

Evaluation of the Shishu Bikash Kendra Component of the Early Childhood Program of Plan Bangladesh

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There is general consensus, in Bangladesh as elsewhere, that young children need early stimulation and social contact for mental and social development. One way to accomplish this is early group care and education. Plan Bangladesh has an innovative early childhood program for children from 0 to 8 years and beyond, that includes group care for children of 3 and 4 years. This component is sandwiched between parenting sessions for mothers of children in the 0 to 3 year age range and a preschool component for children of 5 years.

The Shishu Bikash Kendra program for children of 3 and 4 years aims to provide stimulation and group activities to foster mental and social development. To this end, it arranges an activity center on the veranda of a village home where 8 to 15 children, led by two trained mothers, spend 2 morning hours, 5 days a week. Four mothers in each village are trained four days a year, and receive monthly 2-day refresher courses; in pairs they take turns conducting the child sessions. Parenting sessions on child development, hygiene and nutrition are offered monthly to parents.

The objectives of the program as they pertain to children are:

- encourage the development of skill and self-confidence
- foster each child's own style of learning
- develop a positive attitude toward learning

Expected competencies after two years include:

- knowing own and family member names
- reciting rhymes, singing songs, telling stories in proper sequence
- participate positively in group activities, following rules and social norms
- maintain physical balance, keep neat and clean
- express creativity when working alone
- tell stories in own words, answer simple questions about familiar stories

Children are expected to attain these competencies after two years in the program.

The daily routine of children includes a good mix of indoor and outdoor, fine and gross motor activities, some structured and some unstructured. It also includes language stimulation in the form of rhymes, songs, and stories. The routine is as follows: 50 minutes of free play in three corners (blocks, imaginative, and sand/water), 10 minutes for rhymes and songs, 20 minutes story telling, 20 minutes group circle play, and 20 minutes outdoor play. Since January 2004, improvements were made in the quality and quantity of stories and play materials. Therefore, the objectives of the research were: 1. to examine the impact of the SBK intervention on children and their mothers, and 2. to assess the method of implementation of SBK activities along with the relevance and appropriateness of materials and training of field-level implementers.

Method

Study Design

The design was a cross-sectional comparison of Shishu Bikash Kendra (SBK) children and matched controls from nearby villages where this early childhood activity was not available. SBKs which were functioning for at least two years were randomly selected from three rural sites. Nearby villages without such a program provided control children. Approval of the protocol was provided by the Research Review Committee and the Ethics Review Committee of the ICDDR,B. Funding was provided by Plan Bangladesh.

Study Population, Recruitment and Sample

Three rural sites were chosen where Plan had SBK activities in sufficient numbers: Gazipur, Chirirbandar, and Jaldhaka. Sample sizes were estimated according to expected mean cognitive scores of 10 out of 20 with a standard deviation of 1.5. Setting $\alpha = .05$ and power = .90, an n of 150 for each group provided enough power to detect a mean difference of half a standard deviation, multiplied by 1.5 to compensate for clustering. The clustering was not significant as each of the 35 SBKs contributed to the sample less than 5 children on average.

Children were recruited from SBKs or control villages in the following manner. First, 10 SBKs from each site were randomly selected from among all those that had one; research assistants went to the location, listed all children in the 3.5 to under-5 year age range who were attending for a second year, and randomly selected no more than 8 children from this list. If 10 SBKs were not sufficient to recruit 50 children, then an additional one was randomly selected. In control villages, research assistants started from four different points in the village, asking families if they had a child within the 4-year age range. If they did, their names were taken and they were asked to show up for a play session later that afternoon. Five to eight of the children who showed up were randomly selected for inclusion. In Gazipur, where it was difficult to find non-SBK villages, some newly started SBKs in the third union were used to recruit control children. These children would have had approximately 2 months of the program, and 12 months less than the intervention group. Consent was obtained from mothers when they were interviewed. All SBK mothers agreed to participate and approximately 96% of control mothers. The sample included 163 SBK children and 165 controls for a total of 328.

Measurement of Child

Cognitive development was measured with two WPPSI-III (Wechsler, 2002) subtests appropriate for children in the 2.5 to 7.25 age range: Receptive Vocabulary, a measure of verbal comprehension, and Block Design which measures spatial analytic reasoning. The standard instructions for administration and scoring were translated into Bangla. Social development was assessed with the Play Observation Scale (Rubin, 2003). Finally, nutritional status was based on the child's weight, height, age, and gender. Greater detail on the measures follow:

