

Early Intervention and Caregiving: Evidence from the Uganda Nutrition and Early Child Development Program

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Abstract

It was hypothesized that the World Bank-assisted project on Nutrition and Early Child Development in Uganda, which operated in 35 districts from 2000 to 2003, would have an impact on parenting behaviors and attitudes about child development. Comparing those who lived in the intervention area with those who did not showed at baseline there were few differences in attitudes and practices. At the final assessment, intervention mothers reported significantly more behaviors and positive attitudes supporting children's learning and development and were more likely to report attitudes supporting father involvement compared to the control group. The data suggest that parenting behaviors and attitudes regarding stimulation and support for children's development and learning can be changed through a program intervention at scale.

During the early years children make great strides across all domains of development (McCartney & Phillips, 2006; Shonkoff & Phillips, 2000). The near universal acceptance of the importance of caregiving cannot be disputed; parents and caregivers are the primary providers of stimulating and supportive experiences associated with these developments (Bradley & Corwyn, 2005; Britto, Fuligni, & Brooks-Gunn, 2002; Richter, 2004; Rogoff, 2003; Werner & Smith, 2001; Whiting & Edwards, 1988). Early childhood intervention programming has been fueled by the converging streams of knowledge that early childhood is a period of rapid growth and development, that both biological and social processes in the early years are critical, and that caregiving has a significant effect

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on children's growth and development beyond the effects of socioeconomic status (Bradley & Corwyn, 2005). However much of this evidence has been garnered from developed countries (Barnett, 1995; Shonkoff & Phillips, 2000), with developing country data just emerging (Engle et al., 2007).

Engle, Grantham-McGregor, Black, Walker, and Wachs (sous presse) in this journal outlined the significant associations between early learning and later development, and the size and extent of the loss of developmental potential in the developing world. The paper noted that even though nutritional deficiencies are being recognized, much less is known about strategies to improve children's learning opportunities in the earliest years in resource-poor countries, and early child development interventions are rarely evaluated. Existing data suggests that early childhood development (ECD) programs that provide comprehensive services, e.g., some combination of healthcare, nutrition, and early stimulation, have pervasive and sustained beneficial impacts on children's well being compared to single-service programs (Alderman, Behrman, & Hoddinott, 2004; Young, 1997), albeit it is still unclear how these programs should be combined and what are the best strategies for promoting early stimulation at scale. Engle et al. (2007) identified what appeared to be characteristics of successful programming from 20 evaluations of early child development programs in developing countries. These included sufficient duration, provision of direct services to children, intensity, quality, comprehensiveness, targeting to disadvantaged children, and child's age at beginning the project, but the evidence for the importance of each of these in developing countries is still limited.

The evaluation of an integrated nutrition and early child development program supported by a World Bank loan to the government of Uganda for five years, from 1998 to 2003, provides an opportunity to examine the effectiveness of a comprehensive, large-scale intervention on selected outcomes related to early child development. The *Uganda Nutrition and Early Child Development* (NECD) project was possibly the largest ECD initiative in East Africa. The multi-site, longitudinal evaluation of the NECD project was based on randomized experimental design. The present study was an investigation of one proposed outcome of the intervention, that of family caregiving behaviors and attitudes.

Uganda is a challenging environment vis-à-vis support for early child development. Despite poverty and high rates of malnutrition, most Ugandan families value education and want their children to attend school. To illustrate, when Uganda initiated a program of free primary education the rates of attendance increased dramatically. Although Uganda is approaching universal primary school initiation, there are questions of quality of schooling in many areas. Additionally, there are many parts of the country that cannot ensure adequate health and nutrition of their children. For example, at the time of the study's initiation, over one-third of children were stunted, a rate above the global norm (United Nations Children's Fund, 2006), which is of particular concern because stunting has been shown to significantly affect cognitive development (Walker et al., 2007).

Some results of the intervention have been reported elsewhere. For example, Alderman (2007) and Alderman and Engle (2007) reported that there were improvements in growth but only for the youngest age group. They also reported an increase in exclusive breastfeeding, as well as greater dietary diversity (Britto, Engle, & Alderman, 2005). Use of health services and coverage with deworming treatment also improved

(Alderman, Britto, Engle, & Siddiqi, 2003). Some impact on the cognitive ability of children aged 3.5–6 years, based on the a Ugandan version of the British Ability Scales, was also reported in an unpublished report (Alderman et al., 2003), and further work is underway. The focus of the present paper is the effects of intervention on parenting behaviours and attitudes that support young children's learning and overall development, behaviors that are important for and support the learning and development of young children (Bradley & Caldwell, 1995).

