that the program had strong impacts on parental investments in children, and there is suggestive evidence of impacts on the children's vocabulary.

This paper proceeds as follows. In the next section we describe the programs in question. Then we present our data, document the basic characteristics of the population in our study, and show that there is balance in the characteristics of the villages allocated to each of the three experimental arms of this study. This is followed by a presentation and discussion of our main findings, and by some concluding remarks.

2. BFCI and BFCI+

As stated in the introduction, the BFCI is a comprehensive health and nutrition program which has been running in The Gambia since 1995, implemented by the National Nutrition Agency (NaNA). This program provides parenting education to mothers, fathers, and other caregivers. The BFCI initiative has four components: Maternal Nutrition, Infant and Young Child Nutrition, Personal/Environmental, Sanitation and Growth monitoring. NaNA trains trainers who are mainly health workers, other extension workers. They in turn train community representatives (recruited in the communities served by the program) as Village Support Groups (VSG). A VSG consists of 5 women and 3 men, and their role is to sensitize parents and caregivers to the 10 steps to successful infant feeding. The activities of the VSGs during the implementation of the BFCI components are flexible, and there is no a specific number of households which is permanently assigned to any member of the VSG. As part of their responsibilities, the members of the VSG visit households in their homes in order to sensitize them to the different messages of BFCI. In addition, the VSGs, depending on their schedule, also hold monthly, quarterly or bi-annual group meetings within their communities.

The BFCI+ is an initiative of the Ministry of Basic and Secondary Education (MoBSE), in collaboration with other stakeholders, to ensure children's readiness for preschool by their third birthday. It includes all the components of the BFCI home visits, and adds to them a structured and more intensive cognitive stimulation component. The program provides early age cognitive stimulation for three hours per day, and three times a week, directly to the children under a shed built for that purpose in the community, while at the same time parents acquire hands on experience on stimulation activities. The children always attend these sessions with at least one of their parents or caregiver. Children three years of age or younger in the communities are eligible for the program. A facilitator, who is also member of the VSG, is responsible for managing the activities at the shed. One of the main challenges of these

programs was to staff all the communities with qualified and adequately trained facilitators. The initial plan was to rely solely on volunteers within the community, but the implementing agency later realized that this would lower considerably the pool of candidates, and also their average qualification. Because of that, the program workers (recruited in the communities) were no longer providing their services solely as volunteers, but they were offered a monthly stipend of about USD40. They were also required to have completed at least 10th grade.

There were many implementation challenges affecting the intensity with which the program was delivered. First, several exceptions had to be made to the schooling requirement of facilitators in order to staff the program in a timely manner. The facilitators for the most part were young adult in their late twenties or early thirties on average, married, and had other primary occupations in order to provide for their families. In addition, many of them were not paid their stipends for several months after the start of the program because of administrative delays. The first time all the facilitators were paid was in May or June, six month after the start of the program. The first cohort received retroactive payments from January 2013. After this they were paid monthly.

Each facilitator responsible for delivering the stimulation sessions in the sheds received a week of training on the use of the syllabus. Another week of training was delivered one quarter after the program was first implemented, in order to reinforce the capacity of the facilitators, and to learn from the experiences taking place during the first term of implementation. A third general meeting with the facilitators was held for one day at the end of the second quarter of implementation. During this meeting the facilitators talked about their progress and difficulties in the implementation of the syllabus. Several subsequent meetings and training were delivered either in groups or on an individual basis during monitoring missions led by the team from Early Child Development Unit of the MoBSE, and the implementation agency or service provider in each location. The service providers were required to supervise at least one session in the shed during the monitoring visits, to be able to identify the gaps or good practices, and discuss them with the facilitators.

In addition, the entire VSG members were trained on the "Training manual for the trainers of the Village Support Groups (VSGs) on maternal and infant nutrition", edited by the National Nutrition Agency (NaNA) in 2009. This training required 33 hours over 5 days. The main goal of this training was to ensure that the VSG workers could successfully implement the sensitization of the caregivers on the 10 steps to successful infant and young child feeding.

As described above, the VSGs were composed of 5 women and 3 men. The community health worker and the traditional birth attendant were encouraged to be part of VSG. VSG members should also be between 18 and 60 years of age. Both the Village Health Service (VHS) community health nurses and the Village Development Committee (VDC) monitored the VSGs and reported to the Nutrition Field Officer (NFO). The NFO and the Regional Health Team (RHT) jointly monitors the activities of the VSGs as well. The agency ultimately in charge of both programs was Nana. In addition, a small committee of five members managed the activities at the shed put in place for the BFCI+ program. Each committee included a president, a secretary, a treasurer, someone responsible for the materials, and a health monitor.