1. Receptive Vocabulary. This subtest assesses children's comprehension of words. Thirty-eight words are spoken aloud and the child is required to point to one of four pictures depicting the word. Words become progressively more difficult. Thirteen words

were substituted for the originals in order to maintain the expected level of difficulty within the Bangladeshi context: e.g. diagnosing was substituted for paying because cash registers and giving money to children are uncommon, drums were substituted for guitar, glittery was substituted for fancy. Answers were scored out of 0 or 1, for a maximum of 38. Scores standardized for age and ranging from 0 to 19 were used in analyses. Inter-tester reliabilities comparing scores on two different days was $r(28) = .60$, $p = .0007$, and the raw score difference between two testings 1-2 days apart was $M = 1.29$, $t = 2.48$, $p < .02$. Thus, children scored over one raw point higher a day later, as a result of practice and familiarity; this translates into less than one standard point. Because the items do not necessarily increase in difficulty when translated, we analyzed both the number correct using the discontinuation rule of stopping after four consecutive failures (because one correct out of four would imply random responding), and the number correct without applying the rule. The two scores were highly correlated, $r(328) = .93$, $p < .0001$, and higher by only 0.46 standard points when all items were scored. Both correlated similarly with important determinants such as child's age, mother's and father's education, and stunting, so for most analyses, we used the discontinuation rule scores. The items and standard instructions for administration and scoring were translated into Bangla and back-translated.

2. Block Design was used to assess visual-spatial, analytic reasoning in the completion of red and white patterns with the use of small cubes. Twenty items are presented; the first 10 use red and/or white blocks and the last 10 use red/white bicolor blocks where two sides have both red and white divided along the diagonal and the other sides are either red or white. Items are progressively more difficult in the pattern required. On early items the tester makes a model to be copied by the child, and on later items the model is presented as a 2-dimensional picture. Two trials for each of the first 6 items are allowed if the child errs on the first. Time limits of 30, 60 and 90 seconds were not strictly adhered to. Items are scored as 0, 1, or 2 on the first 6 items and 0 or 2 on the last 14. Although not a part of the standard test, 8 practice trials were first given using different patterns. This was found to be necessary because children showed such great improvement on a second administration of the test, as a result of increased familiarity with the use of blocks to create patterns. Inter-tester reliability was only .17 without practice. With the practice items, inter-tester reliability was $r(13) = .60$, $p < .03$ and the difference of $M = 1.46$, $t = 1.44$ was not significant.

3. Social development was measured within the context of free play using the Play Observation Measure (Rubin, 2003). This observational measure assesses 3 levels of sociability (solitary, parallel, interactive) for 4 cognitive levels of play (functional, constructive, dramatic, games with rules). Additional play codes include: unoccupied, onlooker, exploration, reading, peer conversation, adult conversation, and aggression. Children are observed during a 40-minute period of free play on two separate days. Testers observe each child for 10 seconds and record the play category before moving on to the next child, and finally back to the first again for another round. This way, 20 10-sec play episodes were observed and coded per day for each child. The number of 10-sec units during which the child was engaged in each of the play codes was tallied and expressed as a percent of the total. For example, if the child was building a block tower

for 10 of the 40 units, he/she received a score of 25% for the category of solitary constructive play. Inter-observer reliabilities for the different categories yielded correlation coefficients above .90

4. Nutritional status. Children were weighed on a Uniscale and heights were taken with a meter stick following the usual guidelines concerning head angle and body posture. These were converted to weight-for-age, height-for-age and weight-for-height z-scores using both the WHO 1978 and CDC 2000 guidelines; only the latter will be analyzed. Age was determined from the immunization card if possible, from a birth registration card, or from parental report with the help of a Bangla calendar and notable events.

Mother-reported Variables

The mothers reported on their children's health including diet and disabilities, on their own knowledge of child development and their child's needs, and on the family's sociodemographic status.

1. Child's health status. Mothers reported on preventive health behaviours related to the child. A sum of the following 5 practices constituted the preventive practice scores: measles immunization (a good indicator of full immunization), vitamin A drops, iodized salt, safe water, and child's latrine use. A screening measure of 10 disabilities (Zaman, et al., 1990) provided scores from 0 to 10 to indicate the number of motor, sensory, speech and learning disabilities. Mothers were asked if their child had been ill in the past week (diarrhea, cough, and fever were questioned if illness was reported). Food eaten during the previous morning, afternoon and evening were recorded followed by a probe as to whether other foods were usual though not eaten yesterday.

2. The mother's knowledge of her own child's needs was assessed with six open-ended questions scored from 0 to 3. These asked what the child played, topics he/she liked to talk to the mother about, questions asked of the mother, what the mother would say to prepare her child for school, causes of child sickness, and ways to soothe a crying child. Any good answer was given a point for a total of 18. The alpha coefficient for these was .63. The mother's knowledge of child development was assessed by asking at what age she expected a child to be able to perform certain milestone behaviors, such as feed him/herself, want to play with other children, start to read a book, start to count money, and visit relatives in another village alone. The alpha coefficient was .46 and so should not be summed for a composite score. Knowledge of the child's needs and expectations for attainment were uncorrelated ($r = .03$).

