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Behavioral Change Promotion, Cash Transfers and Early Childhood Development

Experimental Evidence from a Government Program in a Low-Income Setting

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Abstract

Signs of development delays and malnutrition are widespread among young children in low-income settings. Social protection programs such as cash transfers are increasingly combined with behavioral change promotion or parenting interventions to improve early childhood development. This paper disentangles the effects of behavioral change promotion from cash transfers to poor households through an experiment embedded in a government program in Niger. The study is also designed to identify within-community spillovers from the behavioral change intervention. The findings show that behavioral change promotion affects a range of practices related to nutrition, health, stimulation, and child protection. Local spillovers on parenting practices are also found. Moderate gains in children's socio-emotional development are observed, but there are no improvements in anthropometrics or cognitive development. Cash transfers alone do not alter parenting practices or improve early childhood development. Cash transfers improve welfare and food security at the household level, and the behavioral intervention induces intra-household reallocations toward children.

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Behavioral Change Promotion, Cash Transfers and Early Childhood Development

Experimental Evidence from a Government Program in a Low-Income Setting[1]

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JEL Codes: I15, I38, J13, O15.

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1. Introduction

A large number of children in developing countries suffer from malnutrition or signs of development delays. Multiple risk factors contribute to poor early childhood development outcomes (Lancet, 2007, Lancet, 2011). Socio-economic gradients in child development have been consistently documented (Paxson and Schady, 2007; Naudeau et al., 2010; Fernald et al., 2011; Schady et al., 2015). Poorer households in low-income countries are typically exposed to a broader range of risk factors. The expansion of social protection systems around the world creates new opportunities to reach the poorest families and children at risk of malnutrition and development delays. Potential complementarities have been highlighted between social protection interventions and approaches to promote early childhood nutrition and development (Engle et al., 2011; Alderman, 2011). Policy interest is particularly high given the large potential returns to investments in early childhood (Currie and Thomas 1999; Heckman and Masterov, 2007) and increased attention to the long-term consequences of under-investments in children's human capital (Gatti et al., 2018).

Safety net programs such as cash transfers have rapidly expanded in developing countries over the last decades. Their objective is to reduce current poverty and decrease the inter-generational transmission of poverty. The welfare impacts of cash transfers have been widely documented (Fiszbein and Schady, 2009), including in Africa (Ralston et al., 2017). In low-income settings, cash transfers are often unconditional, but programs increasingly include accompanying measures to encourage investments in children's human capital. This is particularly common in Africa, where over a dozen countries are testing a model combining cash transfers with accompanying measures to promote early childhood development (Beegle et al., 2018). These programs are attempting to go beyond focusing on malnutrition to also consider early childhood development more broadly. This implies greater attention to children's cognitive and socio-emotional development. The accompanying measures are based on parenting training curricula or on social and behavioral change communication approaches. In some programs, participation in the accompanying measures is a formal condition to receive the transfers, while in other programs it constitutes a soft condition without loss of benefits for households that may not participate.

In 2011, the Government of Niger started to set up a national safety net system. It included a cash transfer program that has expanded over time and has reached 100,000 households by 2019. The cash transfer program provides small, monthly transfers of 10,000 FCFA (about USD 20)[1] to women in poor households

[1] The exchange rate was 1 USD = 497 CFA francs (FCFA) on January 1, 2013, and 1 USD = 541 CFA francs (FCFA) on January 1, 2015.

for a period of 24 months. One of the innovations of the program is that it combined cash transfers with behavioral change accompanying measures to promote early childhood development. Specifically, the behavioral change component included parenting training activities to encourage health, nutrition, psycho-social stimulation, and child protection practices. The behavioral change component was implemented through monthly village assemblies, community meetings and household visits delivered by trained NGO operators and community workers. Participation was encouraged and monitored but it was not a formal condition to receive the cash transfers. We collaborated with the Niger safety net unit in the Office of the Prime Minister to embed an experiment in the roll-out of the program.

In this paper, we present results from an RCT that disentangles the effects of behavioral change promotion from cash transfers to very poor households. The objective is to document whether the interventions led to changes in parenting practices and resulted in improvements in early childhood development. Villages eligible for the cash transfer program were randomly assigned to (i) a control group, (ii) cash transfers only, or (iii) cash transfers with behavioral change promotion (BCC). Within treated villages, we survey cash transfer beneficiary and non-beneficiary households to identify spillovers from the behavioral change intervention.

The study makes three main contributions. First, we estimate the average treatment effect of the BCC intervention on parenting practices and young children's human capital among cash transfer beneficiary households. Second, we measure local spillovers from the BCC intervention on non-beneficiary households in treated villages. Third, we tease out the relative effects of the behavioral change and cash transfer interventions.

The results show that behavioral change promotion affected a range of practices related to nutrition, health, stimulation and child protection. Local spillovers on parenting practices are found among households not receiving cash transfers within treated communities. Moderate gains in children's socio-emotional development are observed, but there are no improvements in anthropometrics or cognitive development. Cash transfers alone do not alter parenting practices and do not improve early childhood development outcomes. We also find that the cash transfer and behavioral interventions have differential intra-household effects. The behavioral intervention improves dietary diversity among children, but no such improvements are found among adults in the household. The opposite is found for cash transfers, which induce improvements in dietary diversity for adults in the household but not children. The cash transfers also increase household consumption of non-food items, which the BCC intervention offsets.

The paper complements the literature on early childhood interventions in developing countries (Currie, 2001; Schady, 2006). Various studies have analyzed nutrition-specific interventions (Walker et al. 2007, Lancet, 2008; Maluccio et al., 2009; Galasso and Wagstaff, 2019), but meta-reviews suggest mixed results overall (IEG, 2015). A range of papers have also assessed behavioral change or information interventions in the health sector (Alderman, 2007; Fitzsimons et al., 2016; Linnemayr and Alderman, 2011), including social and behavioral change interventions (SBCC) promoting breastfeeding or complementary feeding practices (for reviews, see Bhutta et al. 2008; Dewey and Adu-Afarwuah, 2008; Imdad et al. 2011; Shi and Zhang 2011).[2] Yet research has suggested that interventions focusing on nutrition or health alone might not be most effective and that a more holistic approach to early childhood development might be beneficial. For example, interventions including psycho-social stimulation in addition to nutrition might be more effective than interventions focusing on nutrition alone (Grantham-McGregor et al., 1991; Gertler et al., 2014). Several interventions to foster psycho-social stimulation have been shown to improve children's cognitive and socio-emotional development in developing countries. These include community-based centers or preschools, although quality can at times be an issue.[3] There is also growing interest in parenting training interventions that can be delivered through a mix of community meetings and home visits. By promoting behavioral change without requiring large-scale infrastructure investments, these approaches are flexible and amenable to scale-up in low-income contexts. Parenting interventions have been shown to improve parenting practices (Jeong et al., 2018). Short-term results from parenting interventions on child development have been encouraging (Attanasio et al., 2018; Attanasio et al, 2020; Macours et al., 2015), though there are still questions if these impacts can be sustained over time (Andrew et al., 2018). Existing evidence is mostly based on relatively small-scale proof-of-concept pilots. One recent exception is the evaluation of a large-scale parenting program in Chile, a high-income country (Carneiro et al., 2019). Knowledge on the effectiveness of parenting interventions in low-income settings remains thin, especially for low-cost approaches implemented at scale such as the one we study in this paper.

Our paper also relates to the literature on spillovers of social programs. Spillovers of cash transfer programs have been studied through indirect impacts on non-beneficiaries, changes in food prices or local economy effects (Angelucci and de Giorgi, 2009; Bandiera et al. 2017; Cunha et al., 2018; Filmer et al.,

[2] Other examples in the health sector include HIV behavior change programs, which have led to changes in practices, with less success in reducing risky sexual behaviors (for a meta-review, see Krishnaratne et al. (2016)).

[3] Several studies document positive impacts on early childhood development outcomes, see for instance: Attanasio and Vera-Hernández 2004; Behrman et al. 2004; Berlinski et al. 2008; 2009; Martinez et al., 2017; Bernal and Ramirez, 2019. Quality of services can be an issue, however, and several recent studies have found more limited results (Özler et al., 2016; Blimpo et al., 2019; Bouguen et al., 2018; Berkes et al., 2019; Bernal et al., 2019).

2018). Spillovers are particularly relevant for programs that seek to change practices and social norms, such as information, behavioral change or parenting interventions. However, they have been less studied in the context of early childhood interventions, and this is one of the contributions of our paper.

The study also adds to the literature on cash transfers and human capital. The evidence has generally found cash transfer programs to be effective in improving welfare and increasing access to health and education services (Fiszbein and Schady, 2009; Garcia and Moore, 2011). Results on anthropometrics and child development are more limited (de Groot et al., 2017). There are open questions on pathways and design features for cash transfers to affect early childhood development, including on potential synergies between parenting education interventions and cash transfers. The transfer amounts (Fernald et al., 2008) as well as the duration or timing of exposure to cash transfers can matter (Sánchez et al., 2020). Macours et al. (2012) show that a CCT program has sustained impacts on children's cognitive development in Nicaragua. They attribute the results to changes in parenting practices driven from a social marketing campaign that accompanied the CCT.[4] Conditionalities may affect human capital investments (Akresh et al., 2013; Baird et al., 2011; Baird et al., 2014), including in early childhood (Lopez Boo and Creamer, 2019). In many low-income settings, conditionalities are difficult to implement, especially in contexts with weak health or education systems. A growing number of African countries are implementing a model where unconditional cash transfer programs are combined with complementary interventions encouraging investments in children's human capital that are presented as "soft conditionalities". In this paper, we tease out the relative effect of cash transfers and the value added of the behavioral change intervention on early childhood development. As such, we complement a recent literature on cash transfers, information interventions and children's human capital. For instance, Levere et al. (2016) isolate the value-added of adding cash transfers to an information intervention delivered by health centers. We isolate the value-added of adding a BCC intervention to a cash transfer program delivered through a national social protection system. McIntosh and Zeitlin (2018) compare cash transfer to a package of nutrition-support and nutrition information, which they cannot disentangle. Ahmed et al. (2019) study the effect of providing nutrition information as part of a cash transfer program on nutrition outcomes. The contribution of our study is to isolate the value-added of a parenting intervention layered onto a cash transfer program and consider early childhood development beyond nutrition only.

[4] Duarte-Gómez et al. (2004) have shown that information sessions accompanying the PROGRESA CCT contributed to the program's impact on a small set of early childhood development outcomes in Mexico.

Finally, the setting of the experiment is noteworthy. First, the experiment was embedded in a national government-led program, which provides important evidence from a large-scale intervention implemented in real-life conditions (Muralidahran and Niehaus, 2017). Second, the experiment took place in a context of widespread extreme poverty and Niger has among the lowest levels of human development in the world (UNDP, 2018). As such, the study provides information about the role of behavioral change as a determinant of child development at early stages of economic development. Niger was also one of the first countries to develop and implement behavioral measures to promote early childhood development through a large-scale cash transfer program in Africa. The program had a demonstration effect in other countries, so that lessons learned are of direct policy interest.

The paper is structured as follows. Section 2 describes the intervention. Section 3 summarizes the experimental design and data. Section 4 outlines the estimation strategy and the main outcomes of interest. Section 5 presents the main results. Section 6 discusses mechanisms. Section 7 concludes. Tables and figures are presented in the annex.

2. Context and Interventions

Niger is one of the poorest countries in the world, with 51.4 percent of the rural population living in poverty (World Bank, 2017). Niger also has among the lowest levels of human development (UNDP, 2018), with particularly poor outcomes among children. The prevalence of chronic malnutrition as measured by stunting (low height-for-age) is estimated at 43 percent (INS, 2013). Seasonal and acute malnutrition is also very high. Severe early childhood development challenges are compounded by one of the fastest population growths in the world, with a fertility rate of 7.6 children per woman (INS, 2013).

Social protection interventions in Niger have traditionally focused on providing short-term emergency assistance through food-for-work or seasonal cash transfers during the lean season or in the aftermath of crisis (Brück et al., 2018, Aker et al, 2016; Hoddinott et al., 2018). Seeking a more permanent system, in 2011 the government initiated a national safety net program managed by the Safety Nets Unit[5] in the Office of the Prime Minister.[6] The main intervention is a cash transfer program that has reached over 100,000 beneficiary households between 2012 and 2019. The program provides small, regular unconditional transfers to poor households targeted through proxy-means testing. Monthly transfers of

[5] *Cellule Filets Sociaux* (CFS).

[6] It has received support from the World Bank and DFID, among others, with a funding envelope of over US$180 million between 2011 and 2025.

10,000 FCFA are provided for a period of 24 months.[7] Women are the recipients of cash transfers. As such, beyond improving household consumption and welfare, it is also expected that part of cash transfers will be invested in human capital (particularly for beneficiaries' children) through better nutrition and increased use of health and education services.[8] However, it is unclear if relaxing financial constraints alone is sufficient to trigger investments in children's human capital.

The cash transfer program is accompanied by parenting training on nutrition, psycho-social stimulation, health and sanitation. As such, beyond providing financial resources, the program also provides information to parents. A "behavioral change component" (BCC, or "*Volet Comportemental"*) explicitly focuses on encouraging behavioral changes in parenting practices to further promote investments in children's human capital. It provides information and seeks to influence social norms to encourage adoption of a range of practices. Participation in the behavioral change accompanying measures is framed as a soft conditionality or co-responsibility for beneficiaries to receive the cash transfers. Beneficiaries make an oral commitment to participate in the behavioral accompanying measures. However, the conditionality is not enforced, i.e. even if a beneficiary does not participate, she will continue to receive cash transfers. The behavioral accompanying measures constitute a demand-side approach that aims to provide information to parents. The intervention does not seek to directly improve the supply of health services, the provision of direct nutritional support or stimulation activities for children.

We provide an overview of the intervention in this section, and additional details are provided in the annex. The behavioral change component curriculum builds on UNICEF's "essential family practices" package, which is widely used around the world. In Niger, the package originally included modules focused on child nutrition and health. As part of the safety net project, it was complemented by additional modules covering a broader range of parenting practices related to psycho-social stimulation and child protection.

[7] The cash transfer amounts were calibrated based on international practice, which suggests setting transfers equivalent to 10-20 percent of monthly expenditures of targeted households. Based on data available during project design, the transfer amounts of 120,000 FCFA per year represented 15.6 percent of the rural poverty line (110,348 FCFA per person per year, or 772,436 FCFA per household per year, with an average household size of 7) (World Bank, 2011). We find similar levels of average consumption per capita per year among future program beneficiaries in our baseline sample (103,920 FCFA per person per year, see Section 4.3). However, we also find larger household sizes (9.6 members on average), so that yearly transfers amount to 12% of total consumption on average. Food consumption represents 80% of total consumption, so that transfers represent 15% of total household food consumption.

[8] The program also seeks to facilitate investments in income-generating activities. The effects of a prior cash transfer pilot on productive investments are discussed in greater detail in Stoeffler et al. (2020).

The final curriculum contains 14 core modules covering four main domains:

- *Nutrition*: Exclusive breastfeeding for the first six months; complementary feeding after six months; recognizing signs of malnutrition.
- *Health*: Preventive health practices to protect children against diseases; utilization of health services at first sign of illness; hygiene and handwashing; family planning.
- *Psycho-Social Stimulation*: Language stimulation; stimulation through play; school readiness; brain development; birth registration, child school enrollment and attendance.
- *Child Protection*: Discipline, punishment and conflict management; attachment and socio-emotional development.

The behavioral change promotion intervention is designed to last approximately 18 months, starting three months after the first cash transfer payment. As part of the accompanying measures, each beneficiary household participates in 3 activities per month[9]: a village assembly delivered by an NGO operator, a small-group meeting delivered by a community educator, and a home visit delivered by the same community educator. The village assembly is organized for approximately 50 beneficiary households on average. Although non-beneficiary households in those villages are not explicitly targeted, they can also participate in the assemblies. The community educator delivers one small-group meeting ("*causerie*") targeted to groups of 25 beneficiaries each month, and then a household visit targeted to each beneficiary household each month.

The intervention was based on a positive deviance approach, seeking to identify local examples of good practices to trigger broader behavioral change in the community. Its pedagogy relied heavily on role play and theater pieces, as well as a range of visual aids tailored for illiterate populations. The intervention was standardized through a detailed technical guide. It included scripts and key messages for each theme and each activity. It also provided detailed implementation modalities. The objective was to ensure consistency during implementation at scale, as well as to facilitate quality control and monitoring.

The implementation of the behavioral change component was closely monitored. In addition to continuous quality control by program staff, two qualitative process evaluations were undertaken. The quality of implementation was found to be satisfactory overall. In addition, participation in community

[9] To alleviate concerns about too many messages (Vazir et al., 2013), the messages were designed to be introduced progressively, covering successively nutrition, health, psycho-social stimulation and protection. One new message or theme is introduced each month and is emphasized through all program activities that month. The message is then repeated periodically in subsequent months.

assemblies, small-group meetings and household visits was monitored, and captured monthly for each beneficiary in an information system held by the implementing agency.