Evidence that caregiver support and cognitive stimulation and provision of opportunities, materials, and experiences will promote and further positive child development, especially during the early childhood years, is strong (Bornstein, 2002; Richter, 2004). For example, stimulation of learning has been associated with better cognitive and behavior development in early childhood (Fuligni, Han, & Brooks-Gunn, 2004; Leventhal, Selner-O'Hagan, Brooks-Gunn, Bingenheimer, & Earls, 2004). Positive parent-children interactions and opportunities for development and learning are considered aspects of stimulating and supportive caregiving, e.g., parent and child book reading, playing, singing together (Britto, Fuligni & Brooks-Gunn, 2002; Custodero, Britto, & Brooks-Gunn, 2003). These effects continue to be seen even after controlling for socioeconomic status (Brooks-Gunn, Klebanov, & Duncan, 1996).

For this intervention, which was based on formative research conducted prior to the intervention design and on developmental literature, dimensions of caregiving included support and stimulation for children's development (Bradley, 1994). Specifically, three aspects of stimulation and parental support were assessed in the present study: daily routines, behaviors that support children's learning and preparedness for school, and children's play and everyday experiences. In addition, father attitudes and involvement with young children, as well as attitudes about the importance of these caregiving activities for young children's learning and development were also assessed.

The role of fathers in providing stimulating caregiving is important for young children's development (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000). Father involvement in childrearing has been considered from two perspectives, traditional and contemporary. Traditional approaches to understanding father involvement typically include the extent to which the father is the primary source of income for the child's education and well-being, i.e., indirectly involved in the development of the child. Contemporary approaches to father involvement take into consideration the father's direct role in caregiving, e.g., bathing, feeding, interactions, and how frequently, e.g., on a daily basis (Pruett, 2000). The second approach to father involvement was explored in the present study.

Attitudes play a role in influencing caregiving behaviors through the caregivers' beliefs in self-efficacy (their belief that they can be effective in caregiving) and in their role construction (what they perceive as their appropriate role; Bandura, 1997; Hoover-Dempsey & Sandler, 1997). Parental attitudes toward their roles and their beliefs in their abilities to help their children's learning have been linked with parenting behaviors and interactions with their children (Ardelt, & Eccles, 2001; Bandura, Barbaranelli, Caprara, & Pastorelli, 1996). These attitudinal components are particularly important for parental involvement in their children's learning and schooling (Alexander, Entwisle, & Bedinger, 1994; Dauber, Alexander, & Entwisle, 1996). Therefore, finding a change in parental

attitudes could have implications for behavioral change in parent's involvement in their children's learning and development.

The present study examined effects of a comprehensive early childhood intervention on caregiving behaviors and attitudes related to children's development. We hypothesized that caregivers in the intervention group would be more likely to report behaviors related to cognitive stimulation, attitudes in favor of cognitive stimulation, and an increase in the role of fathers with young children at the final assessment. These three areas were specifically targeted in the intervention. An impact on daily experiences and play activities would be unlikely since it was not a focus of the intervention and was not generally regarded as a task specifically linked with education and learning.

Method

Intervention Description

The NECD project was designed to enhance the capacity of families and communities to foster the growth, learning, and development of children less than 6 years of age (preschool or at age of school entry). The project had three aims: (a) help communities organize services for children aged less than six years through growth monitoring and promotion activities, establishment of early childcare and education facilities, and access to child health services through six-monthly Child Health Days; (b) strengthen the capacity of families and communities through sensitization, education, and skills training on early child development and nutrition, and training for savings and income generation; and (c) provide support to communities through community grants and incentives. These aims were achieved with three inter-related components: community based interventions and grants, subdistrict activities, and national level initiatives including capacity building not described here.

The most disadvantaged subdistricts were selected based on level of malnutrition, infant mortality, and rate of primary school enrollment. The community-based intervention was in two-thirds of all communities in these districts. Under the NECD project, services were delivered through a decentralized system coordinated by local nongovernmental organizations (NGOs) and community-based organizations (CBOs). These organizations provided training for child caregivers on relevant caregiving activities, training for resource mobilization, child growth promotion and nutrition counseling. Two volunteers per community, who were given a bicycle as well as training, provided the child growth promotion. In addition, communities under the project had access to a grant set in the course of the project at \$1,500 (\$1,250 from the bank loan and the remainder from the district). The community determined the specific intervention to be funded from this grant through a process of participatory community planning. These community level workshops also provided an opportunity for communities to learn more about factors related to early child development.