The target population for these two programs are children below three years of age in two regions of The Gambia (Regions 2 and 6). For practical reasons, we restricted our sample to children between the ages of 12 and 23 months. They were grouped in two cohorts, each defined by a 6 months interval (12-17 and 18-23).

The two regions covered as quite distinct along many socio economic characteristics. Aside from the capital city of Banjul, Region 2 is the most affluent in the country. Its residents are, educated, and there are several urban communities. Region 6 is at the opposite end of the spectrum.

150 communities were selected from these two regions to participate in the study. For the purposes of the evaluation each of the two programs (BFCI and BFCI+) was randomly assigned to a set of 50 communities or settlements, totalling 100 treatment communities. Another 50 communities were randomly chosen to serve as a control group. Both the sampling of the communities and the randomization procedure were stratified by region and district.

All children in the community within the required age group were eligible (there were not income or wealth requirements). At the village level, the selection of participant households was based on the list of the households provided by the village chief, commonly called Alkalo. The lists were also used to help the survey enumerators identifying all eligible households before randomly selecting 15 households (in each settlement) to become part of the study sample. Community members participated enthusiastically in the study, and there were no reports of refusal to participate in the program or the survey.

The total number of eligible children ranged from 10 in smaller villages, to over 100 in larger villages. Because of capacity limitations, in a small set of very large villages the program could not accommodate all children, and slots were allocated at random among the eligible children who signed up.

3. Data, population characteristics, and group comparison

We collected two rounds of surveys, one at the baseline and one 17 months later when the evaluation period elapsed. There are three components to the survey. First, there are child assessments. Given the nature of the intervention, these will put special emphasis on measuring behaviour and language development, these measures were captured through the Malawi Developmental Assessment Tool (MDAT), a tool developed to assess children in rural African settings.[2] It has two main components, fine motors and language development. In addition, we collected anthropometric information on the children. Second, there is a relatively detailed household survey, which included basic household demographics, labour supply, income, and expenditure/consumption. A particular attention was paid to measure investments in children, both in terms of parental time as well as material resources. The survey also included measures of home environment, such as family background variables including parental education, employment, income, marital status, family size and the like; quality of the home such as availability of water, electricity, etc. We also ask about number of books, number of toys, TV, radio, musical instruments, computer etc. Third, there was a module focused on parents or caregivers' knowledge about parenting practices and their importance for child development, about their attitudes towards child rearing, sources of support to parenting, and expectations for the future of their children.

Over two thirds of the household in our population of reference live in relatively precarious housing with wall mostly made of mud, 22% possess TV, 13 per cent have a sofa in the house, and only 15 per cent have access to electricity.

There are stark differences between the two regions. While Region 2 is closer to the capital, more urban and more well off, Region 6 is the poorest of all six regions of the country. For example, the access to electricity is 9.7% in Region 6 versus 17.1% in Region 2. These differences also imply similar difference on the overall socio economic status in these regions. Columns IV and V of Table 1 compare the two regions along a number of key variables. Children in the Region 2 scored 0.4 standard deviations higher on the language development component of the MDAT and the caregivers' knowledge and attitude and practices (KAP) score is 10 percentage points higher than for Region 2.

[2] Gladstone M, Lancaster GA, Umar E, Nyirenda M, Kayira E, van den Broek NR, et al. (2010) The Malawi Developmental Assessment Tool (MDAT): The Creation, Validation, and Reliability of a Tool to Assess Child Development in Rural African Settings. PLoS Med 7(5): e1000273. doi:10.1371/journal.pmed.1000273

The economic status of household is likely a key driver of the overall investment in the children. To assess this association, we first constructed an index of socio-economic status that the baseline that captures higher quality of housing and the ownership of a number of durables including the housing and then ran a simple regression of the socio–economic status at the baseline on the set of key outcome variables presented in this paper. We find that the presence of books in the household, he language development component of the MDAT, and the knowledge and attitude of the caregiver are all positively related with higher socio-economic status and the coefficients are significant at the 5% level. However, caregivers of higher socio-economic status spend less time playing with the children, and we found no statistically significant association between the socio-economic status and variables such as the health status of the child, the height, the weight, or the fine motor component of the MDAT.

The key identifying assumption of an experimental study like this is that the randomization eliminates potential biases between the households that received the program and those that did not. We compare the two treatment groups and the control group along the baseline counterparts of the outcome variables used in the analysis. The first three columns of Table 1 present the means and the standard deviations of nine such variables. The last column is the F-value of the joint test of comparison of the three means. The three groups were comparable at the baseline along those variables except for the fact that the children in the control group scored lower on the fine motor component of the MDAT.