The behavioral accompanying measures were designed as a relatively low-cost intervention to ensure the feasibility of its implementation at scale. Their cost is estimated at $100 per direct cash transfer beneficiary household, or approximately 20% of the cash transfer amounts. Total implementation costs are estimated at $86 per direct cash transfer beneficiary household, and indirect oversight costs at $14.

3. Experimental Design and Data

3.1 Experimental Design

The study was designed as a multi-arm clustered RCT to disentangle the impact of the behavioral change parenting intervention from the cash transfer program. The RCT was embedded in the first phase of implementation of the program in 6 communes of the regions of Dosso and Maradi.[10] Geographical targeting was used to select the poorest communes to participate in the cash transfer program. In absence of fine-grained poverty maps, communes were selected through a participatory process considering available information on poverty levels, chronic vulnerability and local infrastructure. This was done during local meetings with regional leaders and commune mayors. As such, the eligible communes are those considered the most disadvantaged by regional and communal authorities.

In the six selected communes, nearly 500 villages were eligible for the first cycle of the program, many more than the project could serve. In each commune, public lotteries were used to select beneficiary villages among all equally eligible villages.[11] Prior to performing the public lotteries, small villages were grouped into clusters of neighboring villages. The randomization was performed by clusters and stratified between nomadic and sedentary clusters.[12]

[10] The program was originally designed to be implemented (over several phases) in the 5 regions (Dosso, Maradi, Tahoua, Tillabery, and Zinder) that present the highest concentration of poverty in Niger and where 95 percent of the country's poor population lives. The first phase of the project targeted the regions of Dosso and Maradi, including 40% of the country's poor population (World Bank, 2011). Over time, the Niger cash transfer program expanded to reach all 8 regions of the country.
[11] The study sample is representative of the 6 communes. Given the difficulty to find transparent targeting criteria to prioritize villages within communes, the project team decided to implement public lotteries to select beneficiary villages among all equally eligible villages. Authorities and program staff appreciated the transparency of the selection process. In fact, the project staff later continued to use public lotteries to select villages in communes outside the evaluation sample.
[12] Public lotteries took place in presence of village chiefs, commune authorities and program staff.

The randomization was undertaken in two steps. First, among all eligible villages in the 6 targeted communes, a public lottery randomly selected treatment and control clusters. In total, 152 clusters (244 villages) were drawn, including 100 treatment clusters (159 villages) and 52 control clusters (85 villages). After cash transfers started, a second public lottery was undertaken to assign treatment villages to receive either the cash transfers only (CT, 50 clusters, 84 villages), or the cash transfers plus the behavioral change component (CT + BCC, 50 clusters, 75 villages).[13]

3.2 Sampling, Data and Timeline

After the first public lottery, a listing of households was undertaken in all villages drawn into the sample. The sample for the baseline survey was drawn from the listing by taking a random sample of 30 eligible households in each cluster.[14] A baseline survey was then collected between April and June 2012 among sample households. The baseline sample included 4,330 households and detailed information on 6,132 children aged 6-59 months.

The baseline survey included a household module and a module for children aged 6 to 59 months. The household survey instrument built on the 2011 Niger LSMS-ISA national household survey questionnaire. The survey for children aged 6-59 months built on the Niger DHS/MICS questionnaire. It contained modules on nutrition and food security, parenting practices, as well as anthropometric measures. The child instrument also included a cognitive test adapted by Zeitlin and Barry (2008) to measure cognitive development among young children in West Africa. The test is an adapted version of the Bayley™ cognitive scale, discussed further in Section 4.4 below.[15]

[13] Two nomadic clusters (one control and one treatment cluster, including 6 villages in total) were originally drawn into the evaluation sample but had to be dropped from the baseline survey due to communities being entirely inaccessible. One of the two clusters could be added back into the sample at follow-up as part of the additional booster sample (see discussion in Section 3.2).

[14] Based on this household listing, screening criteria were applied to exclude ineligible households, defined by the program as those with self-reported income higher than a pre-set threshold. Approximately 20% of households were deemed ineligible based on this criterion. (Premand and Schnitzer (forthcoming) show that the use of exclusion criteria does not contribute to targeting inefficiency in a later phase of the program). The sample is representative of households eligible for the program at the commune level. Therefore, the evaluation sample is representative of eligible households in communes eligible to the cash transfer program. Note that after clusters were drawn into the impact evaluation sample, random sampling was used to draw households. When the household sample was drawn, 13 small villages among the full sample of clusters had no observation drawn into the sample: (i) 4 villages in the control group; (ii) 6 villages in the cash transfers group and (iii) 3 villages in the cash transfers and parenting training. A few small clusters of less than 30 households remained, particularly among nomadic villages.

[15] In practice, household and child survey teams followed each other in the field. Household survey teams were responsible for referring children eligible for the child survey to the child survey teams. To ensure a smooth transition between the two surveys, the household survey teams pre-filled information on household location and children's identification in the child questionnaire, before passing them to the child survey team. Child survey teams were then responsible to verify children's age and collect data

Following the baseline survey, a registry census was implemented in treatment villages to collect data to calculate a proxy-means score for each eligible household. The application of the proxy-means test sought to identify the poorest households to be selected as beneficiaries for the cash transfer program. A selection threshold was set for each commune, so that approximately the 40% poorest households would be selected to participate in the cash transfer program. Premand and Schnitzer (forthcoming) provide a detailed analysis of the implementation of proxy-means targeting in a subsequent phase of the program.

After the baseline survey was completed, targeting data collected, and the second public lottery implemented, the baseline survey data were merged with administrative data from the cash transfer program to identify which households from the baseline sample were selected as beneficiaries. In treatment villages, we can thus identify households that are actual program beneficiaries, and households that are actual non-beneficiaries.

The registry census to calculate PMT scores could only be collected in treatment villages. The collection of the registry census to calculate PMT scores did not take place in control villages. However, the baseline survey was designed so that it would also allow calculating PMT scores in both treatment and control villages. As such, we can "predict" potential beneficiary status of all households in the baseline sample. We do so by applying the PMT formula used to select beneficiaries to the baseline data collected in the treatment and control groups. Note that in practice the prediction of beneficiary status based on the baseline survey is imperfect. The groups of actual beneficiaries and "predicted beneficiaries" do not fully overlap in treatment villages. Still, we can identify these "predicted" (or potential) beneficiary households in the control and treatment groups. We use this "predicted beneficiary status" to estimate intent-to-treat impacts of the cash transfers. We discuss this approach in more detail in Section 4, where we present the estimation strategy and the composition of the follow-up sample.

The interventions were implemented between February 2013 and April 2015. Program implementation was closely monitored. The delivery of the monthly cash transfers started in February 2013 in the Dosso region and in March 2013 in the Maradi region. Cash transfers were delivered monthly until the final payments took place (in March 2015 in Dosso and April 2015 in Maradi). More than 98% of households selected for the cash transfer program received benefits. The accompanying measures were rolled out

for all children identified by the household survey team. Data collection for the child survey took place in the household through interviews with the main caregiver for each child. The anthropometric measurements and cognitive test took place in presence of the caregiver. Thorough quality control procedures were put in place, with systematic verifications of questionnaires by enumerators and supervisors. Additional verifications, including random back-checks, were undertaken by the coordination and quality control teams throughout the survey.

between April 2013 and March 2015. Even though it was not compulsory, participation in the behavioral accompanying measures was very high. The average attendance rate among cash transfer beneficiaries was 92%. Substantial participation of non-beneficiaries in assemblies held in beneficiary villages was also observed.[16]

The follow-up survey was collected between mid-January and mid-May 2015. The survey again included two separate instruments: a household survey and a survey for children aged 6 to 59 months at follow-up. The household and child survey instruments were based on the baseline survey questionnaires. The child questionnaire included anthropometric measurements for children 6-59 months old as well as the test to measure cognitive development for children below 42 months. In addition, the strengths-and-difficulties questionnaire was introduced to measure socio-emotional development among children 24-59 months old (Goodman, 1997).

The sampling strategy for the follow-up survey was designed to oversample actual program beneficiaries in the treatment groups. This was done to ensure sufficient statistical power to detect impacts of the behavioral intervention in the sub-sample of beneficiary households. Therefore, the follow-up sample was stratified based on the proxy means test score "predicted" from the baseline survey.[17] A total of 377 households from the baseline sample (with high predicted PMT scores, hence low likelihood of being selected as beneficiaries) were dropped from the follow-up sample. The distribution of these 377 households was balanced between the two treatment and control groups. Separately, an additional booster sample of 1,058 beneficiary households was randomly selected from the administrative database of beneficiaries and added to the follow-up sample. That booster sample is only added for the two treatment groups and used to estimate the value-added of the BCC component. Of the 5,011 households in the follow-up sample, 4,818 were tracked and interviewed, a response rate of 96.1%.[18] Table 1 summarizes the composition of the follow-up sample, which we discuss in more detail in the next section.

[16] A participation rate for non-beneficiaries cannot be calculated as their participation was not recorded nominally.

[17] Specifically, all the households with a proxy means test score below 1.05 times the beneficiary selection threshold were selected, while half the households with a proxy means test score above 1.05 times the beneficiary selection threshold were selected. Stratification was based on the PMT score "predicted" from the baseline survey so that the sampling process would remain similar in the treatment and control group.

[18] The follow-up survey used the SurveySolutions electronic data collection platform. Questionnaires with pre-filled data were downloaded from an online server onto supervisors' laptops, and later transferred to enumerators' tablets. Consistency checks were integrated in the Surveysolutions CAPI application installed on enumerators' tablets. Upon completion of the questionnaires and synchronization back to supervisors' laptops, supervisors were responsible for validating questionnaires before uploading them to the server. A dedicated team of quality controllers verified the data once uploaded to the server. Automated consistency checks were also performed. As for the baseline survey, household and child survey teams followed each other in the field. Household survey teams were responsible to identify children eligible for the child survey. The list of children obtained by the household survey team provided the sample for the child survey. To ensure a smooth transition

4. Estimation Strategy

The experiment is designed to disentangle the impact of the behavioral change parenting component from the cash transfer program. This section describes the estimation strategy. It also outlines how data from the follow-up sample (Table 1) are used in the comparisons on which the estimation strategy relies.

4.1 BCC Value-Added and Local Spillovers

Table 1 provides the composition of the follow-up sample by actual beneficiary status for the cash transfer program. In the control group, all households are non-beneficiaries. In each treatment group, there are three types of households in the sample: non-beneficiaries, beneficiaries from the baseline sample, and beneficiaries from the booster sample.

The experiment is designed to provide precise estimates of the value-added of the behavioral change parenting intervention. Based on randomized assignment of villages to the two treatment arms, we can disentangle the impact of the behavioral change component on cash transfer beneficiaries and local spillovers on households that do not benefit from cash transfers within treated villages.

First, we estimate the value-added of the BCC component for cash transfer beneficiaries by comparing outcomes between cash transfer beneficiaries in villages assigned or not to BCC. This estimate is obtained through the following regression model excluding observations from the control group:

$$Y_{i,B} = \gamma\, BCC_{i,B} + \delta Z_{i,B} + \varepsilon_{i,B} \quad , \quad for\ C=0\ and\ B=1 \qquad (1)$$

i refers to an individual or household (depending on whether the outcome of interest is a household-level or individual-level outcome), *Y* is the outcome of interest, *BCC* takes the value of 1 for cash transfer villages randomly assigned to the behavioral change component, *Z* is a set of randomization strata fixed effects, and ε is the error term. C takes the value of 1 for observations in the control group, 0 otherwise. B captures the actual beneficiary status from the cash transfer program. Robust (White-Huber) standard-errors are clustered. To maximize power, this estimation is undertaken by including observations from the booster

between the two teams, the list of children was extracted by the coordination team from the household data uploaded on the server (after verification). The pre-filled child questionnaires when then downloaded onto the child survey supervisors' laptops, before being transferred to enumerators' tablets. Child survey teams were responsible for verifying children's age for all children identified by the household survey team and collecting data for all children in the appropriate age range. Thorough quality control procedures were put in place, including through automated checks on the tablets, as well as systematic verification of data collected by enumerators and supervisors. Additional verifications, including automated back-checks, were undertaken by the coordination and quality control teams once data were uploaded to the server.

sample. In Table 1, it relies on comparing outcomes between observations in cells D and F with observations in cells E and G.[19] We include sampling weights to ensure results are representative of the population of cash transfer beneficiaries.

Second, we compare outcomes between households that are non-beneficiaries of cash transfers in villages assigned or not to BCC. We obtain estimates of BCC local spill-overs based on the following regression:

$$Y_{i,B} = \psi\, BCC_{i,B} + \delta Z_{i,B} + \varepsilon_{i,B} \quad , \quad for\ C=0\ and\ B=0 \qquad (2)$$

This specification relies on comparing outcomes between observations in cells B and C in Table 1. We include sampling weights to ensure results are representative of the population of non-beneficiaries in cash transfer villages.

In addition to reporting robust (White-Huber) clustered standard errors and related asymptotic p-values for coefficients in equations (1) and (2), we also report the exact p values from a randomization-t test. Following Young (2018), the exact p-values are obtained from 2,000 simulations and take into account the stratified randomization.[20] While in principle the exact p-values could be more conservative since our design involves clustered randomization, the size of the experiment is not small and in practice the exact p values are close to the asymptotic p values. We also report joint test of significance of treatment effects based on Young (2018).

4.2 Impacts of Cash Transfers

The study is also designed to assess the relative effect of the behavioral change component and cash transfers in improving parenting practices and children's human capital. We can estimate the relative impacts of the two interventions on predicted beneficiary households based on baseline data.

As discussed above, the registry census and targeting data collection took place in the treatment groups. However, the baseline survey included all the variables necessary to estimate the proxy-means targeting score for all households in the baseline sample. On that basis, we can replicate the targeting process and

[19] We also provide a robustness check by considering actual beneficiaries from the baseline sample only (comparing observations in cells D and E in Table 1).

[20] We report the randomization-t test as Young (2018) shows it is superior to the alternative randomization-t statistic. Furthermore, he shows that there are little changes in rejection rates beyond 2,000 simulations.

identify "predicted (potential) beneficiary households" by applying the PMT targeting formula to the baseline data collected in the treatment and control groups. In practice, there are differences between the PMT score predicted from the baseline survey and the actual PMT score calculated from the targeting registry census. As such, the set of predicted beneficiaries does not fully overlap with actual beneficiaries in the treatment groups. This approach should thus be interpreted as providing intent-to-treat estimates. Figure A.1 illustrates that the PMT score from the registry census accurately predicts beneficiary status: the probability of being a beneficiary drops sharply around the eligibility cut-off. This shows that the PMT selection procedure was faithfully implemented based on the registry census data. However, the "predicted" PMT score based on the baseline survey variables does not perfectly match the PMT score from the registry census: the likelihood of being predicted beneficiary is strongly associated with the PMT score from the registry census, but no sharp drop is observed at the cut-off.[21] Table 1 (Panel C) illustrates the composition of the sample by "predicted" beneficiary status for all baseline households included in the follow-up sample. (Note that predicted beneficiary status cannot be estimated for households in the booster sample since they were not interviewed at baseline. Booster sample households are not included in specifications involving comparisons with the control group.)

The effect of the cash transfers can be separated from the effect of the behavioral change component by comparing "predicted beneficiaries" between the treatment and control groups. ITT estimates are obtained through the following regression model based on follow-up data on the sub-sample of "predicted beneficiary households" (PB=1):

$$Y_{i,B} = \alpha\, CASH_{i,PB} + \beta\, BCC_{i,PB} + \delta\, Z_{i,PB} + \varepsilon_{i,PB}\ ,\quad for\ PB=1 \qquad (3)$$

i refers to an individual or household (depending on whether the outcome of interest is a household-level or individual-level outcome), *Y* is the outcome of interest, *Z* is a set of randomization strata fixed effects, and ε is the error term. Robust (White-Huber) standard-errors are clustered. This specification compares outcomes between observations in cells H, I and J in Table 1 (Panel C). We include sampling weights to ensure results are representative of the overall population in sample villages.

[21] This is likely due to measurement errors in household survey variables that enter the PMT score calculation (possibly in both the registry census and baseline surveys). For instance, defining household units in the context of large, frequently polygamous households in rural Niger is challenging, and some discrepancies in the application of these definitions may have taken place between surveys. This measurement error likely reflects teething pains during the establishment of the Niger safety net system, including with the quality of large-scale data collection for the registry census in a context characterized by low administrative capacity. Indeed, the PMT targeting was shown to be relatively efficient and to suffer from little measurement errors in subsequent phases of the program (Premand and Schnitzer, forthcoming).

Note that we write the specification in equation (3) as a nested model, whereby CASH = 1 for predicted beneficiary households in any of the treatment groups, and BCC=1 for predicted beneficiary households in the treatment group assigned to cash transfer and BCC. This specification implies that the estimates of γ in equation (1) and of β in equation (3) both capture the value-added of the behavioral change component. The consistency of estimates for the two specifications provides an indication of the robustness of the results. We also report the p-value from a F-test for the significance of the overall treatment effect ($\alpha + \beta = 0$) in villages assigned to cash transfers and behavioral change promotion.