3. Family sociodemographic status. Mothers reported on the household members, their age, gender, educational attainment, and occupation, and the family's religion. Economic status was assessed with questions about the ownership of 11 assets commonly included in the Bangladesh Health and Demographic Surveys (e.g. table, chair, wardrobe, bed, watch, latrine, bicycle, tube well, radio, electricity and television), ownership of a homestead and of land for production, and household income per month. The sum of all assets had an alpha of .78 and correlated highly with income, owning land for production, mother's education and father's education: $r_s = .48, .37, .46, .42$, respectively, $n = 328$, ps

< .0001. The assets variable was less likely to have missing data, so assets was used as the economic status indicator of the family. The mother's decision-making status was determined with 3 questions about whether she alone (scored 2), or jointly (scored 1) or never (0) decided what food to give the children, what medical care to seek if someone was sick, and whether to send her children to school; the composite with an alpha of .99 was the mean of the three items and could range from 0 to 2.

4. Families whose child attended the SBK were asked their opinion on the program: what new they had learned, what their child had learned, whether they now did anything differently with their child, and their evaluation of the preschool experience as very good (3), good, more or less good, or not good (0). The mother's attendance at parenting sessions held by Plan was noted.

Measurement of Preschool Quality

An internationally used observational measure, the Early Childhood Environment Rating Scale – Revised (ECERS-R), was used along with observations of materials, and an interview conducted with teachers and supervisors.

1. The Early Childhood Environment Rating Scale – Revised (ECERS-R Harms, Clifford, & Cryer, 1998), an observational measure, assesses the quality of the program offered in terms of 7 subscales. Because the SBK offered a morning program, certain items concerning meals and naps were excluded. Three other items automatically received zero scores because there were no TVs, videos, soft toys, or cozy areas, and little attempt to protect privacy. On other items, qualitative terms were defined quantitatively for this context, e.g. enough blocks meant 20 per child so 40 were enough for two children, enough space meant 1 m² per child, a variety of water toys meant 5 differently shaped objects, and some books meant 10. Inter-observer reliabilities were calculated previously on 7 preschools, comparing ratings made by pairs of assistants over three mornings with those of the PI made on one morning. Across all items, there was full agreement on the 1-7 score assigned on 74.5% of the items, a rating difference of 1 on 18.1% and a difference of 2 on 7.4% of the items.

2. Ratings were made on the number, repair and use of 13 materials: picture posters, story books, counting objects*, triangle blocks*, rectangle/square blocks, puzzles, water/sand containers, colored pencils, dress-up clothes, little animals*, dolls, transportation items*, and board games*. Items substituted for the previously used preschool material checklist have been identified (*). The rating format was 0 (absent), 1 (poor repair, unused), 2 (poor repair, used), 3 (good repair, unused), 4 (good repair, used). Ratings were averaged.

3. Teachers were individually and privately interviewed. They were asked about their time in this position, educational attainment, total days of training, supervised days per year, refresher course days per year, who decides what they teach, and their pay in the past month. Nine open-ended questions about early care issues were asked and later scored for number of reasonably correct answers: what children learn during free play, what they learn from guided play, how to arouse a positive attitude toward learning, how to handle a frequently absent child, how to handle an inattentive child, what to do with a

child who does not want to pretend play, what children learn from blocks and puzzles, child-friendly actions and reasons for using a child-friendly approach. Teachers were asked to make twelve evaluations of the quantity and quality of materials and other child care components on a scale from 0 (poor) to 9 (excellent).

Procedure

Eight research assistants, with university degrees, were trained for five days to conduct the testing. The training was conducted by the principal investigator, a British psychologist and a Bangladeshi research colleague. The cognitive, social, nutritional, and ECERS measures were practiced at nearby preschools. At this time, inter-observer reliabilities were obtained for the cognitive tests. The assistants were also observed by trainers during their first few days of data collection and on at least one other occasion during the 6-week conduct of the study. Inter-observer reliabilities were obtained for the ECERS-R previously during its use in the preschools.

Data were collected during April and May. Research assistants singly or in pairs spent 2 days in each village collecting the interview and observational data. Cognitive tests were administered to the children at their homes in the afternoons, when mothers were interviewed. Observations were recorded on the ECERS-R, materials and play during the morning group care sessions. Teachers were interviewed in a private place outside of class hours. Two manuals prepared for the SBK program were read to determine the objectives, the activities implemented to achieve these objectives, and teacher training (Plan Bangladesh, 2002). Consent was obtained from all those interviewed except children whose parents vouched for them.