At the parish (subdistrict) level Child Health Days were held every six months and provided an opportunity to communities to access integrated health services (Alderman, Konde-Lule, Sebuliba, Bundy, & Hall, 2006). In addition, the child health days provided an opportunity for imparting information about health, nutrition, and food security through a range of interactive methods.

Finally, an educational campaign, Community and Home-based Interventions for Long-term Development (CHILD), was initiated that included messages and information on growth and child development. Key messages in the communication campaign, which used radio, posters, and other local media, recommended improved health-seeking behaviour, breastfeeding, and complementary feeding. There were also several messages about early child development: the importance of children's learning through play activities, and the importance of fathers in the development of their children.

These messages were developed through formative research conducted prior to the study design to assess family attitudes and practices regarding positive parental interaction to support growth, learning and development, and to determine how best to phrase the messages (Baume, Neema, Kibombo, & Cabanero-Verzosa, n.d.). The formative study videotaped children in 3 communities, conducted interviews with $n = 100$ men and $n = 100$ women, and held focus group discussions in 17 communities across Uganda. Results suggest that parents have very little time for interacting with young children, and children's intelligence is viewed as largely intrinsic. The role of the parent in preparing children for school focused on obedience and training in respect, good feeding, and care. However, the families also reported that they recognized the importance of positive parenting, stimulating a child's talking, answering his questions, and giving the child attention, although "attention" referred primarily to physical care. A majority of both mothers and fathers reported that they played with the child most days. Almost half reported telling stories, 66% reported that they sang, and 33% said that they read to the child on most days. Parents also reported teaching children something, although it was usually about physical care, household chores, or how to behave. The authors noted that none of these activities were observed in the video sequences, but perhaps they occurred in the evening, whereas videos were taken during the day. Although parental teaching may be valued, the formative research did not identify when or how often it was done (Baume et al., n.d.).

A special focus of the formative research was to find ways to expand the father's involvement with young children, which was quite limited, and the recommendation for changing this involvement was to work through community norms and behavior rather to rely on messages to individual families. In response, the intervention included community level activities, a publication in simple language on fathers, and other activities. Therefore, the project was designed to help families understand their role in early childhood development and in particular their role in improving learning opportunities for young children in the home (Baume et al., n.d.).

Implementation faced several challenges. Although the project was originally planned to be in operation for five years, many of the activities did not begin until late 2001, resulting in less than two years of exposure before the final assessment. Community grants were not allocated before 2002, and in most cases even later, and some communities did not receive grants at all. There was less funding per district than initially planned. Initially the program was limited to 25 districts due to financial constraints, but the number of districts was increased to 34 in order to obtain parliamentary approval, although the funding was not increased.

Evaluation Design

The multi-site, longitudinal evaluation of the NECD program was based on a randomized experimental design consisting of three groups: group A received all ECD services, including parenting training, nutritional services, and the experimental delivery of albendazole for deworming at Child Health Days; group B received parenting training and core ECD services only; and group C, the control group, received no services (Alderman et al., 2003).

A baseline assessment was done on a random sample of $N = 2250$ households in 2000, and the same households, and similar aged children, were assessed in 2003. Thus the analysis of effects allows a comparison of baseline and outcome measures. The random sample was selected based on a 3-strata (parish, community, and household) cluster sampling technique with random selection at each level (see Table 1). Fifty parishes were selected from a random draw of parishes in the project site and randomly assigned to either group A or group B. In addition, for each subcounty in the project a control group was selected from a subcounty which was *not* in the project but adjacent to it. All parishes in these subcounties were then listed, and a random draw of 25 parishes from the total list was selected. Two villages from each parish selected were then chosen, again using a list of all the villages in the parish. This step reduced the number of villages where a household listing would be required. A census of households was then conducted in each sample village and a random draw of households containing at least one child less than 6 years of age was selected.