Importantly, estimates from specifications (1) and (2) provide precise and unbiased estimates of average treatment effects (ATE) of the value-added of the BCC intervention for cash transfer beneficiaries, respectively of spillovers among cash transfers non-beneficiaries. In contrast, estimates from specification (3) provide intent-to-treat (ITT) estimates for the relative effect of the behavioral change and cash transfer interventions on predicted beneficiary households. As such, estimates from specification (1) are more precise than estimates from specification (3).

4.3 Baseline Balance

Table 2 documents baseline balance for households surveyed at follow-up. Panel A considers all baseline households surveyed at follow-up. Panel B focuses on actual beneficiaries, and Panel C on households predicted to be beneficiaries when applying the PMT targeting formula on baseline data. Balance is documented for variables from the household survey (top panel, first for household-level variables, then for individual-level variables), as well as variables from the child survey (bottom panel). Results show that the randomization achieved balance between control and treatment groups in the full sample and in the sample of predicted beneficiaries, as well as between actual beneficiaries in the two treatment groups. Observed differences are not more frequent than would be expected, and generally either weakly significant or of small magnitude (less than 10% of the mean in the control group). One meaningful exception is that children aged 0-4 and 5-14 are more likely to be reported sick in the month prior to the baseline survey in the control group. We return to this when discussing the interpretation of the results. Overall, baseline balance indicates that the design was well-implemented. Program impacts can thus be identified at follow-up through single differences in outcome variables across the various treatment and control groups based on the specifications discussed in Section 4.2.

4.4 Parenting Practices and Children's Human Capital Outcomes

The behavioral component seeks to induce behavioral changes among cash transfer beneficiaries in four main domains: nutrition, health, psycho-social stimulation and child protection practices. As such, we first test whether the interventions lead to changes in practices in these four domains (Section 5.1). They represent intermediary outcomes that capture behaviors directly promoted by the program. We then consider whether the interventions affect final (or downstream) outcomes capturing children's human capital, including anthropometrics, cognitive development and socio-emotional development (Section 5.2).

To analyze whether the program triggered behavioral changes, we build indices by aggregating indicators for the practices it promoted in each domain. The consideration of these families of outcomes helps to address potential concerns about multiple hypothesis testing, besides providing exact p-values as discussed in Section 4.3. The indices are built as additive indices of z scores, standardized in the control group.[22] We provide disaggregated results for the individual components of the indices in the annex to facilitate the interpretation of the results.

Nutrition practices (Intermediary outcome domain #1). The BCC intervention promoted exclusive breastfeeding until 6 months of age and encouraged greater diversity in children's diet after 6 months. Therefore, we construct an index of nutrition practices for children aged 12-23 months, which captures (i) whether infants were exclusively breastfed until 6 months, and (ii) the number of types of foods each child started to consume between 6 and 9 months old, which measures food supplementation. We then analyze the food consumption score for all children 6 -59 months old, which provides a measure of dietary diversity at the time of the follow-up survey (WFP, 2008).[23]

Health practices (Intermediary outcome domain #2). The BCC intervention promoted preventive health behaviors to protect children against disease, as well as encouraged health service utilization at the first sign of illness. We build an index of preventive health behavior capturing whether children have (i) received all their vaccines, (ii) received vitamin A, (iii) received iron supplementation, (iv) received deworming, (v) slept under a treated mosquito net, as well as (vi) an index capturing the frequency at which the main caregiver washes hands. We then analyze impacts on children's illness, as reported by the

[22] Note that we standardize indicators with respect to the full control group. When estimations are based on part of the sample only (as outlined in Section 4.2), the mean in the reference group displayed in the result tables is not necessarily exactly 0.
[23] The food consumption score captures dietary diversity based on a set of questions asking about the consumption frequency of different food groups during the past seven days. This indicator is the primary dietary diversity measure used by humanitarian actors working on food insecurity in the Sahel.

main caregivers, before reporting results on health center utilization. While children's illnesses could be interpreted as a final outcome, we report it along with other intermediary outcomes in the health domain because health center utilization is measured conditionally on reported illnesses.

S*timulation practices (Intermediary outcome domain #3)*. The BCC component encouraged psycho-social stimulation through language and play. We build two indices based on items capturing the family care environment in MICS surveys. The first index captures the frequency at which children have interactions with adults through activities such as reading, storytelling, going out together, playing, naming, counting or drawing. The second index captures the number of types of toys children play with, including home-made toys, manufactured toys, household objects, animals, toys that can be pulled, and balls.

Child protection practices (Intermediary outcome domain #4). The BCC component promoted positive disciplining to manage conflict and avoid harsh punishments. It also encouraged birth registration. We first build an index aggregating positive disciplining behavior (explain or redirect) minus negative disciplining behavior (forbid, shake, yell, spank, spank with an object, berate, slap, hit on the hands, and hit with an object). Second, we measure whether children have a birth certificate.

Ultimately, we are interested in testing whether the promotion of behavioral changes in parenting practices contribute to improve human capital outcomes among young children. We consider final (or downstream) outcomes in three domains: anthropometrics, cognitive development and socio-emotional development. We again measure indices for each set of outcomes.[24]

Anthropometrics (Final outcome domain #1). We measure height-for-age (used to identify stunting), weight-for-height (used to identify wasting) and weight-for-age (used to identify underweight) z scores for all children aged 6-59 at the time of the follow-up survey.[25]

Cognitive development (Final outcome domain #2). We implement a cognitive test adapted by Zeitlin and Barry (2008) to measure cognitive development among young children in West Africa. The test is a version of the Bayley^{TM} cognitive scale adapted to West Africa.[26] The baseline survey was the first time that such

[24] The indices are standardized for the control group. Since the distribution of anthropometric measures have long tails, we trim the top and bottom 2% to rule out outlier effects. We perform robustness checks for alternative treatment of outliers in the annex.

[25] We present heterogeneity analysis by age in Section 6.3.

[26] The cognitive scale consists of 91 items ordered by increasing difficulty. The test begins at a standard ("basal") test item determined by the child's age. In case the child does not pass the first three test items administered, the examiner goes back up to the next previous basal item (which is also the starting point for a younger age group) and continues going back until the child passes three consecutive basal items. The examiner then continues with the following items. The test is stopped when the child fails to pass five items in a row. The total raw score for an individual child is constructed as the sum of the items passed. The raw

a test was implemented in a large population in Niger. The test displayed appropriate reliability and validity in both the baseline and follow-up sample. The baseline cognitive score is correlated with both nutritional status and stimulation practices, suggesting sensitivity to factors known to be associated with cognitive development.[27] We report results with the scores normalized based on an international norm.[28] Cognitive scores are measured as z scores for children aged 6-42 months at the time of the follow-up survey.

Socio-emotional development (Final outcome domain #3). We build a z score for an index of socio-emotional development based on the strength-and-difficulties questionnaires for children aged 24-59 months at the time of the follow-up survey. The overall score aggregates sub-scales on emotional problems, conduct problems, hyperactivity, peer problems, and pro-sociality. The overall scale is scored so that a higher score indicates that a child has less socio-emotional difficulties.

Finally, we measure a range of *secondary outcomes* at the household level to analyze additional mechanisms (Section 6). First, to complement the analysis of dietary diversity among children, we document results on food security at the household level based on the food consumption score. We also consider the brachial perimeter for breastfeeding women. Second, we document changes in household consumption (separately for total, food and non-food consumption), as well as the share of food in total consumption. Third, we document impacts on assets (separately for the number of household durable goods, household productive assets, as well as a livestock index expressed in tropical livestock units) and savings (whether households participated in a rotating savings groups, and the amount contributed over the last week). Lastly, we measure impacts on human capital variables for older children and household members, including school enrollment, attendance, illness and health service utilization for older children and adults, as well as use of contraception and recent pregnancies among women aged 15-49.

score can be transformed into a normed score based on norms established for the original version of the test. The normed score is calculated by each age and is standardized to have a mean of 10 at each age.

[27] At the same time, it should be noted that the correlation with such environmental factors does not appear as strong as in some other settings.

[28] Results are robust when using the raw score, or a score based on locally constructed norms.

5. Results

5.1 Behavioral Changes in Parenting Practices

Table 3 (Panel A) presents estimates of the impact of the interventions on intermediary outcomes, capturing parenting practices in four main domains: nutrition, health, stimulation and child protection. Panel A isolates the value-added of the behavioral change promotion on cash transfer beneficiaries (based on the specification in equation (1)). Panel B isolates the spill-over of the behavioral change promotion on cash transfer non-beneficiaries (based on the specification in equation (2)). The estimates of the value-added of the behavioral component in Panel A (respectively its spill-over effects in Panel B) are precisely identified since they are based on the sub-sample of actual beneficiaries from the cash transfer program (respectively non-beneficiaries). Panel C presents ITT estimates for the impact of cash transfers and the behavioral change component on predicted beneficiary households (based on the specification in equation (3)).

Panel A shows that the behavioral change component triggers broad changes in parenting behaviors among cash transfer beneficiary households.

First, in the nutrition domain, the BCC intervention improves the nutrition practice index for children aged 12-23 months by 0.44 standard deviation (Panel A). Changes in the index among beneficiaries (Panel A) are driven by a substantial increase in the share of infants exclusively breastfed for 6 months (by 0.36 standard deviations, or from 40.1 percent to 57.9 percent, Table A.1, Panel A). The effect mostly stems from parents not giving water to children before they are 6 months old, one of the messages highlighted by the accompanying measures as part of discussions on exclusive breastfeeding. Complementary feeding practices also improve as children aged 12-23 months are more likely to be given milk or cereals between 6 and 9 months of age (Table A.1, Panel A). Improved dietary diversity is observed among all children aged 6-59 months old: the food consumption score increases by 0.28 standard deviations, showing that children consume food from more varied food groups.

Second, in the health domain, the BCC intervention improves the index of preventive health behavior by 0.21 standard deviation. This overall improvement in the index is driven by deworming and handwashing, (Table A.1, Panel A), with no significant effect on other components (vaccination, vitamin A, iron supplementation, or sleeping under treated bednets). The point estimate for the prevalence of self-reported illness suggests a significant decrease by 7.5pp (or 19 percent), which is consistent with improvements in preventive health behavior. Utilization of health services conditional on being sick also increases by 7pp, a 10 percent increase significant at the 10 percent level.

Third, in the stimulation domain, the BCC intervention improves the stimulation index by 0.22 standard deviation (significant at the 10 percent level, with an exact p-value of 0.11). This stems from more frequent caregiver-child interactions around activities such as storytelling, naming, counting, drawing or reading (Table A.2, Panel A). No significant effect on the frequency of play is observed, however. There is no robust impact on the stimulation material index capturing the diversity of toys children play with. The share of children playing with manufactured toys or balls increase (Table A2, Panel A), but this is not sufficient to improve the overall index.

Fourth, in the child protection domain, the BCC intervention leads to improvements in the disciplining index by 0.27 standard deviation. The increase is driven by less harsh disciplining (shaking, yelling, spanking, slapping, berating), although such practices are still reported frequently in the sample (Table A.3, Panel A). On the other hand, no significant increase in the use of positive disciplining strategies is observed. No impact is observed on the share of children with a birth certificate either.[29]

Results from Panel B in Table 3 are highly consistent with Panel A and show that the behavioral change component triggers broad changes in parenting behaviors among cash transfer non-beneficiary households. Local spillovers are found on a range of parenting practices. In the nutrition domain, nutrition practices for children aged 12-23 months and dietary diversity for children aged 6-59 months improve. In the health domain, there is no significant impact on preventive health practices and reported illnesses, though there are spillovers on utilization of health services conditional on reporting being sick. In the stimulation domain, the stimulation and stimulation material indices improve. No spillovers are observed on the disciplining index or the share of children with a birth certificate. Overall, the improvements in parenting practices among non-beneficiaries in Panel B are consistent with those observed among beneficiaries in Panel A. These significant local spillover effects show that the behavioral change component leads to changes in a range of parenting practices in villages where it was implemented.

Panel A and B document wide-ranging changes in parenting practices, covering self-reported behaviors in various domains as well as food security measures capturing dietary diversity. While we cannot rule out some misreporting in self-declared parenting practices, thorough quality control procedures were put in place to ensure high quality data (as detailed in Section 2). At a minimum, the results suggest strong changes in information and knowledge about parenting practices. The findings point to broad changes in

[29] Table A.4 also shows results from Panel A when excluding the booster sample. Results are robust (though at times more imprecise, as would be expected with a smaller sample, in particular for the sub-set of children aged 12-23 months old at follow-up).

parenting practices across domains, which may relate to more general changes in norms on parenting practices in villages exposed to the behavioral change component.

Panel C in Table 3 presents ITT estimates of impacts on parenting practices. ITT estimates of the value-added of the behavioral change component are consistent with estimates of average treatment effects in Panel A.[30] In contrast with results on the BCC components, however, Panel C shows that cash transfers alone do not lead to improvements in parenting practices in any dimension. None of the coefficients for the impact of cash transfers on parenting practices are significant across the nutrition, health, stimulation and child protection domains. The only (marginally) significant coefficient suggests a higher prevalence of reported illnesses among children in villages assigned to cash transfers. This difference is best not overinterpreted given the imbalances observed at baseline for this indicator. Overall, the results consistently show that cash transfers alone do not change parenting behavior.

5.2 Children's Human Capital

We now test whether the interventions contribute to improve young children's human capital, including anthropometrics and child development outcomes (Table 4).[31]

Results in Panel A show that the BCC intervention has limited impacts on early childhood nutrition and development outcomes. Despite improvements in nutrition and health practices, children from cash transfer beneficiary households who were exposed to the behavioral accompanying measures do not have better anthropometric outcomes than children in households receiving cash transfers only. The coefficients are not close to showing improvements: the point estimate for weight for height is very close to zero, and the coefficients for height for wage and weight for age are negative (though far from statistical significance). As such, these null effects are not explained by statistical power.[32]

Despite substantial impacts on exclusive breastfeeding, we do not find improvements in anthropometric outcomes among children. Results can be seen as consistent with existing literature showing no strong links between exclusive breastfeeding and anthropometric outcomes (Bhutta et al., 2008). Exclusive breastfeeding may have other benefits for children, including through effects on survival (Bhutta et al., 2008), or a reduction of infections and other long-term effects on intelligence (Victora et al., 2016). As

[30] As discussed in Section 3, estimates of average treatment effects in Panel A are more precise than ITT estimates in Panel C.
[31] Table A.5 shows the results from Panel A when excluding the booster sample. Results are robust.
[32] In any case, the estimation of the value-added of the BCC component is also well-powered.

such, changes in practices could be positive in and of themselves, even in absence of short-term impacts on anthropometrics. Bhutta et al. (2008) also show that education about complementary feeding can improve children's anthropometrics, but that effects are concentrated among populations having an income of 1$ a day or more (including in countries such as Brazil, China or Peru). In a low-income setting with widespread prevalence of extreme poverty such as the one we study, the results underline that behavioral change promotion and related changes in nutrition practices are not necessarily sufficient to improve children's anthropometrics. We further discuss intra-household changes in dietary diversity and consumption in Section 6 below.

Performance in the cognitive test does not improve among children from cash transfer beneficiary households receiving the behavioral accompanying measures, compared to children in households receiving the cash transfers only. The cognitive test indicates strong signs of cognitive delays in the population at baseline, but the behavioral change accompanying measures do not reduce these signs of delays. As for anthropometrics, the coefficient of interest is not positive or close to being statistically significant. Despite improvements in psycho-social stimulation and child protection practices, no impacts on children's cognitive development are observed.

It is noteworthy that child stimulation activities are very limited in rural Niger. On average, household heads in the sample have 0.5 year of education. Reflecting the very low level of literacy in the sample, only 3% of children in beneficiary households are read stories. Other activities promoting school readiness (such as naming, counting or drawing) are also very infrequent. These patterns highlight challenges in fostering children's cognitive development or school readiness given widespread illiteracy among parents. In this context, the behavioral accompanying measures lead to improvements in stimulation practices, but the impacts are of limited magnitudes and not sufficient to improve children's cognitive development. Despite the observed impacts, there is substantial scope for additional enrichment in children's psycho-social stimulation.

Lastly, the behavioral accompanying measures lead to moderate improvements in children's socio-emotional development: the socio-emotional development score improves by 0.17 standard deviation. Changes in child protection practices (disciplining) and in psycho-social stimulation likely contribute to these observed gains in socio-emotional development.

Panel B in Table 4 presents estimates of the spillover effects of the BCC intervention on anthropometrics and child development. Spillover patterns of the BCC component on children's human capital are

consistent with observed impacts on beneficiaries in Panel A. Improvements in socio-emotional development are also observed among non-beneficiaries and are again of moderate magnitude (0.15 standard deviations). There are no robust improvements in anthropometric outcomes.[33] No significant impact is observed on cognitive development either.

Panel C presents ITT estimates of the impact of the BCC and cash transfer interventions. ITT estimates of the value-added of the BCC component are consistent with average treatment effects in Panel A. Results show that cash transfers alone do not induce significant improvements in anthropometric measures or child development outcomes. The point estimates for cash transfer impacts on height for age, weight for age and the cognitive score are negative and not statistically significant. These results clearly show that cash transfers alone do not improve children's human capital in the study context. We cannot rule out that cash transfers may have adverse effects on children's anthropometric outcomes.[34] However, given the higher incidence of disease among treated group children at baseline and the fact that height for age is generally considered as capturing a stock measure that is less malleable than weight for age or weight for height, we caution against overinterpreting these patterns. We return to the discussion of mechanisms between behavioral change, cash transfers and children's human capital in Section 6 below.