In term of attrition and its effect on our estimates, of the baseline covered 1615 households covered at the baseline, 1,228 were successfully tracked at the endline. The main reason for the failure to track the remaining 387 households is due to coding errors in the baseline data and the failure to track down the entire baseline questionnaires. To assess the extent to which the attrition may bias the results, we constructed an attrition variable that takes value one if the household were not tracked at the endline and zero otherwise, and then ran a simple marginal probit model where the dependent variable is the attrition variable and the main independent variables of interest are the treatment dummies. None of the variables included has a statistically significant association with the attrition variable (the R-squared of 0.002). This suggests that the attrition follows mostly a random pattern relative to the assignment variable. Note that in terms of absolute numbers, the households that were not tracked at the endline were more represented in the Control group (152 or 27%) than both in the BFCI group (120 or 23%) and the BFCI+ (115 or 21%). However, this difference may be due to the fact that we made a deliberate choice to identify the treatment households in priority. The households that were not successfully tracked at the endline were replaced with other randomly selected participants within the same community.

4. Empirical Results

a. Method

Since the program was randomly assigned across settlements, in order to estimate the average impacts of BFCI and BFCI+ on parental and child outcomes one simply needs to compare the average values of these variables in settlements in different treatment arms. However, it is useful to control for a very basic set of variables in our empirical models. All the variables used for this analysis are described in Table 6 in the appendix.

As described above, the randomization was stratified at the district level, so that each district ends up with a similar number of settlements in each treatment arm. Therefore, our models will include district level dummy variables. In addition, both the age and the gender of each child are likely to be important predictors of child outcomes and parental behaviours. Therefore, it is likely that controlling for these variables contributes to more precise estimates, so all our models will include controls for age (one dummy variable for each month) and gender of the child. Including or excluding these controls has little or no impact on our point estimates.

Therefore, we estimate the following models:

$$Y_{is} = \alpha + \beta BFCI_s + \gamma BFCI_s^+ + X_{is}\delta + \varepsilon_{is} \quad (1)$$

where Y_{is} is the outcome of interest for child/parent i in settlement s, $BFCI_s$ is an indicator variable taking value 1 if settlement s was randomly assigned BFCI, $BFCI_s^+$ is an indicator variable taking value 1 if settlement s was randomly assigned BFCI+, X_{is} is a vector of controls including indicators for gender and age of the child, as well as district dummies, and ε_{is} is an error term. We estimate this equation by ordinary least squares, and cluster the standard errors at the settlement level.

We consider several child and parent outcomes, as described in the previous section. These include z-scores for the child's performance in the MDAT (language and fine motor skills), z-scores for height and weight, an index of child health, indices of parental investments in time and goods, and indices of parental knowledge and behaviours towards their children.

The parameters of interest are β and γ, which measure intent to treat (ITT) effects of living in a settlement to which either BFCI or BFCI+ was assigned (respectively). Unfortunately we do not observe whether household i ever participated in the activities of the program, although (as mentioned above) our impression from the field is that participation rates among the eligible children and families was very high in most villages. Therefore, throughout the rest of the paper we will refer to ITT as the impact of BFCI and BFCI+ on the outcomes of children and parents.

We also consider models where we allow the ITT parameters to vary by region. Since our study only takes place in regions 2 and 6, let R_s^2 be an indicator variable taking value 1 if settlement s is in region 2, and let R_s^6 be an indicator variable taking value 1 if the settlement is in region 6 ($R_s^2 = 1 - R_s^6$). We then estimate the following models by ordinary least squares, clustering the standard errors at the settlement level:

$$Y_{is} = \alpha + \beta_2 BFCI_s * R_s^2 + \gamma_2 BFCI_s^+ * R_s^2 + \beta_6 BFCI_s * R_s^6 + \gamma_6 BFCI_s^+ * R_s^6 + X_{is}\delta + \varepsilon_{is} \quad (2)$$

The district dummies absorb the level effects of the region. In this case the parameters of interest are β_2, γ_2, β_6 and γ_6, which measure the ITT impacts of BFCI and BFCI+ in regions 2 and 6, respectively.

b. Average Treatment Effects

We start by documenting the impacts of BFCI and BFCI+ on parental investments in children. Table 2 shows estimates of β and γ in equation (1), when the dependent variable is a measure of either goods or time investments, namely: the total number of books in the home (including school books but excluding picture books for children), the number of children's books in the home, the number of magazines and newspapers in the home, an index of toys and play materials, time (hours and minutes) spent on activities where the child was present (over the course of a day), and time (hours and minutes) spent playing with the child during the day.