Table 1
Evaluation Study Design (N = 2250)

3-strata sample of households	Group A: ECD services, parenting training, nutritional and deworming services	Group B: ECD services and parenting training	Group C: No services
Parish ^a	25	25	25
Community ^b : 2 per parish	50	50	50
Household ^c : 15 per community	750	750	750

^aA parish in Ugandan local government hierarchy is below the district level. ^bA community is the equivalent of a village. ^cGiven the conditions associated with the civil war and the AIDS epidemic, the definition of a household extends beyond the immediate biological family. Second, from a cultural perspective the extended family plays a key role in socialization practices. In the NECD project a household is defined as a unit of people living together under one roof and generally sharing meals.

A baseline questionnaire was administered to 2250 households (750 in each strata) by the Institute of Public Health (IPH) between January and March 2000. Each household with a child less than six years old was revisited in the same season in 2003. Of the initial 2250 households, a total of 2037 were located for re-interview. Households in the parish that fostered children who were orphaned or otherwise changed households since the baseline were also included in the 2003 sample. If an original household no

longer had a child under 6 years of age and thus was unable to contribute information relevant to the early child development evaluation, it was dropped from the survey after the roster was filled in and a replacement household with a suitable aged child was selected (Alderman et al., 2004).

The sampling approach for the household survey was influenced by the costs and logistics of revising households and the need to design a survey instrument, including tests of cognitive development in the local languages. For these reasons this aspect of the analysis was concentrated on a single region with the understanding that other aspects of the evaluation would be conducted more broadly. As one aspect of the study was to test the administration of albendazole on Child Health Days (see Alderman et al., 2006) the selection of the Eastern region for this study was based on the results of a study by the Vector Control Unit of the Ministry of Health that indicated the highest rates of worm loads (number of worms per stool) in the country.

Study Sample

Since the major intervention to effect parental childrearing was the parent education and community improvement components, the two intervention groups were combined for this study. Additionally, although deworming, when administered twice a year over a period of several years, significantly improved weight gain (Alderman et al., 2006), it had no impact on the British Ability Scales score (Alderman et al., 2004).

The equivalence of the baseline data was evaluated through comparisons on outcome indicators such as nutritional status, socioeconomic status and income levels. No differences were found between the treatment groups and the controls (Alderman et al., 2004; Makerere University Institute of Public Health [IPH], 2003).

Table 2 describes sample characteristics for the control and intervention groups at posttest. On average the mothers had completed three years of schooling and on average the father had completed two more years, i.e., five years of schooling. The two groups were comparable at final assessment for child age, gender (49% in the intervention group and 51% in the control group), maternal education, and paternal education. However, there were significant differences in numbers of possessions, a measure of wealth, at the final assessment that had not been present in the initial assessment. Some changes in socioeconomic status from 2000 to 2003 were limited to the project area, but others were seen across all project areas (IPH, 2003). Households in general increased the quality of their housing, their access to safe water sources, and their labor force participation. In the project areas, there was a small increase in families owning bicycles and in families raising chickens, which were both project goals.

The baseline survey found that over 36% of children under the age of 5 years were moderately and severely malnourished. Food shortages were reported to be common; in the baseline period 30% of families reported having only one major meal a day for at least ten weeks. Houses were generally of basic quality, with the majority having grass roofs and dirt floors. Not surprisingly, malnutrition was high; the overall rate of stunting, at 39%, was fairly consistent across the three groups and was higher than found in many parts of sub-Saharan Africa.

HIV/AIDS is an overwhelming issue in Uganda, and one concern was that many of the children may have been without parents because of the effects of the epidemic of HIV/AIDS in the country. Families were asked about the status of the mother. A total of

113 mothers (6.5%) were said to be “away”, and 14 (0.8%) were reported to have died. The low number is not surprising in that orphanhood increases with child age, with fewer young children likely to be affected.

Table 2

Selected Sample Characteristics of Intervention and Control Groups at Baseline and Final Assessment

Characteristic	Mean		Standard deviation		Sample size	
	Intervention	Control	Intervention	Control	Intervention	Control
Number of possessions at baseline ($t = 1.31$, ns)	1.91	1.86	.98	.91	1493	751
Number of possessions at final ($t = 3.86$, $p < .001$)	2.87	2.60	1.41	1.31	1142	635*
Child age (months) at final	36.2	35.6	16	16	1243	660
Child gender (female) at final	--	--	--	--	1243	660
Maternal education (years of schooling) at final	3.15	3.11	3.20	3.04	926	491
Paternal education (years of schooling) at final	4.82	4.76	4.05	4.16	926	491

Note. Dashes indicate the mean and *SD* were not reported.