Method of Analysis

Preliminary tests were conducted to determine differences between SBK and control children on variables related to demographic and socioeconomic status. Frequencies and mean scores were therefore calculated for the two groups. Correlations of these variables with the cognitive and social outcomes were used to identify ones that required covariation in the final analyses. The major analyses examined differences between SBK and control children on the vocabulary and block design scores, and on the social and cognitive levels of play. Analysis of covariance (ANCOVA) was used to examine group and gender differences covarying SES and other variables, such as age and height for age, found to correlate with both group and the dependent variables. Means rather than adjusted means will be presented as the two were almost identical. Additional analyses examined whether SBK benefited one SES group over the other, and one nutritional status group over others. The most complete analysis included a design looking at site, group, and villages nested within site x group, but although there were some site differences, there were no Site x Group interactions. Consequently, sites were combined. Secondary analyses were conducted on the SBK data alone to examine the quality of the program and whether this correlated with child outcomes.

Results

Description of Sample

Table 1 provides frequency distributions of the categorized data for SBK and control children. These are presented for descriptive purposes only as no hypotheses were formulated about them as single items. Table 2 provides means and standard deviations for continuous variables along with t-test comparisons of the SBK and control groups.

Differences between SBK and control children were found in the children's ages (SBK children were 2 months older on average), and preventive health behavior where SBK children had higher reported rates of immunization, iodized salt, and children's use of a latrine. Parent's education was low in both groups, in that that average was third grade and slightly over 40% had no schooling at all. Malnutrition was high in both groups where close to 30% were stunted and the same proportion wasted.

To identify variables that required covarying in the child outcome analyses, correlations were performed with the WPPSI scores (see Table 3). Standardized WPPSI scores correlated negatively with age indicating that with age children declined in relation to age norms; however, as expected their unstandardized scores correlated positively with age ($r = .17, p = .003$ on the receptive vocabulary test; $r = .27, p < .0001$ on the block design). They correlated positively with stunting, but not wasting. Vocabulary but not block design correlated positively with parent's education and assets. From this, we selected four covariates for subsequent analyses, namely age, assets, mother's education, and height for age. Assets correlated highly with all other SES indicators, namely income, parent education, and home and land ownership; it was therefore chosen as the indicator of SES. Mother's education and child's nutritional status are typically considered as important protective factors for child health and survival.

Cognitive and Social Outcomes

Group x Gender ANCOVAs were conducted on the vocabulary and block design scores standardized for age, while covarying age, height for age, mother's education and assets. The results are presented in Table 4. On vocabulary and block design, SBK children performed significantly better than controls. The effect sizes were small but larger than found with the preschool children last year ($d = .34$ for vocabulary and $.29$ for blocks). There were no gender differences.

ANCOVAs were similarly conducted on play using group and gender as between-groups factors and the three levels of sociability during play (solitary, parallel, and interactive) as a repeated factor. Only the main effect of Group was significant indicating that SBK children were more engaged in all forms of play, as opposed to the non-play categories. This is apparent from the t-tests conducted on all behaviors shown during free play (see Table 5). The SBK children showed considerably more parallel and interactive play than controls and less unoccupied and onlooker behavior. They were also twice as often engaged in peer and adult conversation, though the latter was rather low.

Table 1. Frequency distribution for categorized health and SES data (n = 328)

	SBK (n=163)		Control (n=165)	
	Number	%	Number	%
Gender: boys	61	37.4	78	47.3
girls	102	62.6	87	52.7
Clinic attendance: yes	121	74.2	138	83.6
Immuniz card: yes	49	30.1	47	28.5
BCG: yes	161	98.8	158	95.8
DPT: 0	3	1.8	6	3.6
1-2	5	3.1	11	6.7
3	155	95.1	148	89.7
Polio: 0	0	0.0	5	3.0
1-2	5	3.1	7	4.3
3	158	96.9	153	92.7
Measles: yes	152	93.2	145	87.9
Vitamin A: yes	163	100	165	100
Iodine Knowledge	155	95.1	150	90.0
Iodized salt	147	90.2	131	79.4
Safe water	162	99.4	165	100
Sanitary defecation	59	36.2	44	26.7
Sick past week	60	36.8	58	35.1
Diarrhea	17	10.4	18	10.9
ARI	18	11.0	15	9.1
Fever	48	29.4	41	24.8
No Disability	139	85.3	134	81.2
1 and 2	69	13.5	30	18.8
3 or more	2	1.2	0	0.0
Weight for age: $z < -2.0$	73	44.8	82	49.7
$-2.0 < z < -1.0$	56	34.3	61	37.0
$-1.0 < z < +.47$	34	20.9	22	13.3
Height for age: $z < -2.0$	44	27.0	51	30.9
$-2.0 < z < -1.0$	55	33.7	62	37.6
$-.99 < z < + 1.0$	64	39.3	52	31.5