Column (1) shows that there is no statistically significant impact of either BFCI or BFCI+ on the number of books in the home. However, columns (2) and (3) show that BFCI+ leads to statistically significant increases of 0.33 children's books, and of 0.13 magazines per home. Column (4) shows that BFCI leads to an average decrease in the index of toys at home by 0.03 points, which is somewhat puzzling. If this occurred in response to BFCI+ we could perhaps say that parents are substituting their own toys and other materials by those provided by the program during the community sessions taking place in the local sheds, but we do not believe this is a likely explanation for what we observe, given that no such sessions were offered in the basic BFCI program. It is also possible that as a result of the BFCI program parents shifted resources away from these activities and towards the ones emphasized by the BFCI messages on growth and nutrition.

Columns (5) and (6) concern time spent with the child. We see that BFCI does not lead to statistically significant impacts on time spent with the child, either on a general set of activities (column (5)), or just

in play activities (column (6)). In contrast, BFCI+ leads to an increase of about 42 minutes (or 0.70 hours) in the time spent with the child each day, and of about 28 minutes (0.48 hours) in the time spent playing with the child.

Finally, column (7) shows that there were no substantial impacts of either program on parental knowledge and practices regarding health, hygiene, nutrition, and the socio-emotional development of children, as measured by the set of KAP index discussed above. The KAP index concerns mainly health and nutrition, which are discussed in both the BFCI and the BFCI+ programs. The estimated coefficients are very small, and even slightly negative.

The broad message of this table is that BFCI+ led to moderate increases in parental investments in children, both in time and in goods. However, this was not the case with BFCI, which is perhaps expected, since BFCI was not only less intensive than BFCI+, but it was focused only on child health, and not on child stimulation.

What this means is that it is possible to change parental practices through large scale parenting programs, delivered by community residents to their neighbouring families, even in settings as poor as the ones we encountered in this study (see also, for example, Engle et al, 2007, 2011, Attanasio et al, 2015, or Bedregal et al, 2016). However, notice that this is only true in the intensive version of the program, which offered not only home visits, but also group sessions to parents and children taking place three times per week. This requires significant time investments on the part of the community workers, and on the part of the parents.

It is also important to note that, in spite of all this effort, the impacts of BFCI+ on measured parental investments in children are not very large. This may have happened because the programs were not very successful in convincing parents of the importance of investing in their children. In fact, the results just shown document that there are no changes in the KAP index. But it is also possible that the moderate response in parental investments is instead a consequence of parents having severe constraints in the use of their time and financial resources. In this scenario, even if parents update their beliefs about the importance of investments in children, they are not able to translate this change in beliefs into substantial investment responses.[3]

It is not possible to rule out that unobserved investments are being substantially affected. However, it is unlikely this is the case given our very weak estimates of the impacts of the program on the development of children. We review these next.

Table 3 documents the estimated impacts of BFCI and BFCI+ on the health, motor, and language development of children, as well as on an index of child health (described above). We do not find any statistically significant average impact of BFCI or BFCI+ across any of these dimensions of child development.

It is possible that there are small impacts of the program which our study is not powered to detect. This would be certainly consistent with our findings of moderate effects in parental behaviours. Unless these parental behaviours are very effective at promoting child development, we would not expect the resulting effects on child outcomes to be large.

Moreover, our results also say that there are not likely to exist large direct impacts of the child stimulation sessions taking place under BFCI+ several times a week, unless there is a powerful unobserved parental input which is moving exactly in the opposite direction, if parents try to substitute away from their own inputs in response to the inputs provided by BFCI+ (e.g., Becker and Tomes,

[3] We did some exploratory work examining whether there were differential impacts of the programs on households with different levels of resources (measured at baseline), as proxied by the education of the head, or by indices of household expenditure. These could proxy for the severity of resource constraints in the household. However, no strong patterns emerged from this analysis.

1976), namely in the child stimulation sessions taking place in the community sheds. However, we find this to be unlikely, in light of the evidence in the previous table, which points to an increase, not a decrease, in parental inputs. Furthermore, at least in what concerns early childhood programs, the existing literature does not generally find strong substitution behaviours by parents (e.g., Attanasio et al, 2013, Attanasio et al, 2015, Gelber and Isem, 2013, Carneiro and Ginja, 2014).

It is important to point out however that we can rule out are large impacts of either versions of the BFCI on child outcomes, given that our estimates are relatively precise. Even if we take the more intensive BFCI+, we can rule out (at the 5% level of significance) impacts larger than 0.22 standard deviations (sd) in fine motor skills, 0.27 sd in language, 0.13 sd in height, 0.07 sd in weight, and 0.02 points in the child health index (about 0.13 sd). In other words, even the very high end of the confidence intervals for our point estimates correspond to moderate to small effect sizes.

c. Regional Heterogeneity

The average impacts of BFCI and BFCI+ discussed above mask substantial regional heterogeneity, which is important to uncover. As described above, these programs were implemented in Region 2 and Region 6 of The Gambia. Young children in Region 2 have substantially better levels of development than those in Region 6, as assessed by the instruments applied in our surveys (namely, differences of 0.1 to 0.2 sd in the MDAT tests and in the anthropometric measurements). These differences are likely to be related to dramatic regional disparities the types of families these children grow in, as mentioned previously in the paper. For example, looking at education alone, 84% of the caregivers in region 6 report never have attended school, and 77% cannot read nor write in any language. In contrast, for region 2 these figures are 54% and 59% respectively, which are undoubtedly very large numbers, but much smaller than the ones in region 6.