* $p < .01$.

Measures

Outcome variables in the evaluation included nutritional status, attitudes and beliefs about nutrition, vaccination rates, use of health services, test score on an adaptation of the British Ability Scales (a measure of language and cognitive development, for children aged 3.5 to 6 years), and parental attitudes and practices about early child development. There were nine modules to the household questionnaire addressing various aspects of the home life including housing assets, utilities, and labor force participation. The current study focused on the caregiving attitudes and behaviours.

Caregiving attitudes and behaviors were measured through questions to the mother or female head of household in the baseline and final household surveys. Questions were asked about a specific child, namely the child closest to 3 years of age. On average, children were 36 months of age.

Three areas of caregiving were assessed: (a) behaviors that support learning and development; daily routines and caregiving; and daily experiences including play; (b) father involvement (behavior and attitudes) in caregiving; and (c) attitudes toward parents' role in a child's learning and development. The assessment of behaviors that support learning and development was based on aspects of caregiving adapted in part from the Home Observation for Measurement of the Environment (HOME) inventory (Bradley, 1994), the most widely used assessment of children's home environments in the field of developmental psychology. The HOME inventory is intended to measure the quality and quantity of stimulation and support available to a child in the home environment. The following aspects of stimulation and support were included in the present study:

1. Physical caregiving: 1 item, e.g., "On the last day you were with the child, did the child receive care of physical needs from you (e.g. bathing, feeding)?"
2. Child involvement in routine household activities: 2 items, e.g., "Spent time with you doing work of some sort (e.g., sweeping, washing, agriculture; child did errands)."
3. Experiential and play activities: 11 items, e.g., "Spent time with mother/respondent playing, talking & laughing; went outside village; child had purchased or made toys."
4. Learning activities linked with school preparedness: 3 items, e.g., "Spent time in learning activities (counting, naming objects, drawing, etc.)."

Father involvement was assessed with four questions about his activities with the child on the previous day (e.g., spent time with father playing, laughing and talking), and two questions on attitudes (e.g., fathers' responsibilities for children are ONLY to provide food and medicine).

The final set of seven questions addressed caregiving attitudes towards their role in preparing children for school [e.g., making toys and playthings for children less than 6 years old helps them to get ready for school; children become more intelligent if they eat a good diet when they are young (under age 3 years)].

Data Analytical Approach

The survey instrument was essentially unchanged from baseline to final assessment. Although the same families were followed from the baseline to the final survey, in the case of the caregiving questions it was not possible to ask the caregiver questions on the same child, as the developmental tasks would have changed; therefore, in both assessments, the target child was the one closest to the age of 36 months. Although it is possible that the same child would have been selected for both rounds, given the fertility rates in Uganda and the three-year time difference, it is more likely that a younger child was selected for the second round. However, this may not be a major problem, since the focus of the study was on caregiver behavior not child outcomes.

Attrition between baseline and follow-up was very low, as refusals were negligible and few households had relocated; moreover, Global Position Systems

facilitated locating the families that had moved (Alderman et al., 2004). Therefore, rather than a longitudinal design the analytic strategy involved a cross-sectional comparison of the baseline data in comparison to group comparisons in the final study.

Program effects were examined using descriptive and bivariate analyses. Given the categorical type of data, chi-square analyses were conducted. This analytical procedure is most suited for binomial data and observations involving two often mutually exclusive categories (Tabachnick & Fidell, 1996). In the present study the categorical predictor variables were intervention and control status. The dependent variables of parental behaviors and attitudes were also coded on a binary scale. The Pearson 2-sided χ^2 tests were conducted to determine significance of the results.

Results

A primary aim of the NECD program was to build the capacity of families and communities to improve young children's well-being. This section presents the results of the impact of intervention on caregiving behaviors and attitudes analyzed in the current study.

Stimulation and Supportive Behaviors for Learning and Development

The first set of analyses examined differences between intervention and control families on stimulation and support for learning and development across physical care, daily routines, play and experiential activities, and learning and school preparedness. Table 3 presents results of the maternal behavioral report of behaviors at baseline and at the final assessment, and differences between intervention and control. At baseline a significantly greater percentage of control mothers reported giving physical care for their children, $\chi^2(1) = 4.76$, $p = .029$, whereas at the final assessment a greater percentage of intervention mothers reported doing daily physical care behaviors, $\chi^2(1) = 5.26$, $p = .022$.