6. Additional Mechanisms and Discussion

We now discuss additional mechanisms that may contribute to explain why the behavioral change and cash transfer interventions induce limited to no improvements in early childhood nutrition and development outcomes. We analyze intra-household changes in dietary diversity (Section 6.1), changes in household consumption and assets (Section 6.2), heterogeneity in impacts of the BBC intervention (Section 6.3), and impacts on human capital of other household members (Section 6.4).

[33] Table A.6 presents results for alternative approaches to handle outliers in anthropometric measures. Estimates for height for age z scores tend to be negative and are marginally significant when trimming the distribution at the 5th and 95th percentile.
[34] The treatment effect of cash transfers on height for age is negative and borderline insignificant in Table 4. It becomes significant when trimming the distribution at the 5th and 95th percentile or trimming using the interquartile range (see Table A.6).

6.1 Intra-Household Changes in Dietary Diversity

Table 5 shows how the interventions affected household consumption and food security indicators. It documents impacts on dietary diversity of adults in the households (column 1) and on the brachial perimeter of breastfeeding mothers (column 2). As mentioned in Section 5.1, the behavioral intervention improves dietary diversity among children (as shown in Table 3, Panel A and B, column 2). However, Table 5 reveals no such improvements among adults in the household. We can clearly reject that the behavioral change intervention improves dietary diversity among adults in Panel A and Panel B. The estimated coefficients are negative, and only marginally non-significant for dietary diversity in Panel A. These results suggest that the behavioral intervention induces a reallocation of some food items from adults toward children within households. This can explain why improvements in children's dietary diversity are not associated with improvements in adult household members' dietary diversity. The behavioral intervention did not have a strong focus on mothers' nutrition. Considering the large share of breastfeeding women and the generally poor nutrition outcomes in the sample, poor (or even worsening) dietary diversity among breastfeeding mothers may have hindered improvements in children's anthropometrics.[35]

Interestingly, cash transfers have opposite effects on intra-household allocations: cash transfers induce significant improvements in dietary diversity among adults (Table 5, Panel C, column 1), but not among children (Table 3, Panel C, column 2). Cash transfers and behavioral change promotion thus have differential effects on intra-household allocations of food between adults and children. Neither of the two interventions achieves improvements in dietary diversity for both adults and children.

6.2 Household Consumption and Assets

Table 5 documents impacts of behavioral change promotion and cash transfers on household consumption (columns 3-8).[36] The cash transfer and behavioral interventions have differential effects.

ITT estimates in Panel C show that cash transfers alone lead to a large increase in total household consumption per capita. This is explained by an increase in non-food consumption (including items such as clothes, shoes, pots or pans), as well as an increase in health expenditures. The observed increase in

[35] As mentioned in Section 5.2, estimates of BCC spillovers on height for age z scores tend to be negative and marginally significant when trimming the distribution at the 5th and 95th percentile. For the same sample, the negative coefficients for mother's brachial perimeter also become marginally significant when trimming the distribution at the 5th and 95th percentile.
[36] The point estimates for the impacts on cash transfers are positive for total consumption, food consumption, and non-food consumption, but only significant for the latter.

health expenditures is related to the higher incidence of disease in cash transfer villages compared to the control group, a variable in which there was imbalance at baseline, as noted above. Since no significant impact on food consumption is observed, the differences in non-food consumption and health expenditures induce a decrease in the share of food consumption in total consumption among cash transfer beneficiary households. [37] We do not find evidence that the interventions affected food prices in a way that would explain these results. There is no significant impact on the share of households reporting increases in food prices over the 12 months before the follow-up survey (Table 5, last column).[38]

Panels A and C show that the BCC intervention offsets some of the cash transfer impacts on non-food consumption. In both Panel A and Panel B, the BCC component induces a consistent decrease in non-food consumption, which essentially counterbalances the increase observed among cash transfer beneficiaries. ITT estimates in Panel C also suggest that the BCC component reduces cash transfer impacts on total consumption and offsets the reduction in the food share of total consumption among cash transfer beneficiaries. These effects are not robust in Panel A, however.

Table 6 provides results for assets and savings. Consistent with the behavioral intervention offsetting cash transfer impacts on non-food consumption, Panel A shows that the BCC component induces lower accumulation of household durables relative to households receiving cash transfers only. Few differential effects are found on savings or investment in productive assets (including livestock), though cash transfers beneficiaries are marginally more likely to save.[39] These results are consistent with lower investments in household durable goods among cash transfer beneficiary household assigned to the BCC component. They are also consistent with intra-household reallocation of resources between adults and children, as discussed in Section 6.1.

[37] Panel B of Table 5 shows no significant changes in consumption, among cash transfer non-beneficiary households in villages assigned to the BCC component.

[38] In addition, Table A.7 tests for impacts on village-level prices for the products most frequently purchased in the follow-up survey (Panel A). No significant difference in prices is found. Note that the likelihood that food products are purchased by any household in the village is lower for some items in cash transfer villages (Panel B). Filmer et al. (2018) find that cash transfers have adverse effects on child nutrition by increasing prices of perishable goods in villages with a high share of beneficiaries. In our sample, cash transfer beneficiaries represent 40% of households in the village on average, and the saturation levels never reach the levels found in Filmer et al. (2018). We do not find price effects in villages with higher saturation levels either.

[39] Panel B of Table 6 shows no significant changes in assets or savings among cash transfer non-beneficiary households in villages assigned to the BCC component.

6.3 Heterogeneity in BCC Impacts on Children's Human Capital

We now turn to analyzing heterogeneity in impacts on children's human capital outcomes. The very low-income setting in which the study is conducted is worth underlining again. It implies that there is limited within-sample variation in some domains, which reduces the dimensions of heterogeneity that can be analyzed. For instance, in our sample, only 8 percent of mothers have been to school. In addition, the demographics are noteworthy, with women having children early and frequently. As a result, only 9 percent of children in our sample are first children. There are nevertheless a range of relevant heterogeneity dimensions we can explore. Overall, we find no strong pattern of heterogeneity. The limited impacts on children's human capital hold across subgroups in the sample.

We first analyze heterogeneity by children's characteristics (gender and age) in Table 7 (Panel A and B). We do not find significant heterogeneity by age when distinguishing between children aged 0-2 and older children[40] (Panel A). We find some evidence that impacts on boys may be slightly larger in some dimensions than impacts for girls. The impact on weight for height is marginally significant and negative for girls. While it is larger for boys, it is still not significant and mostly offsets a lower weight for height scores for boys compared to girls in the control group. Impacts on socio-emotional development are driven by boys. These patterns of heterogeneity suggest that the limited observed impacts on human capital are concentrated among boys. While this further points to intra-household reallocations, the differences are not strong.

In Table 7 (Panel C), we analyze heterogeneity by whether the child's mother is the first wife of the household head. BCC impacts may be stronger for children whose mother is a first wife because she was the recipient of the cash transfers and was directly targeted for BCC activities such as village assemblies, small group meetings or household visits. Results do not show robust heterogeneity between children in beneficiary households. Impacts on children's human capital do not vary between children of the first wife or other wives in the household. Overall, not seeing significantly larger effects among children of cash transfer recipients within households is consistent with earlier results showing that the behavioral change promotion induced widespread changes in parenting practices. This is also in line with the lack of effects of cash transfers on parenting practices and children's human capital.[41]

[40] This break-down is natural both because children aged 0-2 where exposed to the intervention most (and often all) of their life, but also because the first 3 years of life has been highlighted as the key window for early childhood development.

[41] First wives differ from other wives in ways other than just receiving the cash transfer. For instance, they tend to be older and have more children. In the context of rural Niger, there are little inequalities between children of different wives within households, although first wives hold more assets than more junior wives. We also analyze whether impacts on human capital

Finally, we analyze heterogeneity by access to a health services, specifically whether the nearest health center is more than 20 minutes away from the household (Panel D). We do not find significant heterogeneity by this proxy of access to services. We do not however have measures of the quality of services provided in health centers to test whether the BCC intervention varies by access to quality services, which is known to be an issue in Niger (World Bank, 2017b).[42]

6.4 Human Capital of Other Household Members

Table 8 presents effects on human capital of other household members, including education and health indicators for older children and adults. Results are broadly consistent with the limited impacts found on younger children's human capital. The BCC intervention has some positive impacts on utilization of health services after illnesses for older children (Panel A and B) and adults (Panel A). It does not however affect school enrollment or attendance, self-reported illness, or fertility among adult women.[43] On the other hand, cash transfers alone do not lead to improvements in human capital among older children or adults either (Panel C). A higher incidence of illness in cash transfer villages is again observed, similar to the baseline imbalances noted above. Overall, results are consistent with cash transfers being mostly used for the purchase of non-food consumption items or small durable goods, as discussed in Section 6.2.

7. Conclusion

In this paper, we disentangle the effects of behavioral change promotion and cash transfers on parenting practices and young children's human capital in the low-income setting of rural Niger. Results show that behavioral change promotion induces robust changes in parenting practices related to nutrition, health, psycho-social stimulation and child protection among cash transfer beneficiaries. It also generates local spillovers in parenting practices among households not benefiting from cash transfers in treated villages. The results point to broad changes in parenting knowledge and practices.

differ among children of younger mothers (not shown). Younger mothers, who have had fewer children, may be more likely to change behavior and adopt changes in parenting practices conducive to early childhood development. We do not find robust patterns of heterogeneity. This is consistent with the widespread effects on parenting practices observed earlier.

[42] We further tested heterogeneity of BCC impacts by exposure to report drought shocks and did not find significant heterogeneity along that dimension either.

[43] The lack of effect on fertility is not surprising given the limited time span of the intervention, but we report it since it was one of the topics covered by the BCC intervention.

The impacts of behavioral change promotion on children's human capital are limited, however. Moderate improvements in socio-emotional development are found, but children's anthropometric and cognitive development do not improve. Increases in psycho-social stimulation and reduction in harsh disciplining likely contribute to improving socio-emotional development. Yet changes in psycho-social and nutrition practices are not sufficient to improve cognitive development or anthropometric outcomes.

While it remains possible that changes in final outcomes among children may take more time to materialize, the observed impacts are measured after 18 months of exposure to the behavioral parenting intervention, which is broadly in line with studies documenting short-term impacts of parenting interventions in other contexts (Attanasio et al., 2020; Macours et al., 2015).

Results also show that cash transfers alone do not have positive impacts on young children's human capital in the study context: cash transfers do not improve parenting practices or children's outcomes. While cash transfers improve welfare and dietary diversity at the household level, they do not lead to higher dietary diversity among children. In contrast, the behavioral change intervention leads to improvements in dietary diversity for children but not adults in the household. Cash transfers also increase non-food consumption, which the BCC intervention offsets. As such, results suggest that the BCC intervention leads to some intra-household reallocation of resources toward young children. The study thus documents that, while cash transfers improve household welfare, they are not sufficient to improve early childhood development in the low-income study setting of Niger.

Though we cannot formally test for complementarities, the study does not reveal strong signs of synergies between the impacts of the cash transfer and behavioral change interventions. Most effects on parenting practices and children's human capital stem from the behavioral change intervention. Still, the delivery of the behavioral change parenting intervention was facilitated by its implementation through the national cash transfer program. The safety net system provided a delivery mechanism to implement the behavioral intervention at large scale in the poorest areas of the country. Delivery through the national safety net also likely contributed to high participation rates and facilitated strong social dynamics around the program. As such, the integration of the parenting intervention in the safety nets had advantages from an implementation standpoint, and it is not clear that the effect of the BCC intervention without cash transfers would have been the same.

Overall, the results likely reflect the widespread poverty and multiple deprivations of the study context. In such an environment where several risk factors interplay, demand-side interventions, even if they

address a range of interlinked behaviors may require other complementary investments to be effective. In light of the study results, the Niger safety net unit has adjusted its program and strengthened its approach to identify and monitor cases of malnutrition, as well as to better coordinate the behavioral change component with supply-side interventions in the water and sanitation, health and education sectors. The study findings also suggest that stronger attention to mothers' nutrition may be needed. Additional research would be welcome to better understand potential complementarities between cash transfers, demand-side behavioral change interventions and supply-side interventions improving the quality of service provision or direct nutrition support interventions targeting children or mothers.

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Figure 1: Timeline

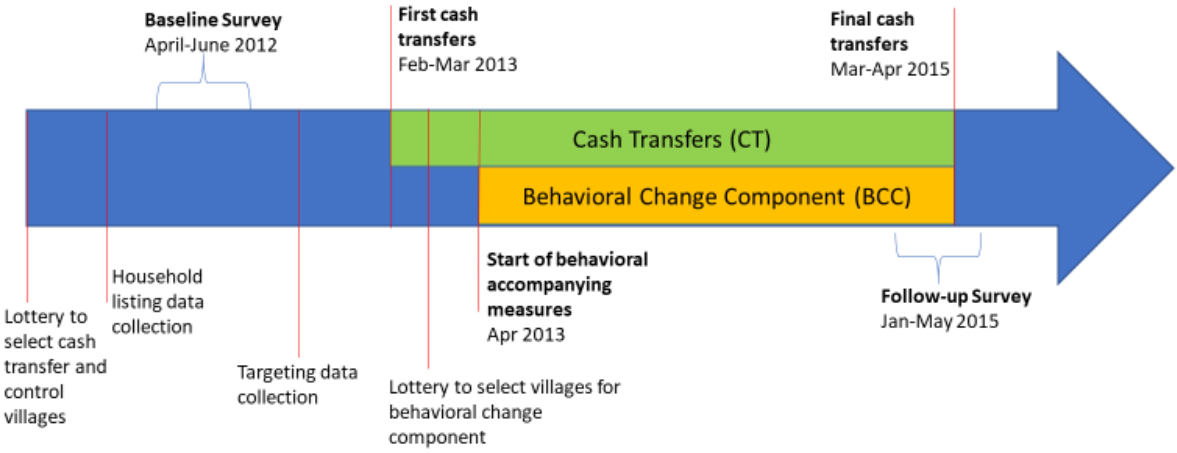
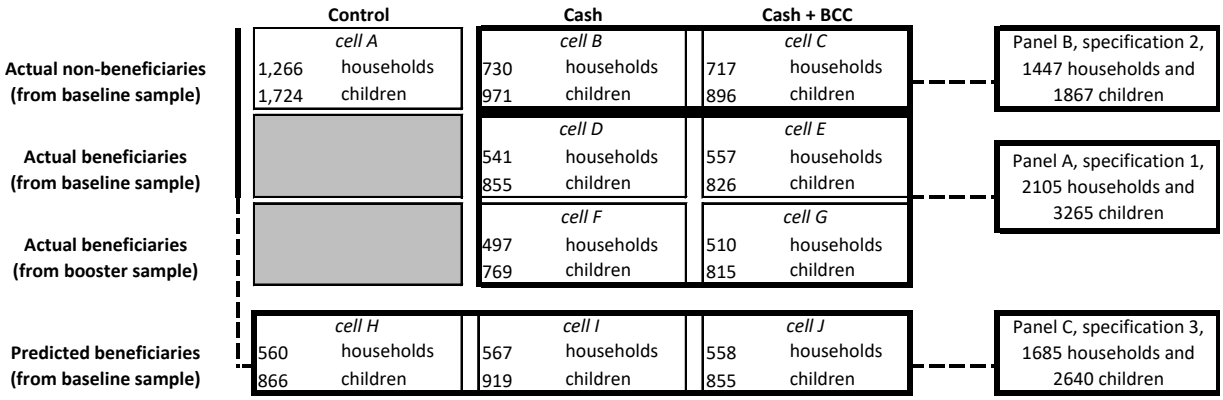


Table 1: Follow-up Sample Composition (4818 households, 6856 children)



Notes: This table details the composition of the follow-up sample. It distinguishes between cash transfer beneficiaries (separately for households from the baseline sample and from a booster sample added at follow-up) and cash transfer non-beneficiaries across villages assigned to the control group, cash only group, or cash with BCC group. Panel A provides the break-down of the follow-up sample used to estimate the value-added of the BCC intervention in specification (1). Panel B provides the break-down of the follow-up sample used to estimate local spill-overs from the BCC intervention in specification (2). Panel C provides the break-down of the sample used to estimate the intent-to-treat impacts of cash transfers and BCC on the sub-sample of predicted beneficiary households based on their PMT scores estimated using the baseline survey.