Therefore, it is reasonable to expect both the BFCI and BFCI+ to have different impacts in these two regions. This could happen for several reasons. The programs could have a larger impact on the most disadvantaged children given that they are so far behind to start with at such young age. In addition, parents in region 6 are less educated, and probably less well informed about the adequate health and stimulation practices than those in region 2. Therefore they may benefit especially from receiving basic information on these topics.

It is however also possible that the larger benefits of the program occur in region 2 instead. Since the levels of education and literacy are so low in region 6, parents in that region may not be able to absorb the information provided by the BFCI programs as well as parents in region 2. In addition, it is easier to find qualified community workers for these programs in region 2 than in region 6 since the population is so much more educated. Therefore, we may expect the quality of program delivery to be better in region 2 than in region 6.

Table 4 shows the impacts of BFCI and BFCI+ on parental investments in children in each region. The first three columns (especially the first two) suggest that the impact of BFCI+ on the number of books in the home occurs in region 2 but not in region 6 (for which the coefficient is slightly negative). We can reject that the coefficients are the same across regions. In addition, column 4 suggests that BFCI+ led to an increase in the number of toys and other play materials at home in region 2 but not in region 6, while BFCI led to a decrease in the amount of these materials in region 6 but not in region 2.

This should be seen together with the evidence of regional program impacts on time with the child. When we look at time with the child in any activity, we see that the impacts are roughly uniform across regions. However, when it comes to play time, column 6 shows that the impacts are larger in region 6,

although the differences across regions are not statistically different from zero. In terms of the KAP index, there are no statistically important impacts in any region.[4]

Perhaps the lower levels of scarcity of resources in region 2 allowed parents to respond more visibly to the interventions by investing additional resources in books and other play materials, while in region 6 there may even have been some substitution of parent by program resources. In terms of time, there were no statistically differences across regions, although for play time the point estimates for the responses are larger for region 6. Goods may be relatively more expensive in region 6 than in region 2, while time may be relatively more expensive in region 2 than in region 6, which could help explain these patterns (although we should reiterate that the regional differences in time investments are not statistically strong).

Table 5 presents program impacts on child outcomes for each region. Starting with the MDAT fine motor scores in column (1), we continue to see point estimates which are uniformly small across regions, although the standard errors of these estimates are a bit larger than when we aggregate the two regions together. Interestingly, column (2) shows that larger point estimates for the impact of BFCI+ on MDAT-language in region 2 than in region 6, although that difference is not statistically significant. Although the standard errors for the impact estimates for language scores in region 2 are not that much different than what we had above, when we considered both regions together, they are much larger for region 6.

These estimates seem to suggest that BFCI+ had a moderate impact on language scores in region 2 (0.16 sd, statistically different from 0 at the 10% level of significance). Region 2 is also the region where BFCI+ had the largest impacts on goods investments in children, and this may have been one of the channels through which such impacts occurred. It is also simply possible that the community program workers were more effective at developing the children's language during the stimulation sessions taking places in the community sheds, three times each week. In terms of anthropometrics or child health, we do not find statistically significant impacts in either region.

In summary, and following from the hypotheses laid out at the beginning of this section, one way to interpret our regional impact estimates is the following. In contexts of severe poverty, such as the ones experienced by the children and families in our study, there are likely to be strong constraints to parental investments in children. Faced with new information about desirable parenting practices and the importance of investments in children, provided by the BFCI or the BFCI+, all parents may want to respond accordingly, but may only be able to do it when they have resources available. In addition, more educated parents may be able to understand more effectively the messages of BFCI and BFCI+, and live in regions where the pool of program workers is of better quality.

This means that there are likely to be strong complementarities between BFCI type programs, and the education and financial resources available in the target communities. Conversely, programs of this type may not be effective in extremely poor communities if they are not accompanied by some relief of their resource constraints, perhaps through the provision of cash or in-kind transfers. We cannot however rule out that, even if such complementary transfers are delivered jointly with the parenting programs, low levels of education of both parents and program workers may render the whole program ineffective.

5. Conclusion

This paper studies the impact of a set of parenting and child stimulation intervention in two regions of the Gambia. The most intensive of these two interventions, BFCI+, requires substantial time and material resources from the communities and from parents. In spite of that, average program impacts

[4] This could indicated either that the program did not succeed in transmitting new information to parents, or that the KAP index is a poor measure of that information

on parental investments are fairly moderate in magnitude, and average impacts on child development are statistically indistinguishable from zero.