In terms of daily routine activities, at baseline a greater percentage of control mothers reported involving their children in their daily routines of sweeping, washing, and agriculture, $\chi^2(1) = 9.06$, $p = .003$, which was reversed at final assessment with a significantly higher percentage of intervention mothers involving their children in daily routines, $\chi^2(1) = 5.02$, $p = .025$.

The behaviors which differed most between the baseline and the final assessment were the three related to learning preparedness: "spent time in an early childhood education center," "spent time in learning activities (counting, naming objects, drawing)," and "spent time in dancing, drawing, and singing." At baseline, none of these three behaviors differed significantly between groups. However, at the final assessment there were significant differences in all three behaviors, all favoring the intervention group, $\chi^2s(1) > 5.90$, $p < .015$.

Among the play and experiential activities, only 2 of 11 items differed at pretest: more intervention families reported a special place to put children's things, $\chi^2(1) = 4.025$, $p = .039$, and more intervention families had homemade toys for their child, $\chi^2(1) = 8.02$, $p = .005$. Two differed at posttest: more intervention families reported taking the child outside the village, $\chi^2(1) = 3.81$, $p = .05$, and the home has a special place for this child to

play, $\chi^2(1) = 13.91$, $p = .0001$. Overall the number of families who reported having homemade toys increased from 14% to 33%, although there was no increase in the number of purchased toys (10%).

Table 3

Percentage of Caregivers in Intervention and Control Groups Reporting Stimulation and Supportive Caregiving Behaviors at Baseline and Final Assessment

Assessment question	Baseline assessment (2000)		Final assessment (2003)	
	Intervention (<i>n</i> = 1493)	Control (<i>n</i> = 751)	Intervention (<i>n</i> = 1310)	Control (<i>n</i> = 698)
<i>In the last day you were with the child, did the child do any of these?</i>				
Physical Care				
Did the child receive care of physical needs from you (e.g. bathing, feeding)	93	95*	92	89**
Household Activities				
Did an errand at someone's request	60	55**	70	71
Spent time with you doing work of some sort (e.g., sweeping, washing, agriculture)?	49	56***	62	58*
Learning Activities for School Preparedness				
Spent time in an early childhood education centre (in 2000 parents were asked about plans to send child to preschool)	9	12	12	8**
Spent time in learning activities (counting, naming objects, drawing, etc.)	25	26	50	44**
Spent time dancing and drawing	37	34	70	65*
Play and Experiential Activities				
Spent time listening to songs or stories told to him/her	43	42	57	55
Went outside compound	73	74	72	73
Went outside village	7	6	17	13**
Home has a special place to put his/her things	11	8*	21	20
Played with other children	94	95	96	95
Played with toys	21	20	38	41
Spent time with you playing, talking and laughing	85	88	90	88
Played by imitating or copying some of your actions like washing	54	55	68	69

Assessment question	Baseline assessment (2000)		Final assessment (2003)	
	Intervention (n = 1493)	Control (n = 751)	Intervention (n = 1310)	Control (n = 698)
<i>In the last day you were with the child, did the child do any of these?</i>				
dishes				
Home has a special place for this child to play	8	10	16	11**
Child has toys that were purchased for him/her	7	5	11	10
Child has toys that a parent or other adult made for him/her	16	11***	33	32

* $p < .05$. ** $p < .01$. *** $p < .001$.

Father Involvement

For the category of father involvement (see Table 4), differences were limited. The only difference at pretest was that intervention mothers were more likely to agree that fathers need only be responsible for provision, $\chi^2(1) = 19.26$, $p = .0001$, which was not seen at final assessment; at posttest, mothers were more likely to agree that there are ways that fathers can help their children learn to talk at a young age, $\chi^2(1) = 7.02$, $p = .008$.