Table 2: Baseline Balance (baseline households surveyed at follow-up)

	Panel A: All households					Panel B: Beneficiaries			Panel C: Predicted beneficiaries				
	N	Mean in control	Cash-control	Cash+BCC - control	Cash+BCC - cash	N	Mean in cash	Cash+BCC - cash	N	Mean in control	Cash-control	Cash+BCC - control	Cash+BCC - cash
Variables from household survey			Diff	Diff	Diff			Diff			Diff	Diff	Diff
Household (hh) size	3,811	8.35	0.31	0.21	0.11	1,098	9.57	0.25	1,685	10.22	-0.02	-0.11	0.09
Hh head is polygamous	3,811	0.44	-0.02	-0.04	0.02	1,098	0.52	0.00	1,685	0.57	-0.01	-0.09**	0.08**
Hh head has never been to school	3,811	0.90	0.04***	0.02	0.02	1,098	0.94	0.02	1,685	0.93	0.03*	0	0.03
Hh head owns land	3,811	0.99	0.00	-0.01	0.01	1,098	0.98	-0.01	1,685	0.99	0	0	-0.01
Number of rooms in dwelling	3,804	3.08	0.00	-0.03	0.03	1,097	3.21	-0.04	1,680	3.4	-0.12	-0.13	0.01
Number of hh durable assets	3,811	4.60	0.07	-0.08	0.15	1,098	4.63	0.07	1,685	3.97	0.06	-0.12	0.19
Livestock index (TLU)	3,811	1.79	-0.03	0.21	-0.24	1,098	1.78	-0.04	1,685	1.56	-0.25	-0.08	-0.17
Hh member participated in a tontine (Rosca)	3,811	0.12	0.01	0.00	0.01	1,098	0.12	0.01	1,685	0.1	0.02	0	0.02
Time to nearest health center (min)	3,809	27.87	3.82	-0.74	4.56	1,098	31.87	6.45*	1,683	27	4.53	2.11	2.42
Time to fetch water (min)	3,648	26.45	3.25	1.74	1.51	1,055	29.76	-0.05	1,611	26.96	4	1.8	2.2
Hh has treated mostquito net	3,811	0.19	-0.02	-0.05*	0.03	1,098	0.17	0.03	1,685	0.17	-0.01	-0.02	0.01
Non-food consumption per capita (FCFA)	3,647	19,099	-258	-1,706	1,448	1,059	17,013	786	1,643	14,385	298	-976	1,273
Food consumption per capita (FCFA)	3,675	95,194	-4,675	-4,330	-345	1,066	83,472	-4,500	1,663	79,507	-1,943	-2,730	787
Total consumption per capita (FCFA)	3,656	116,253	-4,496	-5,462	967	1,061	103,920	-1,814	1,651	94,652	-493	-2,788	2,295
Share of food in total consumption	3,811	0.82	0.00	0.01	-0.01	1,098	0.82	-0.02	1,685	0.84	-0.01	0.00	-0.01
Dietary diversity (food consumption score)	3,748	50.39	-0.30	-2.28	1.98	1,084	48.93	0.57	1,656	48.52	-2.05	-3.22	1.16
Hh reported drought shock	3,811	0.71	0.01	-0.02	0.03	1,098	0.72	0.03	1,685	0.70	0.03	0.00	0.03
Hh reported crop disease	3,811	0.24	0.01	0.04	-0.03	1,098	0.27	-0.01	1,685	0.25	0.01	-0.02	0.03
Hh reported input price increase	3,811	0.20	-0.01	-0.01	0.00	1,098	0.18	-0.01	1,685	0.19	0.00	-0.02	0.02
Hh reported food price increase	3,811	0.56	0.00	0.02	-0.02	1,098	0.56	-0.03	1,685	0.58	0.01	-0.01	0.02
Number of live births for adult women	6,851	4.37	0.06	-0.18	0.24*	2,168	4.73	0.29	3,565	4.65	0.03	-0.27	0.30*
Adult woman pregnant in last 12 months	6,851	0.30	0.00	-0.02	0.02	2,168	0.31	0.05**	3,565	0.31	-0.01	-0.04**	0.03
Adult women not pregnant uses contraception	6,131	0.14	0.02	-0.02	0.04*	1,915	0.18	0.05*	3,218	0.14	0.01	-0.03	0.04**
Young child aged 0-4 reported sick in last month	4,190	0.36	-0.06**	-0.05**	-0.01	1,372	0.29	-0.02	2,274	0.30	-0.02	-0.01	-0.01
Child aged 5-14 reported sick in last month	14,879	0.14	-0.02*	-0.01	-0.01	4,937	0.11	-0.02	8,370	0.12	-0.01	0.00	-0.01
Adult 15+ reported sick in last month	13,387	0.18	-0.02	-0.01	-0.01	4,059	0.15	-0.01	6,503	0.16	-0.02	0.00	-0.02
Sick young child (0-4) consulted	1,328	0.82	-0.04	-0.03	0.00	410	0.76	-0.04	660	0.85	-0.06	-0.04	-0.02
Sick child (5-14) consulted	1,883	0.53	-0.04	0.06	-0.10***	594	0.49	-0.04	983	0.49	0.02	0.11**	-0.09*
Sick adult (15+) consulted	2,279	0.51	-0.03	0.00	-0.03	630	0.48	-0.02	969	0.49	-0.02	0.06	-0.08*
Child (6-14) attended school	12,052	0.46	-0.04	-0.04	-0.01	4,010	0.40	-0.02	6,767	0.44	-0.05	-0.03	-0.02
Variables from child survey													
Height for age z score	5,515	-1.94	-0.01	-0.11	0.10	1,800	-2.01	0.07	2,964	-1.97	-0.07	-0.11	0.04
Weight for height z score	5,510	-1.32	0.01	0.07	-0.06	1,800	-1.31	-0.08	2,962	-1.32	-0.06	0.07	-0.13*
Weigh for age z score	5,526	-2.38	0.02	-0.02	0.04	1,811	-2.42	-0.01	2,963	-2.39	-0.06	-0.02	-0.04
Dietary diversity (food consumption score)	5,450	43.90	1.25	2.08	-0.82	1,800	44.22	0.13	2,939	42.18	2.45	2.89	-0.45
Number of food types consumed in last week	5,455	5.83	-0.10	0.08	-0.18	1,800	5.63	-0.18	2,941	5.58	0.17	0.22	-0.06
Received vitamin A	5,637	0.85	0.05	-0.05	0.10**	1,855	0.91	0.11**	3,039	0.84	0.07	-0.05	0.12**
Received deworming	5,558	0.35	0.08*	0.08*	0.00	1,829	0.45	0.02	2,997	0.33	0.08*	0.08*	0.00
Received all vaccines	5,490	0.40	0.02	0.01	0.01	1,811	0.40	-0.02	2,964	0.36	0.04	0.03	0.01
Cognitive score (children 6-42 months, norm=10)	3,717	6.24	0.20	0.44*	-0.25	1,222	6.37	-0.34	1,978	6.17	0.19	0.53**	-0.34
Stimulation material index (scale: 0-6)	5,655	3.16	0.02	-0.26	0.28	1,855	3.11	0.18	3,049	3.16	-0.08	-0.27	0.19
Stmulation index (scale: 0-7)	5,638	2.06	0.01	0.28	-0.27	1,845	2.04	-0.33	3,042	2.01	0.12	0.40*	-0.28
Has birth certificate	5,680	0.48	-0.03	0.04	-0.08*	1,864	0.43	-0.07	3,657	0.44	-0.02	0.03	-0.06

Note: This table documents balance for baseline households surveyed at follow-up. Panel A considers all baseline households surveyed at follow-up. Panel B considers actual beneficiaries only. Panel C considers households predicted to be beneficiaries when applying the PMT targeting formula to the baseline survey in treatment and control groups. Balance is documented for variables from the household survey (top panel, first for household-level variables, then for individual-level variables), as well as children's outcomes (bottom panel). The exchange rate was 1 USD = 497 CFA francs (FCFA) on January 1, 2013, and 1 USD = 541 CFA francs (FCFA) on January 1, 2015. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Parenting practices

(A) Value-added of BCC for cash transfer beneficiaries

	Nutrition		Health			Stimulation		Child protection	
	Nutrition Practice Index (12-23 months old)	Dietary Diversity	Preventive Health Practice Index	Sick	Consulted if sick	Stimulation Index	Stimulation material index	Discipline Index	Has birth certificate
BCC (Value-Added)	0.441***	0.285***	0.205**	-0.075**	0.066*	0.218*	0.118	0.272***	0.021
	(0.136)	(0.071)	(0.082)	(0.035)	(0.035)	(0.129)	(0.091)	(0.083)	(0.027)
Exact p-value	0.00	0.00	0.02	0.04	0.07	0.11	0.23	0.00	0.46
Number of observations	706	3,262	3,181	3,220	1,213	3,262	3,263	3,261	3,220
R2	0.064	0.050	0.052	0.033	0.030	0.041	0.010	0.031	0.049
Mean in cash only group (beneficaries)	-0.085	0.016	0.037	0.403	0.650	0.017	0.043	0.052	0.877

(B) Spill-overs of BCC for cash transfer non-beneficiaries

	Nutrition		Health			Stimulation		Child protection	
	Nutrition Practice Index (12-23 months old)	Dietary Diversity	Preventive Health Practice Index	Sick	Consulted if sick	Stimulation Index	Stimulation material index	Discipline Index	Has birth certificate
BCC (Spill-overs)	0.290**	0.250***	0.120	-0.014	0.108**	0.368***	0.283***	0.053	-0.008
	(0.119)	(0.085)	(0.087)	(0.045)	(0.043)	(0.118)	(0.092)	(0.084)	(0.027)
Exact p-value	0.02	0.01	0.20	0.77	0.02	0.01	0.00	0.53	0.78
Number of observations	403	1,869	1,809	1,855	778	1,867	1,868	1,868	1,846
R2	0.122	0.045	0.057	0.047	0.071	0.075	0.035	0.011	0.031
Mean in cash only group (non beneficaries)	-0.144	-0.028	0.053	0.426	0.640	-0.108	-0.019	0.006	0.881

(C) ITT for predicted beneficiaries

	Nutrition		Health			Stimulation		Child protection	
	Nutrition Practice Index (12-23 months old)	Dietary Diversity	Preventive Health Practice Index	Sick	Consulted if sick	Stimulation Index	Stimulation material index	Discipline Index	Has birth certificate
BCC (Value-Added)	0.287*	0.240**	0.238**	-0.007	0.083*	0.361***	0.210**	0.211***	0.021
	(0.150)	(0.097)	(0.096)	(0.040)	(0.045)	(0.117)	(0.086)	(0.076)	(0.031)
Cash	0.117	0.015	0.029	0.070*	0.035	-0.096	0.012	-0.015	-0.034
	(0.128)	(0.102)	(0.082)	(0.040)	(0.045)	(0.111)	(0.081)	(0.080)	(0.030)
p for BCC + Cash = 0	0.00	0.00	0.00	0.13	0.02	0.02	0.01	0.01	0.63
Exact p-value BCC	0.06	0.02	0.01	0.86	0.07	0.00	0.02	0.01	0.55
Exact p-value Cash	0.39	0.89	0.74	0.07	0.46	0.40	0.90	0.85	0.26
Randomization t joint test	0.02	0.01	0.01	0.17	0.05	0.01	0.02	0.01	0.55
Number of observations	541	2,640	2,568	2,616	963	2,638	2,639	2,639	2,605
R2	0.084	0.045	0.068	0.041	0.052	0.053	0.021	0.017	0.043
Mean in control (predicted beneficiaries)	-0.057	-0.065	-0.086	0.318	0.623	0.034	-0.027	0.047	0.881

Notes: See Table A.1 for components of the nutrition practice index and the preventive health practice index, Table A.2 for components of the stimulation index and stimulation material index, and Table A.3 for components of the discipline index. Indices are standardized with respect to the full control group. The food consumption score is used to measure dietary diversity for children. Panel A isolates the value-added of the behavioral change promotion on actual cash transfer beneficiaries (based on the specification in equation (1)). Panel B isolates the spill-over of the behavioral change promotion on actual cash transfer non-beneficiaries (based on the specification in equation (2)). Panel C presents ITT estimates for the impact of cash transfers and the behavioral change component on predicted beneficiary households (based on the specification in equation (3)). OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table 4: Early childhood nutrition and development outcomes

(A) Value-added of BCC for cash transfer beneficiaries					
	Anthropometrics			Child Development	
	Height for age	Weight for height	Weight for age	Cognitive Score	Socio-Emotional Score
BCC (Value-Added)	-0.037	0.001	-0.052	-0.049	0.172**
	(0.051)	(0.044)	(0.050)	(0.058)	(0.067)
Exact p-value	0.48	0.98	0.32	0.41	0.01
Number of observations	3,014	2,919	2,976	2,049	2,033
R2	0.027	0.014	0.030	0.006	0.041
Mean in cash only group (beneficiaries)	-0.107	-0.033	-0.096	-0.059	-0.098
(B) Spill-overs of BCC for cash transfer non-beneficiaries					
	Anthropometrics			Child Development	
	Height for age	Weight for height	Weight for age	Cognitive Score	Socio-Emotional Score
BCC (Value-Added)	-0.055	0.048	-0.027	-0.004	0.149**
	(0.052)	(0.053)	(0.063)	(0.069)	(0.062)
Exact p-value	0.31	0.38	0.69	0.96	0.03
Number of observations	1,748	1,676	1,704	1,141	1,179
R2	0.019	0.028	0.024	0.011	0.064
Mean in cash only group (non beneficaries)	-0.092	-0.095	-0.091	-0.086	-0.152
(C) ITT for predicted beneficiaries					
	Anthropometrics			Child Development	
	Height for age	Weight for height	Weight for age	Cognitive Score	Socio-Emotional Score
BCC (Value-Added)	0.007	0.003	-0.019	0.023	0.132*
	(0.064)	(0.059)	(0.063)	(0.079)	(0.076)
Cash	-0.117	0.057	-0.053	-0.047	-0.054
	(0.074)	(0.055)	(0.070)	(0.067)	(0.069)
p for BCC + Cash = 0	0.07	0.28	0.26	0.73	0.33
Exact p-value BCC	0.91	0.96	0.76	0.79	0.09
Exact p-value Cash	0.11	0.32	0.47	0.49	0.47
Randomization t joint test	0.17	0.47	0.54	0.80	0.26
Number of observations	2,460	2,371	2,393	1,602	1,693
R2	0.039	0.017	0.031	0.014	0.024
Mean in control (predicted beneficiaries)	-0.027	-0.046	-0.059	-0.025	-0.012

Notes: Height-for-age (used to identify stunting), weight-for-height (used to identify wasting) and weight-for-age (used to identify underweight) are z scores for children aged 6-59 at the time of the follow-up survey. Cognitive (Bayley^{TM}) score is a z score for children aged 6-42 months at the time of the follow-up survey. Socio-emotional development (strength-and-difficulties) score is a z score for children aged 24-59 months at the time of the follow-up survey. All z scores are standardized with respect to the full control group. Panel A isolates the value-added of the behavioral change promotion on actual cash transfer beneficiaries (based on the specification in equation (1)). Panel B isolates the spill-over of the behavioral change promotion on actual cash transfer non-beneficiaries (based on the specification in equation (2)). Panel C presents ITT estimates for the impact of cash transfers and the behavioral change component on predicted beneficiary households (based on the specification in equation (3)). OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table 5: Food Security and Household Consumption

(A) Value-added of BCC for cash transfer beneficiaries

	Household dietary diversity	Mother brachial perimeter	Total consumption pc	Food consumption pc	Non food consumption pc	Education and Health expenditures pc	Share of food consumption in total consumption	Household reported higher food prices
BCC (Value-Added)	-3.209	-1.568	-7,599.349	-1,276.007	-3,576.881*	-802.421	0.014	-0.005
	(1.985)	(1.708)	(6,589.801)	(3,344.237)	(2,082.415)	(2,732.442)	(0.013)	(0.041)
Exact p-value	0.13	0.39	0.26	0.71	0.10	0.77	0.30	0.91
Number of observations	1,983	2,154	1,999	2,004	2,002	1,999	1,999	2,016
R2	0.041	0.024	0.081	0.063	0.063	0.038	0.062	0.014
Mean in cash only group (beneficiaries)	44.971	258.085	135,718.7	78,115.4	27,542.8	26,294.3	0.666	0.308

(B) Spill-overs of BCC for cash transfer non-beneficiaries

	Household dietary diversity	Mother brachial perimeter	Total consumption pc	Food consumption pc	Non food consumption pc	Education and Health expenditures pc	Share of food consumption in total consumption	Household reported higher food prices
BCC (Value-Added)	-2.846	-3.851	-2,568.293	321.247	-1,290.547	-4,950.513	0.022	-0.014
	(2.093)	(2.598)	(9,602.355)	(4,378.391)	(2,363.162)	(5,096.729)	(0.013)	(0.049)
Exact p-value	0.20	0.19	0.83	0.95	0.60	0.46	0.12	0.80
Number of observations	1,275	1,153	1,284	1,285	1,286	1,282	1,281	1,299
R2	0.049	0.061	0.075	0.060	0.069	0.034	0.054	0.022
Mean in cash only group (non beneficiaries)	44.689	256.975	146,684.5	85,253.5	29,996.8	26,490.1	0.670	0.295