Upon closer inspection, we distinguish two different stories across two regions, which substantially different availability of human resources, and substantially different levels of development of their children. We find that these programs, especially the BFCI+, is more effective in the richer region, where it has a positive impact on the language development of very small children. We discuss potential explanations for this finding, and what it implies for policy.

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Table 1: Intervention groups and regional comparison at the Baseline

VARIABLES	CONTROL	BFCI	BFCI+	Region 2	Region 6	All	F-value
# of Books	2.34	2.15	2.43	2.65	1.95	2.31	0.89
	(2.79)	(2.87)	(2.84)	(2.93)	(2.68)	(2.83)	
# of Children's Books	0.39	0.20	0.33	0.43	0.18	0.31	0.44
	(1.23)	(0.95)	(1.10)	(1.32)	(0.81)	(1.11)	
Time Playing with Child	1.75	1.59	1.75	1.67	1.73	1.70	0.78
	(1.05)	(1.05)	(1.09)	(1.05)	(1.08)	(1.07)	
MDAT Language	-0.10	-0.01	0.11	0.19	-0.20	0.00	0.10
	(1.01)	(1.03)	(0.95)	(0.94)	(1.02)	(1.00)	
MDAT Fine Motor	-0.19	0.09	0.09	0.09	-0.09	0.00	0.01
	(1.02)	(0.96)	(1.00)	(0.98)	(1.01)	(1.00)	
Height - cm	76.30	76.76	77.15	77.18	76.28	76.75	0.25
	(9.68)	(7.22)	(6.66)	(8.13)	(7.66)	(7.92)	
Weight - kg	9.49	9.73	10.01	10.13	9.35	9.75	0.17
	(2.55)	(4.57)	(6.83)	(6.11)	(3.46)	(5.01)	
Child Health	0.47	0.48	0.46	0.46	0.48	0.47	0.61
	(0.15)	(0.15)	(0.13)	(0.15)	(0.14)	(0.14)	
Knowledge and Practices	0.52	0.53	0.52	0.57	0.47	0.52	0.81
	(0.15)	(0.15)	(0.15)	(0.15)	(0.13)	(0.15)	
Observations	563	512	540	829	786	1615	

This table reports the mean values of the baseline counterpart key outcome variables across treatments groups, and regions. Standard deviations in parentheses. ** $p<0.01$, * $p<0.05$, + $p<0.1$

Table 2 - Average Impacts of BFCI and BFCI+ on Potential Investments in Children

VARIABLES	(1) # of Books	(2) # Children's Books	(3) # Magazines and Newspapers	(4) Toys and Play Materials	(5) Total time with child	(6) Time playing with child	(7) Knowledge and Practices
BFCI	0.18	0.18	0.08	-0.03+	0.15	-0.01	-0.01
	(0.25)	(0.16)	(0.07)	(0.02)	(0.30)	(0.24)	(0.01)
BFCI+	0.34	0.35*	0.13+	0.02	0.74*	0.54*	-0.01
	(0.26)	(0.17)	(0.07)	(0.02)	(0.32)	(0.27)	(0.01)
N	1,599	1,599	1,600	1,599	1,601	1,601	1,601
R^2	0.16	0.12	0.06	0.18	0.20	0.11	0.16
μ_Y	2.018	0.717	0.240	0.282	4.727	3.136	0.783
σ_Y	2.727	1.679	0.984	0.206	3.640	2.921	0.117

This table reports coefficients of regressions of different measures of parental investments in children on indicators for whether BFCI or BFCI+ was offered in each settlement, and a set of control variables which include the age and gender of the child, and district level dummy variables. N denotes number of observations in the regression and R^2 is the R-squared. μ_Y and σ_Y are the mean and standard deviation of each dependent variable, respectively. Standard errors are clustered at the level of the settlement. ** p<0.01, * p<0.05, + p<0.1

Table 3 - Average Impacts of BFCI and BFCI+ on Child Development

VARIABLES	(1) MDAT – Fine Motor	(2) MDAT - Language	(3) Z-Score Height	(4) Z-Score Weight	(5) Child Health
BFCI	-0.02	-0.09	-0.09	-0.06	-0.01
	(0.09)	(0.11)	(0.09)	(0.06)	(0.01)
BFCI+	0.02	0.05	-0.05	-0.05	-0.00
	(0.10)	(0.11)	(0.09)	(0.06)	(0.01)
N	1,014	1,009	1,018	1,022	1,601
R^2	0.19	0.23	0.06	0.07	0.06
μ_Y	0.00487	0.000260	-1.403	-0.901	0.769
σ_Y	1.021	0.946	1.101	0.773	0.153