Table 4

Percentage of Caregivers in Intervention and Control Groups Reporting Father Involvement and Attitudes at Baseline and Final Assessment

Assessment question	Baseline assessment (2000)		Final assessment (2003)	
	Intervention (n = 1493)	Control (n = 751)	Intervention (n = 1310)	Control (n = 698)
<i>In the last day you were with the child, did the child do any of these?</i>				
Received care of physical needs from his/her father (e.g., bathing, feeding)	30	31	43	47
Spent time with father playing, laughing and talking	53	52	64	64
Spent time with his/her father doing work of some sort (e.g., sweeping, washing, agriculture)	23	21	34	32
There are ways that fathers can help their children learn to talk at a young age (agree)	Not reported	Not reported	83	79**
Fathers' responsibilities for children are ONLY to provide food and medicine	31	23***	50	50
Fathers don't need to have conversations with children less than 6 years old (disagree)	81	82	73	71

* $p < .001$. ** $p < .0001$.

Caregiving Attitudes

Seven attitude questions assessed the respondent's attitude toward a child's development and preparing her child for school, both cognitively and through dietary support. At baseline, on two of these questions the control group was more in agreement with the importance of learning activities than were intervention mothers. However, at final assessment, intervention mothers were clearly more in agreement with the importance of learning activities than were control mothers, differing on five of the seven items.

Table 5
Percentage of Caregivers in Intervention and Control Groups Reporting Attitudes Supporting Learning at Baseline (N = 2300) and Final Assessment (N = 2100)

Assessment question	Baseline assessment (2000)		Final assessment (2003)	
	Intervention	Control	Intervention	Control
<i>In the last day you were with the child, did the child do any of these?</i>				
Playing helps a child to learn to think well	94	94	97	96
Playing has nothing to do with how much young children learn (disagree)	71	76*	65	47***
Parents don't need to find or make anything special for young children to play with (disagree)	72	73	71	65**
Making toys and playthings for children under age 6 years helps them to get ready for school	80	81	82	75**
Children become more intelligent if they eat a good diet when they are young (under age 3 years)	92	94	92	93
What you feed a child before age 2 years has no effect on how well they do in school (disagree)	69	69	53	48*
Teaching children colors and numbers before they go to school is a waste of time (disagree)	79	83*	69	63***

* $p < .05$. ** $p < .01$. *** $p < .001$.

Lastly, to understand the results obtained we report on exposure to the project. The project used a number of communication approaches such as radio, so it was likely that both project and nonproject households were exposed to the CHILD campaign. When sample parents were asked if they had heard of the project, 93% in the project area reported having heard of it compared to 46% in the nonproject area, $\chi^2(1) = 538.1$, $p < .0001$. Of those who had heard of the project, 83% of parents in the project area reported face-to-face contact with the project compared to 35% of nonproject parents. Not

surprisingly, Not surprisingly, non-project parents who had heard of the program were much more likely to know it through mass media only (65%) than were project parents (17%), $\chi^2(1) = 254.8, p < .0001$.

Discussion

The specific aim of the present study was to determine whether there were intervention effects on supportive and stimulating behaviors, father involvement, and attitudes towards children's development in the NECD project.

Caregiving Behaviors and Attitudes

The hypothesis that the project would affect caregiving is supported for attitudes and behaviors related to child learning and stimulation. Compared to baseline, at final assessment intervention mothers were more likely to involve their child in their own daily routines such as housework and agriculture. The child development literature has emphasized the importance of daily routines in learning and development (Boyce, Jensen, James, & Peacock, 1983; Britto et al., 2002). By involving children in their own daily routines mothers spend more time interacting with their children, an important aspect of caregiving (Bradley, 1995).

The results also indicate that intervention mothers reported greater involvement in learning activities at final assessment compared to baseline. For example, intervention mothers reported spending more time in learning activities such as counting, naming, and drawing in the previous day (50%) than did control mothers (44%). At baseline, only 25% of both intervention and control mothers reported this behavior. Parents are children's first teachers and their role in their children's development and learning is vital (Richter, 2004; Shonkoff & Phillips, 2000). By enhancing parent's behaviors in these areas the NECD project could be considered successful in achieving its aims.

Increasing father involvement was a clearly stated aim of the project, and the results provide some support for this aim in terms of changing father's attitudes towards their involvement in children's development (Pruett, 2000). Attitudes towards father involvement beyond traditional aspects of physical caregiving were improved by the project. However changes in actual behaviors were limited. In part greater changes in attitudes but not in behaviors could be attributed to the fact that the studied relied on maternal reporting, and mothers tend to do a majority of the caregiving for young children in families (Britto et al., 2002). Additionally causing change in fathers' behaviors is far more difficult in cultures where fathers are not typically involved in caregiving.