(C) ITT for predicted beneficiaries

	Household dietary diversity	Mother brachial perimeter	Total consumption pc	Food consumption pc	Non food consumption pc	Education and Health expenditures pc	Share of food consumption in total consumption	Household reported higher food prices
BCC (Value-Added)	-2.055	-1.202	-13,692.783**	-988.447	-5,845.011***	-5,764.859	0.033**	-0.027
	(1.990)	(2.741)	(5,992.703)	(3,906.727)	(2,030.073)	(3,638.615)	(0.014)	(0.046)
Cash	4.565**	0.132	20,543.954***	4,127.496	5,207.815**	7,795.771**	-0.056***	0.051
	(2.276)	(3.296)	(6,446.673)	(4,224.358)	(2,415.521)	(3,341.233)	(0.014)	(0.050)
p for BCC + Cash = 0	0.26	0.61	0.27	0.38	0.72	0.55	0.09	0.63
Exact p-value BCC	0.32	0.68	0.03	0.80	0.01	0.13	0.02	0.55
Exact p-value Cash	0.06	0.97	0.00	0.33	0.04	0.02	0.00	0.31
Randomization t joint test	0.17	0.83	0.00	0.57	0.03	0.07	0.00	0.61
Number of observations	1,533	1,627	1,536	1,542	1,538	1,536	1,522	1,548
R2	0.047	0.046	0.124	0.110	0.102	0.038	0.073	0.014
Mean in control (predicted beneficiaries)	42.391	257.824	117,284.0	71,751.7	23,651.2	21,701.8	0.690	0.252

Notes: The food consumption score is used to measure dietary diversity. Consumption and expenditure variables in local currency (FCFA). The exchange rate was 1 USD = 497 CFA francs (FCFA) on January 1, 2013, and 1 USD = 541 CFA francs (FCFA) on January 1, 2015. Panel A isolates the value-added of the behavioral change promotion on actual cash transfer beneficiaries (based on the specification in equation (1)). Panel B isolates the spill-over of the behavioral change promotion on actual cash transfer non-beneficiaries (based on the specification in equation (2)). Panel C presents ITT estimates for the impact of cash transfers and the behavioral change component on predicted beneficiary households (based on the specification in equation (3)). OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table 6: Assets and savings

(A) Value-added of BCC for cash transfer beneficiaries					
	# Household Durable Goods	# Household productive assets	Livestock (TLU index)	Participated in savings group (tontines)	Weekly amount contributed in tontines
BCC (Value-Added)	-0.781**	0.162	0.069	0.017	-15.9
	(0.365)	(0.284)	(0.090)	(0.034)	(62.6)
Exact p-value	0.03	0.56	0.45	0.63	0.81
Number of observations	1,994	1,997	2,003	2,014	2,013
R2	0.036	0.015	0.097	0.048	0.012
Mean in cash only group (beneficiaries)	5.210	6.382	1.423	0.365	281.0
(B) Spill-overs of BCC for cash transfer beneficiaries					
	# Household Durable Goods	# Household productive assets	Livestock (TLU index)	Participated in savings group (tontines)	Weekly amount contributed in tontines
BCC (Value-Added)	-0.299	-0.009	0.092	-0.020	-399.0
	(0.337)	(0.266)	(0.087)	(0.026)	(276.5)
Exact p-value	0.39	0.98	0.31	0.45	0.10
Number of observations	1,291	1,288	1,280	1,299	1,298
R2	0.047	0.018	0.110	0.036	0.009
Mean in cash only group (non beneficiaries)	4.799	5.976	1.316	0.196	582.1
(C) ITT for predicted beneficiaries					
	# Household Durable Goods	# Household productive assets	Livestock (TLU index)	Participated in savings group (tontines)	Weekly amount contributed in tontines
BCC (Value-Added)	-0.635*	-0.016	0.065	0.021	-358.9
	(0.380)	(0.346)	(0.116)	(0.042)	(236.4)
Cash	0.381	-0.003	-0.110	0.075*	185.0
	(0.412)	(0.318)	(0.125)	(0.042)	(184.3)
p for BCC + Cash = 0	0.55	0.95	0.68	0.03	0.23
Exact p-value BCC	0.10	0.97	0.58	0.63	0.14
Exact p-value Cash	0.40	0.99	0.39	0.07	0.35
Randomization t joint test	0.27	1.00	0.68	0.07	0.35
Number of observations	1,538	1,534	1,531	1,548	1,548
R2	0.036	0.021	0.106	0.034	0.022
Mean in control (predicted beneficiaries)	4.689	6.460	1.481	0.209	560.4

Notes: Weekly amount contributed to savings group in local currency (FCFA). Livestock index in Tropical Livestock Unit (TLU). The exchange rate was 1 USD = 497 CFA francs (FCFA) on January 1, 2013, and 1 USD = 541 CFA francs (FCFA) on January 1, 2015. Panel A isolates the value-added of the behavioral change promotion on actual cash transfer beneficiaries (based on the specification in equation (1)). Panel B isolates the spill-over of the behavioral change promotion on actual cash transfer non-beneficiaries (based on the specification in equation (2)). Panel C presents ITT estimates for the impact of cash transfers and the behavioral change component on predicted beneficiary households (based on the specification in equation (3)). OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table 7: Heterogeneity in value-added of BCC on children's human capital

A. Heterogeneity by child's age (54.7% aged 0-2 years old)	height for age	weight for height	weight for age	Cognitive Score	Socio-Emotional Score
BCC	-0.071	0.041	-0.050	-0.071	0.135**
	(0.063)	(0.061)	(0.059)	(0.061)	(0.066)
BCC * age 0-2	0.063	-0.063	0.003	0.018	0.118
	(0.091)	(0.086)	(0.072)	(0.071)	(0.097)
aged 0-2	-0.012	-0.447***	-0.334***	0.648***	-0.100
	(0.079)	(0.059)	(0.052)	(0.055)	(0.074)
p for BCC=0 when age 0-2	0.91	0.73	0.46	0.43	0.02
Exact p-value BCC	0.27	0.48	0.39	0.25	0.05
Exact p-value BCC* age 0-2	0.50	0.48	0.97	0.80	0.26
Randomization t joint test	0.55	0.74	0.63	0.47	0.06
Number of observations	3,013	2,918	2,975	2,048	2,032
R2	0.028	0.090	0.063	0.117	0.042
B. Heterogeneity by child's gender (51.5% male)	**height for age**	**weight for height**	**weight for age**	**Cognitive Score**	**Socio-Emotional Score**
BCC	-0.001	-0.096*	-0.065	0.004	0.114
	(0.068)	(0.054)	(0.064)	(0.067)	(0.087)
BCC * boy	-0.068	0.185**	0.024	-0.102	0.110
	(0.093)	(0.078)	(0.079)	(0.075)	(0.084)
Boy	-0.132*	-0.169***	-0.113*	0.047	-0.053
	(0.074)	(0.059)	(0.058)	(0.054)	(0.050)
p for BCC=0 when boy	0.32	0.16	0.51	0.17	0.00
Exact p-value BCC	0.98	0.08	0.31	0.96	0.21
Exact p-value BCC* boy	0.50	0.02	0.77	0.17	0.21
Randomization t joint test	0.65	0.06	0.56	0.32	0.01
Number of observations	3,014	2,919	2,976	2,049	2,033
R2	0.037	0.019	0.033	0.007	0.042
C. Heterogeneity by child mother (48.7% first wife of head)	**height for age**	**weight for height**	**weight for age**	**Cognitive Score**	**Socio-Emotional Score**
BCC	-0.077	-0.025	-0.105	-0.058	0.133
	(0.064)	(0.056)	(0.066)	(0.072)	(0.086)
BCC * child of 1st wife	0.081	0.048	0.104	-0.014	0.110
	(0.092)	(0.062)	(0.079)	(0.081)	(0.094)
Child of 1st wife	-0.117	0.065	-0.041	0.018	-0.024
	(0.071)	(0.044)	(0.055)	(0.058)	(0.054)
p for BCC=0 when child of 1st wife	0.95	0.66	1.00	0.31	0.00
Exact p-value BCC	0.25	0.65	0.15	0.43	0.14
Exact p-value BCC* child of 1st wife	0.40	0.46	0.22	0.86	0.29
Randomization t joint test	0.50	0.75	0.32	0.58	0.02
Number of observations	2,899	2,806	2,862	1,990	1,922
R2	0.032	0.016	0.032	0.007	0.045
D. Heterogeneity by distance to health center (45.5% far, >20min away)	**height for age**	**weight for height**	**weight for age**	**Cognitive Score**	**Socio-Emotional Score**
BCC	-0.084	-0.020	-0.103	-0.099	0.169*
	(0.060)	(0.060)	(0.063)	(0.077)	(0.089)
BCC * far health center	0.112	0.043	0.123	0.126	0.030
	(0.076)	(0.086)	(0.080)	(0.095)	(0.124)
Far health center	-0.089	-0.058	-0.095*	-0.082	0.080
	(0.059)	(0.046)	(0.054)	(0.071)	(0.072)
p for BCC=0 when far health center	0.67	0.70	0.75	0.69	0.03
Exact p-value BCC	0.18	0.75	0.12	0.21	0.08
Exact p-value BCC* far health center	0.14	0.62	0.13	0.20	0.82
Randomization t joint test	0.28	0.89	0.25	0.40	0.03
Number of observations	3,014	2,919	2,976	2,049	2,033
R2	0.029	0.015	0.031	0.008	0.043

Notes: Height-for-age (used to identify stunting), weight-for-height (used to identify wasting) and weight-for-age (used to identify underweight) are z scores for children aged 6-59 at the time of the follow-up survey. Cognitive (Bayley^{TM}) score is a z score for children aged 6-42 months at the time of the follow-up survey. Socio-emotional development (strength-and-difficulties) score is a z score for children aged 24-59 months at the time of the follow-up survey. All z scores are standardized with respect to the full control group. OLS estimates for heterogenous treatment effect based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table 8: Impact on human development outcomes of other household members

(A) Value-added of BCC for cash transfer beneficiaries								
	School enrollment (children 6-14)	# of school days missed (children 6-14)	Sick (children 5-14)	Consulted if sick (children 5-14)	Sick (adults 15+)	Consulted if sick (adults 15+)	Pregnant over last 12 months (adult women)	Uses contraception (adult women)
BCC (Value-Added)	-0.019	-0.065	-0.035	0.113***	-0.032	0.064**	-0.022	-0.019
	(0.031)	(0.050)	(0.026)	(0.039)	(0.034)	(0.028)	(0.024)	(0.015)
Exact p-value (rand-t, 2000 simulations, stratified)	0.54	0.21	0.19	0.01	0.37	0.03	0.40	0.23
Number of observations	7,178	4,056	7,816	1,794	8,024	2,617	4,596	4,596
R2	0.028	0.008	0.022	0.040	0.026	0.025	0.007	0.019
Mean in cash only group (beneficiaries)	0.550	0.261	0.238	0.406	0.345	0.482	0.433	0.084
(B) Spill-overs of BCC for cash transfer beneficiaries								
	School enrollment (children 6-14)	# of school days missed (children 6-14)	Sick (children 5-14)	Consulted if sick (children 5-14)	Sick (adults 15+)	Consulted if sick (adults 15+)	Pregnant over last 12 months (adult women)	Uses contraception (adult women)
BCC (Value-Added)	-0.012	0.035	-0.015	0.101**	-0.029	0.010	-0.006	-0.019
	(0.036)	(0.078)	(0.025)	(0.048)	(0.030)	(0.030)	(0.029)	(0.016)
Exact p-value (rand-t, 2000 simulations, stratified)	0.76	0.67	0.59	0.05	0.37	0.74	0.86	0.28
Number of observations	3,763	2,175	4,104	987	4,959	1,742	2,670	2,670
R2	0.036	0.017	0.028	0.041	0.029	0.030	0.014	0.032
Mean in cash only group (non beneficiaries)	0.573	0.288	0.238	0.423	0.353	0.507	0.412	0.089
(C) ITT for predicted beneficiaries								
	School enrollment (children 6-14)	# of school days missed (children 6-14)	Sick (children 5-14)	Consulted if sick (children 5-14)	Sick (adults 15+)	Consulted if sick (adults 15+)	Pregnant over last 12 months (adult women)	Uses contraception (adult women)
BCC (Value-Added)	0.015	-0.056	-0.023	0.084**	-0.008	0.005	-0.013	-0.015
	(0.038)	(0.060)	(0.028)	(0.042)	(0.030)	(0.031)	(0.024)	(0.017)
Cash	-0.020	0.100*	0.064**	0.057	0.062*	0.024	-0.010	0.041**
	(0.037)	(0.058)	(0.026)	(0.052)	(0.032)	(0.032)	(0.024)	(0.017)
p for BCC + Cash = 0	0.87	0.41	0.16	0.02	0.13	0.41	0.29	0.12
Exact p-value BCC	0.69	0.35	0.40	0.05	0.78	0.90	0.58	0.37
Exact p-value Cash	0.59	0.08	0.02	0.28	0.05	0.45	0.70	0.02
Randomization t joint test	0.86	0.24	0.06	0.04	0.15	0.69	0.60	0.06
Number of observations	6,172	3,533	6,675	1,498	6,627	2,150	3,809	3,809
R2	0.039	0.078	0.027	0.037	0.021	0.023	0.007	0.022
Mean in control (predicted non beneficiaries)	0.573	0.168	0.192	0.394	0.293	0.488	0.395	0.064

Notes: Panel A isolates the value-added of the behavioral change promotion on actual cash transfer beneficiaries (based on the specification in equation (1)). Panel B isolates the spill-over of the behavioral change promotion on actual cash transfer non-beneficiaries (based on the specification in equation (2)). Panel C presents ITT estimates for the impact of cash transfers and the behavioral change component on predicted beneficiary households (based on the specification in equation (3)). OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Supplementary Material: Annex, additional figures and tables

Annex: Additional Details on Behavioral Change Intervention

The "behavioral change component" (BCC, or "*Volet Comportemental*") provides information to parents and encourages behavioral changes in parenting practices to promote early childhood development.

The curriculum builds on UNICEF's "essential family practices" package, which is widely used around the world. In Niger, the UNICEF package of "essential family practices" focuses on the health and nutrition domains by covering the following themes: (i) exclusive breastfeeding for the first six months of life, (ii) sleeping under treated mosquito nets, (iii) providing children with oral rehydration solution in case of diarrhea, (iv) handwashing with soap, (v) complementary feeding for children after six months, (vi) use of preventive health care services to protect children against diseases, (vii) health visits for children at first sign of illness, and (viii) family planning. As part of the safety nets project, the content of the curriculum was further adjusted to cover themes relate to psycho-social stimulation, in line with recommendations such as those in Lancet (2007, 2011). The new material covers (i) recognizing signs of malnutrition, (ii) language stimulation, (iii) stimulation through play, (iv) school readiness, (v) brain development, (vi) birth registration, (vii) child school enrollment and attendance, (viii) discipline, punishment and conflict management; and (ix) attachment and socio-emotional development. Some of the original modules on essential family practices were adjusted (for instance covering hygiene of the home environment together with handwashing) and at times combined (for instance by covering preventive health behaviors together). The final curriculum contains 14 modules (see list in Section 2 of the paper).

The intervention was standardized through a detailed technical guide. It included the curriculum, as well as detailed scripts and key messages for each theme and each activity. It also provided detailed implementation modalities, supervision and quality control arrangements, as well as protocols to record participants' attendance in the project monitoring and information system. The technical guide was developed through multiple rounds of piloting and iterative field testing, which led to multiple revisions before the guide was adopted and implemented in the context of the program. The objective was to ensure consistency during implementation at scale, as well as to facilitate quality control and monitoring.

The intervention was based on a positive deviance approach, seeking to identify local examples of good practices to trigger broader behavioral change in the community. Its pedagogy relied heavily on role play and theater pieces, as well as a range of visual aids tailored for illiterate populations.

The behavioral change promotion intervention was designed to last approximately 18 months, starting three months after the first cash transfer payment. As part of the accompanying measures, each beneficiary household participates in three activities per month: a village assembly delivered by an NGO operator, a small-group meeting delivered by a community educator, and a home visit delivered by the same community educator. The village assembly is organized for approximately 50 beneficiary households on average. Although non-beneficiary households in those villages are not explicitly targeted, they can also participate in the assemblies. The community educator delivers one small-group meeting ("*causerie*") targeted to groups of 25 beneficiaries each month, and then a household visit targeted to each beneficiary household each month.

To alleviate concerns about too many messages (Vazir et al., 2013), the messages were designed to be introduced progressively, covering successively nutrition, health, psycho-social stimulation and protection. One new message or theme is introduced each month and is emphasized through all program activities that month. The message is then repeated periodically in subsequent months. In addition to covering these messages, some assemblies and small-group meetings also included cooking and play demonstrations, although these were not systematically implemented.

The behavioral change accompanying measures are not designed to take place at the same time as the cash transfer payments. They are implemented separately, including through specialized NGOs that are distinct from the micro-finance agencies in charge of providing monthly payments to beneficiaries. The behavioral component has a clear implementation and delivery structure. NGOs are contracted by the Safety Nets Unit to deliver the curriculum. An NGO field staff is selected to serve 10-15 villages, and there is one quality controller for every five NGO field staff. In addition to NGO operators, one community educator is selected for each 25 beneficiaries (on average 2 per village). Community educators are typically not beneficiaries of the cash transfers but receive an allowance of 10,000CFA (approximately USD 20) per month for their work. NGO field staff and community educators participate in a two-weeks training at the beginning of the program, as well as similar two-week refresher trainings after 6 and 12 months of implementation. In addition to delivering village assemblies, NGO field staffs are also responsible for coaching community educators.