This table reports coefficients of regressions of different measures of child development on indicators for whether BFCI or BFCI+ was offered in each settlement, and a set of control variables which include the age and gender of the child, and district level dummy variables. N denotes number of observations in the regression and R^2 is the R-squared. μ_Y and σ_Y are the mean and standard deviation of each dependent variable, respectively. Standard errors are clustered at the level of the settlement. ** p<0.01, * p<0.05, + p<0.1

Table 4 - Average Impacts of BFCI and BFCI+ on Parental Investments in Children in each Region

VARIABLES		(1) # of Books	(2) # Children's Books	(3) # Magazines and Newspapers	(4) Toys and Play Materials	(5) Total time with child	(6) Time playing with child	(7) Knowledge and Practices
REGION 2	BFCI	0.61+	0.39	0.15	-0.01	-0.34	-0.37	-0.01
		(0.35)	(0.24)	(0.13)	(0.02)	(0.36)	(0.32)	(0.01)
	BFCI+	0.82*	0.62**	0.17	0.04+	0.75	0.37	0.00
		(0.37)	(0.23)	(0.12)	(0.02)	(0.48)	(0.38)	(0.01)
REGION 6	BFCI	-0.24	-0.03	0.01	-0.05+	0.61	0.33	-0.01
		(0.34)	(0.19)	(0.07)	(0.03)	(0.46)	(0.35)	(0.02)
	BFCI+	-0.15	0.08	0.09	0.01	0.71+	0.70+	-0.02
		(0.35)	(0.23)	(0.09)	(0.04)	(0.41)	(0.37)	(0.02)
N		1,599	1,599	1,600	1,599	1,601	1,601	1,601
R^2		0.16	0.12	0.06	0.18	0.21	0.11	0.16
REGION 2	μ_Y	2.59	0.93	0.32	0.26	4.69	3.20	0.79
	σ_Y	2.95	1.99	1.26	0.17	3.85	3.09	0.10
REGION 6	μ_Y	1.46	0.51	0.16	0.28	4.76	3.06	0.78
	σ_Y	2.37	1.28	0.59	0.21	3.42	2.75	0.13

This table reports coefficients of regressions of different measures of parental investments in children on indicators for whether BFCI or BFCI+ was offered in each settlement interacted with indicators for whether the settlement was in region 2 or region 6, and a set of control variables which include the age and gender of the child, and district level dummy variables. N denotes number of observations in the regression and R^2 is the R-squared. μ_Y and σ_Y are the mean and standard deviation of each dependent variable, respectively. Standard errors are clustered at the level of the settlement. ** p<0.01, * p<0.05, + p<0

Table 5 - Average Impacts of BFCI and BFCI+ on Child Development in each Region

VARIABLES		(1) MDAT – Fine Motor	(2) MDAT - Language	(3) Z-Score Height	(4) Z-Score Weight	(5) Child Health
REGION 2	BFCI	-0.07	0.03	-0.13	-0.07	-0.03
		(0.10)	(0.09)	(0.11)	(0.07)	(0.02)
	BFCI+	0.06	0.18+	-0.06	-0.08	-0.02
		(0.13)	(0.10)	(0.09)	(0.07)	(0.02)
REGION 6	BFCI	0.01	-0.20	-0.05	-0.04	0.02
		(0.16)	(0.19)	(0.14)	(0.09)	(0.01)
	BFCI+	-0.04	-0.09	-0.03	-0.01	0.01
		(0.17)	(0.19)	(0.17)	(0.10)	(0.02)
N		1,014	1,009	1,018	1,022	1,601
R^2		0.19	0.23	0.06	0.07	0.06
REGION 2	μ_Y	0.11	0.17	-1.32	-0.86	0.76
	σ_Y	0.99	0.82	1.07	0.76	0.15
REGION 6	μ_Y	-0.10	-0.18	-1.49	-0.94	0.78
	σ_Y	1.05	1.04	1.13	0.77	0.16

This table reports coefficients of regressions of different measures of child development on indicators for whether BFCI or BFCI+ was offered in each settlement interacted with indicators for whether the settlement was in region 2 or region 6, and a set of control variables which include the age and gender of the child, and district level dummy variables. N denotes number of observations in the regression and R^2 is the R-squared. μ_Y and σ_Y are the mean and standard deviation of each dependent variable, respectively. Standard errors are clustered at the level of the settlement. ** p<0.01, * p<0.05, + p<0.1