The most striking changes are noted in caregiving attitudes towards children's learning and development. At final assessment, intervention mothers reported greater agreement with their role in promoting children's preparedness for school. Parents' attitudes towards their role in their children's learning and development is important and is seen as an important predictor of children's success in school (Eccles & Harold, 1996; Hoover-Dempsey, & Sandler, 1997). By changing parental attitudes toward their role in their child's development and learning, the NECD project could be considered an important step in achieving the goal of helping families and communities enhance their capacity to improve child outcomes.

Study Limitations

Notwithstanding the results obtained, limitations of the current study should be noted in interpreting the results. First, the analytical approach used was primarily descriptive. Multivariate analyses controlling for family and community level confounders were not conducted due to large amounts of missing data on several of the key sociodemographic variables. Given sample size limitations it was not possible to perform analysis of covariance with fixed effects for individual or community. Because communities played a role in selecting the community grants, it is possible that including controls could alter the results obtained. Therefore, as with descriptive results only, these results should be interpreted with caution.

Implications for Intervention Programs

The key dimensions of effectiveness of successful early intervention programs include timing (age at child enrollment), intensity, duration, comprehensiveness, quality, and targeting to the poorest (Engle et al., 2007; Shonkoff & Phillips, 2000). The program did meet several of these criteria. In terms of timing, the age of child enrollment was young, as children began to receive services at the health center prenatally and at birth, and the educational messages were targeted to parents of young children. Prior results reported the greatest effect in the nutrition intervention was in the youngest age group (Alderman et al., 2003). Second, the program was targeted to the most disadvantaged, where it was likely to have the greatest impact, but there was not a middle SES comparison group. On the dimension of comprehensiveness, the project was relatively strong; it attempted to combine health, nutrition, and development interventions. Although the major focus of the intervention was on growth promotion and health, the effect on caregiving attitudes and behaviours related to both growth and development was notable.

However, on other recommended dimensions the NECD was less effective. Both intensity and duration were limited by several implementation challenges. First, the population to be covered was expanded by request of the government, but no more funds were made available, resulting in lower funds per community than planned. Despite this problem, communication about the project appeared to be widespread. As noted above, in the final survey almost all (93%) of the project mothers reported hearing of the project, and of those that had, 83% reported face-to-face contact with someone from the project. Britto et al. (2005) found that those who reported greater exposure to the project had greater changes in caregiving behaviors.

Duration was far shorter than expected. The intervention was initially implemented by nongovernmental organizations, and the process of identifying and training them took longer than originally planned. Therefore, in some areas the evaluation occurred after the program had been in operation less than two years; moreover some of the interventions had not been implemented as fully as expected. Results may have been stronger with longer duration, or greater intensity. Quality of the intervention was not assessed.

However, given these constraints, the changes in intervention mothers' reported behaviors and attitudes about support for learning are striking. Intervention respondents were much more likely to report being involved in educational activities, and to have positive attitudes toward these activities than control mothers at follow-up, whereas there

were few differences at baseline. The effects tended to be stronger in behaviors related to learning activities; few changes were seen in play behaviors without this component.

Changes noted in father involvement were small, but this is not surprising given difficulties in changing fathers' behaviors without changing broader norms. If a relatively low duration and intensity intervention can have an impact on parental reports of these behaviors, stronger interventions have the power to result in far greater changes in a variety of caregiving behaviors.

Changes in caregiving behaviors and attitudes must have an impact on a child's development in order for interventions to be justified. Preliminary analyses suggest that the effects for children aged 4–6 years are limited (Alderman et al., 2004). It is possible that greater effects were not seen because the major impact was on younger children who had not yet progressed to the cognitive test sample given the short duration of the intervention. If family behaviors did change, as reported by mothers, one might expect to see effects on the cognitive development of children aged 4–6 years if the children who were less than 3 years at the time of the intervention were tested at school entry. Changing the cognitive level of children who were already 3–5 at the time of the intervention is more difficult.

Brooks-Gunn (2003), in the eloquently titled “*Do you believe in magic? What can we expect from early childhood intervention programs?*” reminds us that we must not expect too much from one or two years of a program in early childhood. Yet there is a growing body of evidence that changing early parenting practices can have a subsequent effect on children's development (e.g., Karoly, Kilburn, & Cannon, 2005) and such efforts can help us address the loss of human potential of over 200 million children in the developing world (Grantham-McGregor et al., 2007).

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