The BCC intervention was rolled-out between April 2013 and March 2015. In practice, this was done in two phases. During a first 6-months phase between April and September 2013, NGO operators were trained, community educators selected and trained, introductory community assemblies were held, and the first three training modules on exclusive breastfeeding, complementary feeding, and recognizing signs of malnutrition were implemented. The second phase of training of NGO operators and community educators started in January 2014. The roll-out of remaining modules took place between March 2014 and March 2015. Project staff undertook some refresher training and follow-up activities between the two phases, but the intensity was lower. The implementing NGO remained the same for the two phases in Dosso but changed in Maradi. Community educators mostly remained the same, though some replacements took place. Some changes were necessary for family reasons (pregnancies, child birth or marriage in other villages) or due to performance problems (non-compliance with technical guidelines or insufficient skills). In total, 21 community educators of 308 were replaced at some point during implementation.

Even though it was not compulsory, participation in the behavioral accompanying measures was very high. The average attendance rate among cash transfer beneficiaries was 92%. Substantial participation of non-beneficiaries in assemblies held in beneficiary villages was also observed.

The implementation of the behavioral change component was closely monitored. Continuous quality control protocols were established. Quality control included full-time controllers hired by the implementing NGOs, dedicated heads of accompanying measures hired directly by the project in each region, as well as a project field worker in each commune. Two qualitative process evaluations were undertaken. They found that quality of implementation was satisfactory overall (for additional discussion, see Premand et al., 2016). In addition, participation in community assemblies, small-group meetings and household visits is monitored, and captured monthly for each beneficiary in an information system held by the implementing agency.

The behavioral accompanying measures were designed as a relatively low-cost intervention to ensure the feasibility of its implementation at scale. Their cost is estimated at $100 per direct cash transfer beneficiary household, or approximately 20% of the cash transfer amounts. Total implementation costs are estimated at $86 per direct cash transfer beneficiary household, and indirect oversight costs at $14.

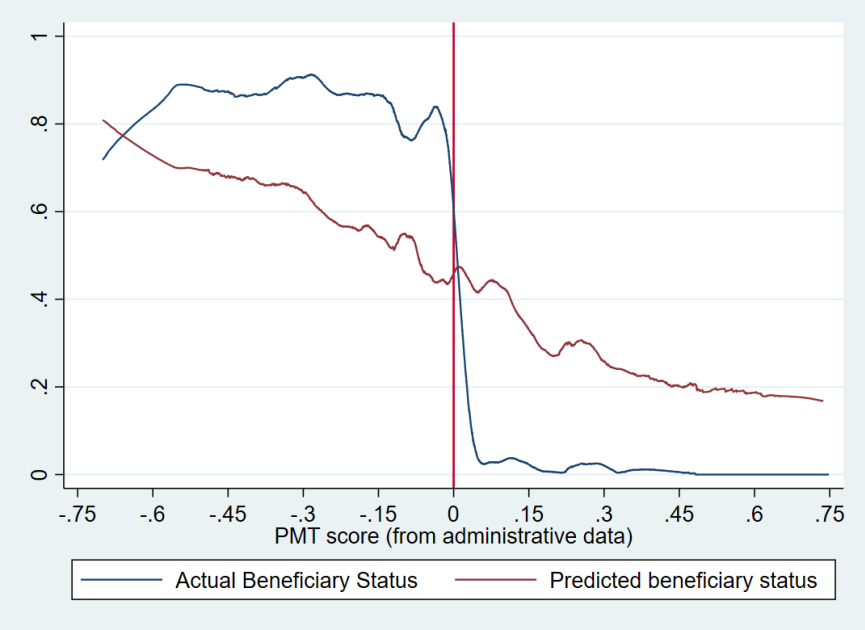
Costs include direct field implementation costs, as well as oversight of the behavioral accompanying measures. Oversight costs mostly come from regional project offices in charge of supervising the

implementation of NGO activities. Staff costs comprise 50% of the costs: 23% for NGO field workers, 16% for community educators, and 11% for NGO staff. NGO field activities and supervision amount to 18% of total costs, followed by workshop and training and administration costs. Project management costs from the national project implementation unit are not included, since many staffs work across components and management costs are difficult to distribute across activities. The fixed costs of designing the training package are not included either. The opportunity costs for beneficiaries to participate in the behavioral accompanying measures is not included.[44]

[44] Hourly earnings for women in the study area are hard to estimate since most are active in agricultural or non-agricultural self-employment. Moreover, the behavioral accompanying measure activities were scheduled in consultation with communities to minimize conflicts with other activities in the village. High participation rate is consistent with a low opportunity cost. To obtain an upper bound for the opportunity costs of participation in the behavioral accompanying measures, we can use the cash-for-works program implemented by the safety nets unit as a benchmark. The cash-for-works provides a wage of 1,300 FCFA per day, or approximately 2.6 USD. In any given month, the behavioral accompanying measures include one village assembly (approximately 2 hours), one small group meeting (approximately 2 hours) and a household visit (approximately 1 hour), which could together be considered equivalent to one workday. Behavioral accompanying measures activities in the field span 15 months. We could then estimate that opportunity costs of participation amount at most to 15 * 1,300 FCFA per beneficiary, or 19,500 FCFA (or 39 USD) per person, or approximately 40% of direct and indirect costs. Again, this estimate constitutes an upper bound, as few women have access to occupations that provide earnings as high as the cash-for-works program. In practice, opportunity costs are likely substantially lower.

Figure A1: Cash Transfer Program Beneficiary Status

(based on PMT score from Registry Census or Baseline Survey)



Note: This figures shows how the probability that households in the treatment group are selected as beneficiaries of the cash transfer program depend on the PMT score calculated from the registry census (blue line), or on a PMT score estimated from the RCT baseline survey (red line). The PMT score is centered so that the selection threshold is 0 (a household is selected as beneficiary if it has a PMT score below 0).

Table A1: Components of nutrition and health indices

(A) Value-added of BCC for cash transfer beneficiaries

	Nutrition Practice Index (for children 12-23 months old)										Preventive Health Practice Index					
	Exclusively breastfed for 6 months (sub-index)	Number of complementary food types (sub-index)	Vitamin	Juice	Rehydratation solution	Prepared food	Milk	Liquid	Solid food	Cereals	Completed vaccines	Received vitamin A	Received iron	Received deworming	Caregiver washes hand with soap	Sleep under treated mosquito net
BCC (Value-Added)	0.356***	0.247*	0.022	0.034	0.024	0.043	0.072*	0.024**	-0.025*	0.059**	0.026	0.022	0.049	0.043*	0.065**	0.040
	(0.101)	(0.145)	(0.037)	(0.026)	(0.018)	(0.064)	(0.039)	(0.010)	(0.013)	(0.027)	(0.032)	(0.016)	(0.044)	(0.025)	(0.025)	(0.036)
Exact p-value	0.00	0.10	0.54	0.19	0.19	0.53	0.07	0.00	0.07	0.03	0.44	0.17	0.27	0.10	0.01	0.29
Number of observations	706	706	706	706	706	706	706	706	706	706	3,181	3,181	3,181	3,181	3,181	3,181
R2	0.128	0.037	0.055	0.065	0.020	0.022	0.042	0.025	0.012	0.053	0.046	0.038	0.020	0.052	0.074	0.046
Mean in cash only group (beneficaries)	-0.131	0.012	0.171	0.108	0.026	0.182	0.507	0.977	0.972	0.051	0.614	0.903	0.173	0.671	0.780	0.106

(B) Spill-overs of BCC for cash transfer beneficiaries

	Nutrition Practice Index (for children 12-23 months old)										Preventive Health Practice Index					
	Exclusively breastfed for 6 months (sub-index)	Number of complementary food types (sub-index)	Vitamin	Juice	Rehydratation solution	Prepared food	Milk	Liquid	Solid food	Cereals	Completed vaccines	Received vitamin A	Received iron	Received deworming	Caregiver washes hand with soap	Sleep under treated mosquito net
BCC (Value-Added)	0.179*	0.218	0.011	0.043	0.016	0.030	0.086	-0.027	0.005	0.053**	0.023	0.000	0.062	-0.004	0.002	0.062
	(0.101)	(0.135)	(0.041)	(0.036)	(0.016)	(0.070)	(0.060)	(0.017)	(0.021)	(0.026)	(0.040)	(0.022)	(0.038)	(0.031)	(0.033)	(0.045)
Exact p-value	0.10	0.14	0.79	0.28	0.37	0.71	0.18	0.11	0.83	0.05	0.61	1.00	0.14	0.91	0.96	0.20
Number of observations	403	403	403	403	403	403	403	403	403	403	1,809	1,809	1,809	1,809	1,809	1,809
R2	0.177	0.050	0.041	0.025	0.012	0.051	0.052	0.127	0.014	0.077	0.055	0.034	0.071	0.054	0.028	0.060
Mean in cash only group (non beneficaries)	-0.171	-0.023	0.155	0.117	0.044	0.155	0.442	0.995	0.971	0.078	0.593	0.906	0.192	0.656	0.790	0.128

(C) ITT for predicted beneficiaries

	Nutrition Practice Index (for children 12-23 months old)										Preventive Health Practice Index					
	Exclusively breastfed for 6 months (sub-index)	Number of complementary food types (sub-index)	Vitamin	Juice	Rehydratation solution	Prepared food	Milk	Liquid	Solid food	Cereals	Completed vaccines	Received vitamin A	Received iron	Received deworming	Caregiver washes hand with soap	Sleep under treated mosquito net
BCC (Value-Added)	0.125	0.267*	-0.025	0.045	0.034*	0.077	0.099	-0.008	-0.014	0.058*	0.015	0.049**	0.105**	0.029	0.079**	0.008
	(0.115)	(0.160)	(0.046)	(0.051)	(0.020)	(0.068)	(0.065)	(0.013)	(0.018)	(0.032)	(0.034)	(0.021)	(0.042)	(0.038)	(0.039)	(0.044)
Cash	0.072	0.088	0.082*	0.038	-0.008	0.009	0.018	-0.005	-0.011	-0.036	-0.004	-0.004	0.005	0.016	-0.009	0.031
	(0.118)	(0.133)	(0.044)	(0.049)	(0.014)	(0.062)	(0.075)	(0.006)	(0.015)	(0.036)	(0.034)	(0.021)	(0.035)	(0.038)	(0.038)	(0.037)
p for BCC + Cash = 0	0.10	0.01	0.18	0.10	0.19	0.21	0.10	0.34	0.13	0.60	0.76	0.02	0.01	0.19	0.06	0.33
Exact p-value BCC	0.27	0.11	0.59	0.40	0.10	0.26	0.14	0.81	0.50	0.07	0.67	0.03	0.01	0.44	0.05	0.84
Exact p-value Cash	0.54	0.51	0.07	0.45	0.58	0.90	0.81	0.56	0.50	0.32	0.90	0.87	0.89	0.69	0.82	0.39
Randomization t joint test	0.27	0.04	0.17	0.28	0.28	0.43	0.18	0.72	0.38	0.18	0.90	0.03	0.02	0.43	0.09	0.54
Number of observations	541	541	541	541	541	541	541	541	541	541	2,568	2,568	2,568	2,568	2,568	2,568
R2	0.188	0.047	0.053	0.050	0.027	0.053	0.056	0.045	0.021	0.056	0.044	0.040	0.074	0.055	0.050	0.058
Mean in control (predicted beneficiaries)	0.021	-0.101	0.116	0.105	0.023	0.134	0.471	0.994	0.977	0.058	0.566	0.887	0.144	0.638	0.775	0.108

Notes: Components of nutrition practice index and preventive health practice index in Table 3. Sub-indices are standardized with respect to the full control group. Panel A isolates the value-added of the behavioral change promotion on actual cash transfer beneficiaries (based on the specification in equation (1)). Panel B isolates the spill-over of the behavioral change promotion on actual cash transfer non-beneficiaries (based on the specification in equation (2)). Panel C presents ITT estimates for the impact of cash transfers and the behavioral change component on predicted beneficiary households (based on the specification in equation (3)). OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table A2: Components of stimulation indices

(A) Value-added of BCC for cash transfer beneficiaries

	Stimulation index							Stimulation material index					
	Read	Tell stories	Take walks together	Play	Name	Count	Draw	Play with homemade toy	Play with manufactured toys	Play with household object	Play with animals	Play with toy that can be pulled	Play with balls
BCC (Value-Added)	0.026**	0.098**	0.066	0.044	0.038	0.060**	0.050*	-0.025	0.072**	-0.019	0.007	0.028	0.098***
	(0.010)	(0.043)	(0.054)	(0.051)	(0.046)	(0.029)	(0.029)	(0.049)	(0.030)	(0.019)	(0.018)	(0.046)	(0.033)
Exact p-value	0.01	0.03	0.24	0.40	0.43	0.05	0.09	0.63	0.02	0.34	0.70	0.57	0.00
Number of observations	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,263	3,263	3,263	3,263	3,263	3,263
R2	0.034	0.025	0.052	0.018	0.029	0.027	0.022	0.019	0.029	0.015	0.009	0.007	0.023
Mean in cash only group (beneficaries)	0.031	0.407	0.685	0.714	0.356	0.270	0.119	0.604	0.184	0.916	0.828	0.479	0.290

(B) Spill-overs of BCC for cash transfer beneficiaries

	Stimulation index							Stimulation material index					
	Read	Tell stories	Take walks together	Play	Name	Count	Draw	Play with homemade toy	Play with manufactured toys	Play with household object	Play with animals	Play with toy that can be pulled	Play with balls
BCC (Value-Added)	-0.001	0.198***	0.123**	0.098**	0.080**	0.101***	0.046*	0.047	0.020	0.061*	0.042	0.086*	0.128***
	(0.009)	(0.052)	(0.061)	(0.037)	(0.039)	(0.032)	(0.024)	(0.036)	(0.034)	(0.034)	(0.026)	(0.044)	(0.035)
Exact p-value	0.95	0.00	0.08	0.01	0.05	0.01	0.06	0.22	0.57	0.11	0.11	0.06	0.00
Number of observations	1,867	1,867	1,867	1,867	1,867	1,867	1,867	1,868	1,868	1,868	1,868	1,868	1,868
R2	0.022	0.062	0.053	0.039	0.035	0.039	0.015	0.019	0.044	0.043	0.014	0.032	0.041
Mean in cash only group (non beneficaries)	0.027	0.352	0.636	0.685	0.332	0.237	0.096	0.602	0.199	0.858	0.813	0.478	0.268

(C) ITT for predicted beneficiaries

	Stimulation index							Stimulation material index					
	Read	Tell stories	Take walks together	Play	Name	Count	Draw	Play with homemade toy	Play with manufactured toys	Play with household object	Play with animals	Play with toy that can be pulled	Play with balls
BCC (Value-Added)	0.024*	0.160***	0.120**	0.097**	0.058	0.111***	0.062**	0.014	0.086***	0.039	0.025	0.046	0.076**
	(0.013)	(0.050)	(0.058)	(0.039)	(0.042)	(0.035)	(0.030)	(0.044)	(0.030)	(0.028)	(0.021)	(0.044)	(0.035)
Cash	0.011	-0.057	-0.058	-0.070*	0.019	-0.015	0.002	-0.009	0.056**	-0.039	-0.035	0.038	0.005
	(0.010)	(0.056)	(0.060)	(0.037)	(0.040)	(0.032)	(0.027)	(0.049)	(0.025)	(0.026)	(0.022)	(0.045)	(0.035)
p for BCC + Cash = 0	0.01	0.01	0.26	0.44	0.07	0.01	0.04	0.91	0.00	0.99	0.67	0.06	0.02
Exact p-value BCC	0.09	0.00	0.05	0.01	0.19	0.00	0.05	0.77	0.01	0.18	0.25	0.31	0.04
Exact p-value Cash	0.29	0.31	0.33	0.07	0.66	0.65	0.94	0.86	0.03	0.17	0.12	0.41	0.91
Randomization t joint test	0.04	0.00	0.13	0.04	0.21	0.01	0.09	0.96	0.00	0.34	0.28	0.18	0.05
Number of observations	2,638	2,638	2,638	2,638	2,638	2,638	2,638	2,639	2,639	2,639	2,639	2,639	2,639
R2	0.031	0.027	0.046	0.019	0.026	0.050	0.024	0.023	0.049	0.028	0.015	0.023	0.026
Mean in control (predicted beneficiaries)	0.024	0.399	0.704	0.757	0.355	0.267	0.108	0.615	0.111	0.905	0.860	0.444	0.272

Notes: Components of stimulation and stimulation material indices in Table 3. Panel A isolates the value-added of the behavioral change promotion on actual cash transfer beneficiaries (based on the specification in equation (1)). Panel B isolates the spill-over of the behavioral change promotion on actual cash transfer non-beneficiaries (based on the specification in equation (2)). Panel C presents ITT estimates for the impact of cash transfers and the behavioral change component on predicted beneficiary households (based on the specification in equation (3)). OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table A3: Components of discipline index