Table 1 continued

Weight for height: $z < -2.0$	43	26.4	61	37.0
-2.0 < $z < -1.0$	68	41.7	60	36.3
-1.0 < $z < +1.8$	52	31.9	44	26.7
Usual Food: rice	163	100	165	100
dal	114	69.9	110	66.7
protein	162	99.4	160	97.0
fruit	135	82.8	129	78.2
vegetable	158	96.9	164	99.4
milk	109	66.9	91	55.2
bread	90	55.2	89	53.9
Mother's education: none	71	43.6	71	43.0
primary school	47	28.8	50	30.3
secondary +	45	27.6	44	26.7
Father's education: none	74	45.4	68	41.7
primary school	43	26.4	45	27.6
secondary +	46	28.2	50	30.7
Live with grandparents	33	20.2	46	27.9
Religion: Muslim	121	74.2	146	88.5
Hindu	42	25.8	19	11.5
Own home	157	96.3	152	92.1
Own land for production	101	62.0	98	59.4
Parenting attendance	138	84.7	3	1.8

Table 2. Means (sd) and t-values comparing SBK and Control Children (n=328)

Variable	Shishu BK	Control	<i>t</i> (326)	<i>p</i>
Child's age	52.77 (4.6)	50.63 (4.8)	4.09	<.0001
Mother's education	3.30 (3.6)	3.41 (3.6)	.26	ns
Father's education	3.69 (4.0)	3.77 (4.0)	.18	ns
11 Assets	5.61 (2.6)	5.21 (2.7)	1.38	ns
Income	3007.3 (1775.7)	2837.6 (1570.7)	.92	ns
Decision-making (0-2)	0.99 (0.4)	1.04 (0.4)	.97	ns
Preventive health (0-5)	4.19 (0.6)	3.94 (0.7)	3.39	.0008
Child disability (0-10)	.19 (0.5)	.21 (0.5)	.40	ns
Weight/age	-1.96 (1.1)	-2.15 (1.1)	1.59	ns
Height/age	-1.38 (1.0)	-1.49 (1.1)	.94	ns
Weight/height	-1.56 (1.3)	-1.72 (1.1)	1.21	ns

Table 3. Intercorrelations among standardized cognitive scores, child health and SES

Health/Demographic	std Vocab	std Blocks
Gender	-.05	-.02
Age	-.36 ***	-.27 ***
Mother's education	.15 *	-.03
Father's education	.24 ***	.03
Assets	.20 **	.07
Disability	-.07	-.08
Weight/age	.14 *	.24 ***
Height/age	.25 ***	.25 ***
Weight/height	-.07	-.08
Intercorrelations among unstd scores partialling out age		
Vocabulary		.33 **

* $p < .01$; ** $p < .001$, *** $p < .0001$

Table 4. Means (sd) and ANCOVA Statistics on Cognitive and Social Indicators

Indicator	Shishu BK (<i>n</i> = 163)	Control (<i>n</i> = 165)	Source	F	df	p
RecVocabulary	7.77 (2.2)	7.04 (2.1)	Group	21.03	1,320	<.0001
			Sex	2.43	ns	Sex x Plan 2.48 ns
Block Design	5.33 (2.8)	4.61 (2.0)	Group	12.71	1,320	.0004
			Sex	0.92	ns	Sex x Plan 1.45 ns
Solitary	37.90 (20.2)	33.43(16.9)	Group	34.43	1,320	<.0001
Parallel	13.74 (15.2)	9.47 (13.5)	Social	1.07	2,640	ns
Interactive	14.76 (14.1)	9.62 (12.0)	Gp × Soc	0.61		ns
			Sex	0.21	ns	Sex x Plan 1.63 ns 3- ns
Functional	13.92 (12.8)	17.57 (13.9)	Group	33.85	1,320	<.0001
Boys	15.00 (14.4)	20.43 (15.3)	Cognitive	.40	2,640	ns
Girls	13.28 (11.7)	15.01 (12.08)	Gp × Cog	10.87		<.0001
Constructive	16.72 (22.2)	12.34 (15.5)	Sex	0.41	ns	Sex x Plan 1.54 ns
boys	25.53 (26.6)	13.25 (15.5)	Sex x Cogn	15.91		<.0001
girls	11.45 (17.0)	11.53 (15.5)	Sex x Plan x Cogn	4.04		.02
Dramatic	35.22 (19.0)	22.18 (19.0)				
boys	27.77 (22.4)	17.69 (15.1)				
girls	39.68 (24.3)	26.20 (21.2)				
Peer Conversation	11.16 (9.2)	5.39 (6.2)	Group	48.29	1,320	<.0001
Adult Conversation	5.04 (6.5)	2.69 (5.2)	Person	.19	1,320	ns
			Gp × Per	9.34	1,320	.0024
			Sex	0.05	ns	Sex x anything <1.0 ns