Table 6 - Description of the Variables used in the Analysis

#	Variable name as presented in the tables	Definition
1	# of Books	This continuous variable that indicates the number of books available in the household. It is meant to capture reading opportunity within the household. The original questions offered four option that we recoded in the following way: None= 0, 1-2 = 2, 3-5 = 4, and 6 or more = 7.
2	# Children's Books	This variable is the same as the row 1 except that it focuses on books that are only for children below the age of 7.
3	# Magazines and Newspapers	This variable is the same as in rows 1 and 2 except that it account only for magazines and newspaper.
4	Toys and Play Materials	This variable is coded by taking the mean of the following ten dummy variables where the caregiver where asked whether the child plays with each of the following items: i. Homemade toys (1 if yes, 0 otherwise) ii. Household everyday objects iii. Objects and materials from outside the household iv. Toys that make music v. Blocks or toys that can stack vi. Toys for drawing and writing vii. Toys that can be rolled or pushed along viii. Dolls or pretend cups ix. Children books x. Toys for shapes and colours
5	Total time with child	This variable were constructed by adding the time in hours that the caregiver spent the day prior to the survey together with the child on the following seven items: i. Playing with the child alone ii. Playing with the child together with other children iii. Telling a story to the child alone iv. Telling a story to the child with other children v. Caring for the child vi. Playing with the child outside of the house vii. Spent with child a the clinic

6	Time playing with child	This variable is the same as in row 5 except that items 5 and 7 are dropped so that it reflect only the time volunteered to play and interact with the child.
7	Knowledge and Practices	This variables measure the caregivers' knowledge, attitude, and practices at the baseline as a mean value of the following dummy variables. Each dummy variable take 1 for the desirable outcome and 0 otherwise: (i) respond to child's misbehaviour non-violently (ii) responsive to the child's cries (iii) spends time with the child just for fun (iv) knows the definition of exclusive breastfeeding (v) knows the timing of first solid food given to the child (vi) washing of raw food (vii) separation of cooked and uncooked food (viii) know how to care for diarrhoea (ix) handling waste water (x) making drinkable water out of unclean water (xi) hand washing practices.
8	MDAT – Fine Motor	This variable is the standardized test score on the fine motor component of the MDAT test (described in the text). Each correctly answered question received 1 point and the total score is standardized.
9	MDAT - Language	This variable is the standardized test score on the language development component of the MDAT test (described in the text). Each correctly answered question received 1 point and the total score is standardized.
10	Z-Score Height	This variable is the height of the child using the World Health Organization child development chart on height for age.
11	Z-Score Weight	This variable is the weight of the child using the World Health Organization child development chart on the weight for age.
12	Child Health	This variable is an index indicating the overall health status of the child at the time of the survey. It takes the mean of the following dummy variables that were coded such that 1 always represent the desirable outcome: i. Was the child confine to bed the past 7 days (1 if no, 0 otherwise) ii. The child had headache the past 7 days iii. The child had cough the past 7 days iv. The child's vitamin A intake is up to date v. The child had malaria at some point the past 3 months vi. The child currently sleeps under a bed net
13	BFCI	This variable is the treatment dummy for the BFCI
14	BFCI+	This variable is the treatment dummy for the BFCI+
15	Child's gender	This is the child's gender.
16	Child's age	This is the age of the child.

17	District	This variable is the district within which a given observation is located
18	Region	This variable is the region within which a given observation is located
BASELINE VARIABLES		
1	Books in House - Baseline	Number of books in the house at the baseline
2	Magazines in House - Baseline	Number of magazines or newspapers in the house at the baseline.
3	Time Playing with Child	
4	MDAT Language	This variable is the standardized test score on the fine motor component of the MDAT test (described in the text) at the baseline. Each correctly answered question received 1 point and the total score is standardized.
5	MDAT Fine Motor	This variable is the standardized test score on the language development component of the MDAT test (described in the text) at the baseline. Each correctly answered question received 1 point and the total score is standardized.
6	Height - cm	The measure of height of the child at the baseline in centimeters
7	Weight - kg	The measure of weight of the child at the baseline in kilograms
8	Child Health	This variable is an index indicating the overall health status of the child at the baseline. It takes the mean of the following dummy variables that were coded such that 1 always represent the desirable outcome: (i) The child was <u>not</u> sick the past 3 days (ii) did not have headache (iii) did not vomit (iv) has an up to date vaccine card (v) was not born prematurely (vi) did not have fever more than once the past three months
9	Knowledge and Practices	This variables measure the caregivers' knowledge, attitude, and practices at the baseline as a mean value of the following dummy variables. Each dummy variable take 1 for the desirable outcome and 0 otherwise: (i) respond to child's misbehaviour non-violently (ii) responsive to the child's cries (iii) spends time with the child just for fun (iv) knows the definition of exclusive breastfeeding (v) knows the timing of first solid food given to the child (vi) washing of raw food (vii) separation of cooked and uncooked food (viii) know how to care for diarrhoea.