(A) Value-added of BCC for cash transfer beneficiaries

	Positive discipline sub-index	Discipline by explaining	Discipline by re-directing	Negative discipline sub-index	Forbid	Shake	Yell	Spank	Spank with an object	Berate	Slap	Hit on hands	Hit with an object
BCC (Value-Added)	-0.040	-0.019	-0.011	-0.259***	-0.023	-0.071**	-0.076*	-0.082**	-0.061**	-0.158***	-0.069***	-0.063**	-0.019
	(0.053)	(0.025)	(0.031)	(0.082)	(0.018)	(0.032)	(0.039)	(0.039)	(0.030)	(0.033)	(0.022)	(0.027)	(0.012)
Exact p-value	0.48	0.47	0.73	0.00	0.22	0.03	0.07	0.04	0.05	0.00	0.00	0.03	0.13
Number of observations	3,261	3,261	3,261	3,261	3,261	3,261	3,261	3,261	3,261	3,261	3,261	3,261	3,261
R2	0.010	0.009	0.013	0.031	0.018	0.019	0.030	0.023	0.022	0.033	0.015	0.019	0.006
Mean in cash only group (beneficaries)	-0.040	0.759	0.578	-0.058	0.118	0.529	0.708	0.384	0.246	0.463	0.246	0.278	0.059

(B) Spill-overs of BCC for cash transfer beneficiaries

	Positive discipline sub-index	Discipline by explaining	Discipline by re-directing	Negative discipline sub-index	Forbid	Shake	Yell	Spank	Spank with an object	Berate	Slap	Hit on hands	Hit with an object
BCC (Value-Added)	0.135**	0.027	0.073***	-0.007	0.006	0.055*	0.005	0.025	0.010	-0.085***	-0.015	-0.018	0.001
	(0.059)	(0.035)	(0.025)	(0.082)	(0.030)	(0.032)	(0.034)	(0.041)	(0.038)	(0.032)	(0.027)	(0.032)	(0.017)
Exact p-value	0.04	0.48	0.01	0.93	0.85	0.10	0.88	0.55	0.81	0.02	0.59	0.58	0.95
Number of observations	1,868	1,868	1,868	1,868	1,868	1,868	1,868	1,868	1,868	1,868	1,868	1,868	1,868
R2	0.010	0.010	0.013	0.007	0.036	0.012	0.011	0.023	0.011	0.014	0.009	0.006	0.006
Mean in cash only group (non beneficaries)	-0.116	0.724	0.556	-0.041	0.127	0.491	0.692	0.398	0.252	0.465	0.260	0.323	0.063

(C) ITT for predicted beneficiaries

	Positive discipline sub-index	Discipline by explaining	Discipline by re-directing	Negative discipline sub-index	Forbid	Shake	Yell	Spank	Spank with an object	Berate	Slap	Hit on hands	Hit with an object
BCC (Value-Added)	0.003	-0.018	0.020	-0.191**	-0.004	-0.030	-0.052	-0.068*	-0.052	-0.123***	-0.079***	-0.047	-0.002
	(0.060)	(0.030)	(0.032)	(0.076)	(0.029)	(0.037)	(0.036)	(0.039)	(0.035)	(0.031)	(0.025)	(0.030)	(0.014)
Cash	0.006	-0.016	0.020	0.015	-0.036	-0.037	-0.029	0.025	0.066	0.046	0.002	0.008	-0.008
	(0.059)	(0.029)	(0.030)	(0.075)	(0.032)	(0.029)	(0.029)	(0.042)	(0.040)	(0.029)	(0.031)	(0.033)	(0.014)
p for BCC + Cash = 0	0.89	0.27	0.24	0.02	0.22	0.07	0.02	0.29	0.66	0.01	0.01	0.22	0.44
Exact p-value BCC	0.97	0.55	0.55	0.02	0.89	0.45	0.16	0.09	0.16	0.00	0.00	0.14	0.87
Exact p-value Cash	0.92	0.59	0.54	0.84	0.27	0.22	0.32	0.54	0.10	0.11	0.94	0.82	0.57
Randomization t joint test	0.99	0.55	0.53	0.03	0.43	0.18	0.10	0.23	0.25	0.00	0.00	0.28	0.74
Number of observations	2,639	2,639	2,639	2,639	2,639	2,639	2,639	2,639	2,639	2,639	2,639	2,639	2,639
R2	0.011	0.017	0.007	0.016	0.013	0.030	0.029	0.010	0.009	0.019	0.015	0.009	0.005
Mean in control (predicted beneficiaries)	-0.014	0.788	0.568	-0.046	0.134	0.572	0.750	0.371	0.200	0.434	0.234	0.298	0.066

Notes: Components of discipline index in Table 3. Sub-index standardized with respect to the full control group. Panel A isolates the value-added of the behavioral change promotion on actual cash transfer beneficiaries (based on the specification in equation (1)). Panel B isolates the spill-over of the behavioral change promotion on actual cash transfer non-beneficiaries (based on the specification in equation (2)). Panel C presents ITT estimates for the impact of cash transfers and the behavioral change component on predicted beneficiary households (based on the specification in equation (3)). OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table A4: Impact on parenting practices for baseline households surveyed at follow-up (excluding booster sample)

(A) Value-added of BCC for cash transfer beneficiaries

	Nutrition			Health		Stimulation		Child protection	
	Nutrition Practice Index (12-23 months old)	Dietary Diversity	Preventive Health Practice Index	Sick	Consulted if sick	Stimulation Index	Stimulation material index	Discipline Index	Has birth certificate
BCC (Value-Added)	0.239	0.331***	0.247**	-0.100**	0.122***	0.262*	0.130	0.288***	0.020
	(0.184)	(0.083)	(0.098)	(0.043)	(0.041)	(0.133)	(0.098)	(0.102)	(0.034)
Exact p-value	0.22	0.00	0.02	0.03	0.00	0.06	0.20	0.01	0.60
Number of observations	364	1,679	1,639	1,664	644	1,679	1,679	1,678	1,655
R2	0.024	0.069	0.042	0.049	0.059	0.074	0.017	0.037	0.051
Mean in cash only group (beneficiaries)	-0.085	0.016	0.037	0.403	0.650	0.017	0.043	0.052	0.877

Notes: Robustness of results in Table 3 (value-added of the behavioral change promotion on actual cash transfer beneficiaries) without booster sample. Indices are standardized with respect to the full control group. The food consumption score is used to measure dietary diversity for children. OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table A5: Early childhood nutrition and development outcomes for baseline households surveyed at follow-up (excluding booster sample)

	(A) Value-added of BCC for cash transfer beneficiaries				
	Height for age	Weight for height	Weight for age	Cognitive Score	Socio-Emotional Score
BCC (Value-Added)	-0.045	0.034	-0.040	0.026	0.223***
	(0.068)	(0.057)	(0.062)	(0.076)	(0.082)
Exact p-value	0.52	0.56	0.53	0.73	0.01
Number of observations	1,549	1,496	1,521	1,056	1,054
R2	0.025	0.016	0.032	0.011	0.045
Mean in cash only group (beneficiaries)	-0.107	-0.033	-0.096	-0.059	-0.098

Notes: Robustness of results in Table 4 (value-added of the behavioral change promotion on actual cash transfer beneficiaries) without booster sample. Height-for-age (used to identify stunting), weight-for-height (used to identify wasting) and weight-for-age (used to identify underweight) are z scores for children aged 6-59 at the time of the follow-up survey. Cognitive (Bayley^{TM}) score is a z score for children aged 6-42 months at the time of the follow-up survey. Socio-emotional development (strength-and-difficulties) score is a z score for children aged 24-59 months at the time of the follow-up survey. All z scores are standardized with respect to the full control group. OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

Table A6: Robustness of impacts on anthropometric variables depending on treatment of outliers

(A) Value-added of BCC for cash transfer beneficiaries

	Height for age (trimmed at 2nd and 98th percentiles) a\	Height for age (trimmed at 5th and 95th percentiles) a\	Height for age (trimmed using the interquartile range) b\	Weight for height (trimmed at 2nd and 98th percentiles) a\	Weight for height (trimmed at 5th and 95th percentiles) a\	Weight for height (trimmed using the interquartile range) b\	Weight for age (trimmed at 2nd and 98th percentiles) a\	Weight for age (trimmed at 5th and 95th percentiles) a\	Weight for age (trimmed using the interquartile range) b\
BCC (Value-Added)	-0.037	-0.043	-0.030	0.001	0.020	-0.005	-0.052	-0.033	-0.041
	(0.051)	(0.033)	(0.039)	(0.044)	(0.034)	(0.046)	(0.050)	(0.044)	(0.053)
Exact p-value	0.48	0.16	0.40	0.98	0.58	0.92	0.32	0.46	0.43
Number of observations	3,014	2,897	3,146	2,919	2,812	3,047	2,976	2,905	3,174
R2	0.027	0.026	0.033	0.014	0.015	0.015	0.030	0.032	0.030
Mean in cash only group (beneficiaries)	-0.107	-0.010	-0.018	-0.033	-0.019	-0.013	-0.096	-0.069	-0.053

(B) Spill-overs of BCC for cash transfer non-beneficiaries

	Height for age (trimmed at 2nd and 98th percentiles) a\	Height for age (trimmed at 5th and 95th percentiles) a\	Height for age (trimmed using the interquartile range) b\	Weight for height (trimmed at 2nd and 98th percentiles) a\	Weight for height (trimmed at 5th and 95th percentiles) a\	Weight for height (trimmed using the interquartile range) b\	Weight for age (trimmed at 2nd and 98th percentiles) a\	Weight for age (trimmed at 5th and 95th percentiles) a\	Weight for age (trimmed using the interquartile range) b\
BCC (Value-Added)	-0.055	-0.055*	-0.056	0.048	0.027	0.029	-0.027	0.021	-0.034
	(0.052)	(0.031)	(0.039)	(0.053)	(0.045)	(0.050)	(0.063)	(0.054)	(0.061)
Exact p-value	0.31	0.09	0.17	0.38	0.56	0.58	0.69	0.71	0.61
Number of observations	1,748	1,688	1,825	1,676	1,606	1,739	1,704	1,684	1,822
R2	0.019	0.020	0.027	0.028	0.023	0.029	0.024	0.032	0.030
Mean in cash only group (beneficiaries)	-0.092	0.004	-0.011	-0.095	-0.066	-0.060	-0.091	-0.077	-0.070

(C) ITT for predicted beneficiaries

	Height for age (trimmed at 2nd and 98th percentiles) a\	Height for age (trimmed at 5th and 95th percentiles) a\	Height for age (trimmed using the interquartile range) b\	Weight for height (trimmed at 2nd and 98th percentiles) a\	Weight for height (trimmed at 5th and 95th percentiles) a\	Weight for height (trimmed using the interquartile range) b\	Weight for age (trimmed at 2nd and 98th percentiles) a\	Weight for age (trimmed at 5th and 95th percentiles) a\	Weight for age (trimmed using the interquartile range) b\
BCC (Value-Added)	0.007	-0.017	-0.011	0.003	0.005	0.002	-0.019	0.015	-0.003
	(0.064)	(0.035)	(0.041)	(0.059)	(0.049)	(0.054)	(0.063)	(0.049)	(0.063)
Cash	-0.117	-0.075*	-0.106**	0.057	0.032	0.027	-0.053	-0.073	-0.064
	(0.074)	(0.042)	(0.046)	(0.055)	(0.047)	(0.049)	(0.070)	(0.054)	(0.068)
p for BCC + Cash = 0	0.07	0.01	0.01	0.28	0.39	0.58	0.26	0.27	0.31
Exact p-value BCC	0.91	0.63	0.81	0.96	0.92	0.98	0.76	0.76	0.96
Exact p-value Cash	0.11	0.07	0.03	0.32	0.51	0.60	0.47	0.19	0.38
Randomization t joint test	0.17	0.05	0.02	0.47	0.67	0.81	0.54	0.42	0.56
Number of observations	2,460	2,369	2,569	2,371	2,272	2,471	2,393	2,349	2,572
R2	0.039	0.038	0.042	0.017	0.016	0.023	0.031	0.038	0.038
Mean in control (predicted beneficiaries)	-0.027	0.040	0.047	-0.046	-0.023	-0.019	-0.059	-0.035	-0.021

Notes: Robustness of results in Table 4 (value-added of the behavioral change promotion on actual cash transfer beneficiaries) to alternative treatment of outliers. Height-for-age (used to identify stunting), weight-for-height (used to identify wasting) and weight-for-age (used to identify underweight) are z scores for children aged 6-59 at the time of the follow-up survey. All z scores are standardized with respect to the full control group. OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

a\ Observations below the lower percentile and above the higher percentile set to missing

b\ Observations below p25-1.5*(p75-p25) and above p75+1.5*(p75-p25) set to to missing

Table A7: Effects on food prices and likelihood of food item purchase between village clusters

(A) Impact on food prices (z-scores based on survey unit value) for selected food products purchased a

	Millet	Baobab leaves	Dried tomatoes	Corn	Fresh dairy products	Dried legumes	Fresh legumes, roots and tubers	Processed legumes	Goat meat	Sorgho
BCC (Value-Added)	-0.086	0.110	0.135	0.049	0.235	0.127	0.078	-0.030	0.209	-0.184
	(0.101)	(0.152)	(0.195)	(0.159)	(0.309)	(0.283)	(0.215)	(0.141)	(0.224)	(0.215)
Cash	-0.031	0.141	-0.231	-0.078	-0.150	0.120	0.118	0.073	-0.327	0.071
	(0.096)	(0.150)	(0.194)	(0.160)	(0.308)	(0.298)	(0.209)	(0.139)	(0.217)	(0.235)
p for BCC + Cash = 0	0.26	0.10	0.63	0.86	0.78	0.41	0.37	0.76	0.61	0.62
Exact p-value BCC	0.39	0.51	0.46	0.77	0.44	0.65	0.71	0.85	0.38	0.29
Exact p-value Cash	0.73	0.35	0.23	0.65	0.61	0.72	0.59	0.60	0.14	0.77
Randomization t joint test	0.52	0.21	0.48	0.90	0.75	0.77	0.66	0.87	0.33	0.54
Number of observations	107	122	137	132	65	68	112	96	91	32
R2	0.638	0.281	0.089	0.424	0.131	0.159	0.129	0.132	0.225	0.608
Mean z-score	0.230	-0.006	0.048	0.009	0.066	-0.021	-0.046	-0.272	0.170	0.046
Mean unit value (Local currency)	371.988	53.333	93.841	470.644	80.166	88.832	337.139	5.982	967.057	323.214

(B) Impact on likelihood that any household in the village purchases (selected) food products b

	Millet	Baobab leaves	Dried tomatoes	Corn	Fresh dairy products	Dried legumes	Fresh legumes, roots and tubers	Processed legumes	Goat meat	Sorgho
BCC (Value-Added)	0.063	0.055	-0.013	-0.010	-0.036	0.095	-0.012	0.161*	0.053	-0.087
	(0.070)	(0.054)	(0.040)	(0.056)	(0.093)	(0.100)	(0.079)	(0.083)	(0.095)	(0.071)
Cash	-0.049	-0.093*	-0.093**	-0.080	-0.009	-0.172*	-0.027	-0.137*	-0.035	0.020
	(0.069)	(0.053)	(0.039)	(0.055)	(0.092)	(0.099)	(0.078)	(0.082)	(0.094)	(0.070)
p for BCC + Cash = 0	0.83	0.48	0.01	0.10	0.62	0.44	0.62	0.77	0.85	0.33
Exact p-value BCC	0.33	0.27	0.65	0.75	0.71	0.35	0.84	0.06	0.57	0.26
Exact p-value Cash	0.54	0.08	0.03	0.18	0.96	0.08	0.73	0.10	0.70	0.82
Randomization t joint test	0.60	0.21	0.10	0.25	0.90	0.23	0.87	0.14	0.86	0.46
Number of observations	152	152	152	152	152	152	152	152	152	152
R2	0.332	0.223	0.375	0.258	0.220	0.112	0.210	0.283	0.151	0.454
Share of hh purchasing product	0.212	0.135	0.115	0.154	0.577	0.596	0.250	0.346	0.385	0.731

Notes: Unit value are in local currency (FCFA). The exchange rate was 1 USD = 497 CFA francs (FCFA) on January 1, 2013, and 1 USD = 541 CFA francs (FCFA) on January 1, 2015. OLS estimates based on regressions including strata fixed effects and sampling weights. Robust (White-Huber) standard-errors are clustered by village clusters. *** p<0.01, ** p<0.05, * p<0.1 (based on asymptotic p-values). Exact randomization-t p-values, obtained from 2000 simulations, accounting for stratified randomization (Young, 2018).

a\ Prices aproximated by median unit values at cluster level. Dependent variables correspond to standardized z-scores for the natural logarithm of each price. Food items selected if at least 10% of households in the sample consume them, at least 5 household per village report consumption, and if there is a well-defined unit of measurement. Millet, baobab leaves, dried tomato, corn, goat meat and sorgho represent median values in village cluster. Other prices are aggregates that weight each item by its mean share in the budgets among all households. Fresh dairy products include prices of fresh milk and milk curd; dried legumes include dried beans and dried gombo; fresh legumes, roots and tubers include sweet potato and onions; processed legumes include peanut paste and beans beignets.

b\ The dependent variables are set to 1 if the median unit value at cluster level is missing and 0 otherwise.