Similarly a 2 (group) x 2 (gender) x 3 (level) ANCOVA was conducted on the three cognitive levels of play, namely functional, constructive, and dramatic. There were too few game episodes to include this fourth level. Here the Group x Cognitive interaction was significant. SBK children showed less of the immature functional play and more of the mature constructive and dramatic play, according to post hoc t-tests. The Gender x Cognitive level interaction was significant as was the 3-way interaction. They indicated that girls engaged in mostly dramatic play; SKB raised the amount of dramatic play but not constructive play in girls. SBK boys showed less of the immature, functional play, and much more dramatic and constructive play than control boys. So the early childhood program encouraged more play behavior generally, and affected boys' play by making it more mature. Girls showed more dramatic play but lacked constructive play.

Table 5. Means (sd) of Shishu BK and control children on all play categories as a percentage of total play units observed.

Play category	Shishu BK	Control	<i>t</i> (320)	<i>p</i>
Solitary	37.86 (20.2)	33.43 (16.9)	2.15	.032
Parallel	13.74 (15.2)	9.47 (13.4)	2.69	.007
Interactive	14.76 (14.1)	9.62 (12.0)	3.56	.0004
Functional	13.92 (12.8)	17.57 (13.9)	2.48	.01
Constructive	16.72 (22.2)	12.34 (15.5)	2.07	.04
Dramatic	35.22 (24.3)	22.18 (19.0)	5.41	<.0001
Games	0.51 (2.1)	0.42 (2.6)	0.32	ns
Unoccupied	9.27 (9.9)	12.68 (13.9)	2.55	.01
Onlooker	10.76 (8.7)	18.86 (13.7)	6.38	<.0001
Explore	1.32 (3.1)	2.71 (5.0)	3.01	.003
Read	1.31 (4.5)	2.44 (7.4)	1.68	ns
Peer conversation	11.16 (9.2)	5.39 (6.3)	6.63	<.0001
Adult conversation	5.04 (6.5)	2.69 (5.2)	3.62	.0003

Nutritional status, in terms of height for age but not wasting, correlated significantly with several forms of play indicating that taller children were more likely to engage in parallel play ($r = .15, p = .006$), and constructive play ($r = .22, p < .0001$), and less likely to be unoccupied ($r = -.14, p = .01$). This analysis controlled for mother's education and family assets and is very similar to the preschool results.

Separate ANCOVA analyses were conducted to examine whether assets and height for age modified the benefits of early group care. Assets did not interact significantly with the program. Thus, children benefited equally from the SBK experience regardless of whether their family assets were above or below the median. However, height for age interacted significantly with group care on the vocabulary test, $F(2, 327) = 3.10, p = .046$. The largest difference between the two groups was found with stunted children who had very low scores if they were in the control group and considerably higher scores in the SBK (M s were 6.25 and 7.64, respectively). Mildly stunted SBK children benefited over similar controls (control $M = 6.89$, SBK $M = 7.60$) and non-stunted children performed similarly regardless of group care (control $M = 7.98$, SBK $M = 8.02$). So fortunately stunted children benefited from the experience even though their long-term nutrition was poor. It seems as if the stimulating experience compensated for the adverse effects of their poor nutritional status. However, the group care experience did not compensate for stunting on block design scores. Nutritional status and SBK experience had an additive effect on nonverbal reasoning; each makes an independent contribution.

Children's Physical Health

A large portion of both SBK and control children were underweight (see Tables 1 and 2); almost half were moderately to severely underweight and one-quarter stunted. After controlling age and preschool experience, nutritional status was not significantly correlated with expected sociodemographic variables, such as mother's or father's education, family assets, income, mother's decision making power, past-week illness, variety of foods eaten the previous day, or mother's knowledge about child development. However, children ate a greater variety of food on the previous day, if the mother's education was higher ($r_s = .18, p = .001$) and the family had more assets ($r = .15, p = .005$). Perhaps because of illness or quantities eaten, this did not translate into weight or height.

Most of the children took part in preventive health procedures, such as immunization, vitamin A drops, iodized salt and safe water; however, most did not use a latrine. The SBK children participated in significantly more preventive health practices than controls. Over one-third of the children were reported to be sick during the previous week. The expected 15% of SBK children were reported by mothers to have one of the ten disabilities, most frequently a delay in acquiring motor milestones such as walking or running (see Table 6). This is not particularly serious if unaccompanied by other sensory or mental disabilities.

Table 6. Number and percent of children with disabilities

Disability	SBK (n=163)		Control (n=165)	
	No.	%	No.	%
1. Delay in motor milestones	16	9.8	24	14.5
2. Difficulty seeing	1	0.6	3	1.8
3. Hearing difficulty	2	1.2	3	1.8
4. Comprehending instructions	1	0.6	0	0.0
5. Weakness in limbs	1	0.6	2	1.2
6. Epilepsy	2	1.2	2	1.2
7. Difficulty learning	2	1.2	0	0.0
8. Speech	0	0.0	0	0.0
9. Articulation	2	1.2	0	0.0
10. Mentally delayed	5	3.1	2	1.2
Total with one or more disability	24	14.7	31	18.8

Mothers' Knowledge of Child Development

Mothers' knowledge about child development and child needs was higher in the SBK than control group with scores above 80% in SBK on the six items. Table 7 shows the means for the composite and each separate item. These were open-ended questions where mothers were encouraged to provide as much information as they could with probes such as "What else?" SBK mothers knew a great deal, but they knew more than controls about general child development: causes of sickness, how to soothe an upset child, and what they would say to prepare their child for school. The expected ages for various developmental milestones, such as self-feeding and playing with peers were late for all mothers. Some 85% of SBK mothers had been to monthly parenting sessions associated with the early childhood program and they were obviously effective. Mothers could name several things they had learned from the SBK program and many things their child had learned. They also could identify almost two things they did differently now.

Evaluation of the SBK program by mothers was very positive with an overall mean of 2.35 on a 0 to 3 scale. Thus, over 96% evaluated it as good to very good. This is extremely high, and slightly higher than the positive responses received from mothers about other programs.

Table 7. Means (sd) on Mother Knowledge Items scored 0 - 3

Measure: Item	Shishu BK	Control	t	p
Mother's Knowledge (18)	14.57 (3.1)	13.76 (2.4)	2.63	.009
What child played	2.66 (0.7)	2.76 (0.5)	ns	
Topics ch talked about	2.74 (0.6)	2.78 (0.5)	ns	
Questions ch asked	2.45 (1.0)	2.51 (0.9)	ns	
Preparation for school	2.10 (1.0)	1.86 (0.8)	2.39	.02
Causes of ch sickness	2.04 (0.9)	1.57 (0.9)	4.73	<.001
Soothe an upset child	2.58 (0.6)	2.27 (0.7)	4.04	<.001
Expected age for skill				
Self-feeding	22.63 (13.6)	24.99 (14.7)	ns	
Begin to play with others	31.39 (16.6)	30.83 (14.8)	ns	
Start to read a book	51.02 (18.9)	51.15 (19.2)	ns	
Start to count money	72.69 (27.4)	74.54 (24.7)	ns	
Visit alone in nearby village	85.44 (30.7)	76.97 (25.7)	2.71	.007
Attended Parenting sessions	84.7 %			
Visited preschool	63.2 %			
List what mother learned	1.79 (1.10)			
List what child learned	2.83 (0.46)			
What mother does differently	1.79 (1.26)			

Evaluation: poor 0.0 %; more or less good 3.5 %; good 58.3 %; very good 38.2 %

ECERS-R: Quality of SBK

Table 8 shows descriptive statistics for the 7 subscales and the totals. The mean for the total 7-subscale score was 3.30 out of 7 with a range of 2.6 to 3.6. The highest scores were obtained for the interpersonal interaction, language and program subscales.

Because many of the preschool recommendations were implemented in SBKs, especially concerning materials, we looked at specific items where SBKs scored higher than 2003 preschools. These included: #17 use of language to develop the child's reasoning (4.3 vs 2.9), #19 fine motor activities (3.6 vs 2.2), #22 blocks (3.9 vs 3.0), #23 sand and water (4.6 vs 3.9), #25 nature and science (3.1 vs 1.5), #33 interaction among children (4.6 vs 3.4), #35 free play (5.6 vs 3.5).

Certain items identified areas for improvement. These included: #20 Art where SBK received on average 1.77 because most did not have or allow children freely to use colored pencils or crayons to draw. Drawing is important for both creativity and pre-literacy skills. No dress-up clothes for imaginative play were available and no age-appropriate puzzles. Also there were not enough manipulatives to acquire math concepts of size, shape and number. Finally, health practices such as latrine use and hand-washing were largely absent. With so many children sick the previous week, hygiene should be practiced with a bucket of water at minimum.

The mean score for materials was 2.97 out of 4. Low scores were usually due to materials being absent rather than in poor repair. Absent were dress-up clothes, puzzles, and colored pencils. Unlike the preschool findings, material scores did not correlate highly with ECERS ratings. This confirms the earlier hypothesis that settings need to have materials in order to score greater than 1; beyond that, they need variety (e.g. different shapes and purposes) and interesting activities to encourage learning from the materials.

Table 8. Mean (sd) scores (1-7) of 35 SBKs on the ECERS (Early Childhood Environment Rating Scale – Revised), Repair and use of Materials

Subscales	Mean	(sd)	Range
1. Space & Furnishings	2.16	.27	1.5 – 2.6
2. Personal care routines	2.43	.41	1.5 – 3.5
3. Language-Reasoning	3.80	.74	2.2 – 4.8
4. Activities	2.72	.31	2.0 – 3.1
5. Interaction	4.90	.62	3.6 – 5.6
6. Program Structure	3.86	.30	3.2 – 4.2
7. Parents & Staff	3.21	.21	2.3 – 3.3
ECERS-7	3.30	.27	2.6 – 3.6
13 Materials (0 - 4)	2.97	.26	2.5 – 3.6

Volunteer Teaching Mothers

Table 9 provides information about the volunteer mothers who run the SBK. The mothers had worked on average close to 24 months, and they had attained grade 7 education. They are typically trained for 4 days and receive twice monthly refresher days. On 9 questions, they averaged 11.7 out of 27, or 43%. They knew the procedure for reducing child absences and how to be child friendly. However, they did not know what was learned in free play and guided play, what was learned from blocks and puzzles, and how to handle an inattentive child during storytime. The teachers' evaluation of the program elements was high at 7.45 on a 0 to 9 scale, similar to preschool teachers. Some identified as problematic the lack of sex integration, the counting materials, and opportunities to converse with individual children. These are reasonable areas for improvement.

Table 9. Knowledge and evaluations of 35 SBK Teaching Mothers

	Mean	sd	Range
Months on Job	24.8	23.4	4 - 48
Years education	7.3	2.8	0 - 10
Teachers' Knowledge: (27)	11.7		
Learned in free play	1.0	0.9	0 - 3
Learned in guided play	0.8	0.9	0 - 3
Child positive attitude	1.5	0.8	0 - 3
Reduce absences	1.7	0.6	1 - 3
Inattentiveness	1.3	0.5	1 - 3
Avoid imaginative play	1.3	0.5	1 - 2
Learn from block play	1.4	0.8	0 - 3
How to be Ch.friendly	1.6	0.8	0 - 3
Why Ch.friendly	1.0	1.0	0 - 3
Evaluation overall	7.45	1.1	5.2 - 9
space	8.1	1.1	5 - 9
cleanliness	7.7	1.4	4 - 9
sex integrated	7.7	1.6	2 - 9
quantity of play materials	8.1	1.3	4 - 9
quality of games, rhymes, songs	8.0	1.6	3-9
quality of play materials	8.1	1.2	5-9
quality of stories	8.0	1.5	4 - 9
quantity of counting materials	6.4	2.7	0 - 9
access to drinking water	8.0	1.5	3 - 9
access to latrine	4.7	3.6	0 - 9
child-adult conversations	6.4	2.7	0 - 9
child assessment	8.2	1.1	5 - 9
Pay per month	90.	28.7	0 - 120

Discussion

The objectives of the research were: 1. to examine the impact of the SBK intervention on children and their mothers, and 2. to assess the method of implementation of activities along with the relevance and appropriateness of materials and training of field-level implementers. This discussion will therefore be organized into two sections to deal with each objective. Recommendations follow.

Child and Mother Outcomes

The SBK 4-year-olds performed better than control children of similar socioeconomic status on vocabulary and nonverbal reasoning measures. The effect sizes were respectable. They also showed better social skills during play, and the cognitive level of play was higher, especially on dramatic play and for boys on constructive play as well. The expectation that boys create constructions and girls engage in dramatic play was not confirmed. Boys engaged in as much dramatic as constructive play; however, girls engaged in mostly dramatic play. This was the only sex difference found in the analysis, unlike the parenting finding that boys and girls differed on several dimensions.

Obvious areas for improvement include greater vocabulary development, especially during these important language years when children are able to learn 10 to 20 new words each day. We must ask ourselves how many new words are learned from the teachers' non-instructional talk, stories and rhymes. Also nonverbal reasoning is very low among all children and should be improved given its importance for mathematical reasoning. The practice trials necessary to get the children started indicated that few had experience making patterns with differently shaped and coloured blocks. The new set of blocks present in SBKs as of February may help, but teachers need training in the creative use of blocks and the learning they foster in children. Teachers do not spend much time in the block corner and do not know what is acquired from block construction. Recommendations will include more stories and more sophisticated stories, given the teachers' education level, and more training of teachers in creative constructions with blocks and puzzles. Girls also need materials and experiences that encourage their constructive play; to see teachers in the block corner might do this, as would access to drawing materials, books and puzzles.

Mothers' knowledge about childcare was better than expected, and better than preschool mothers. The monthly parenting sessions attracted 84% of the mothers and their knowledge reflected this interest. Also had an opportunity to watch their children playing and to see the materials, because families live close to the SBK. Mothers might have acquired some of this information while attending the 0 to 3 parenting sessions, but now two years later most of that would have been lost if it were not for it being reinforced during SBK parenting session. This seems to be an excellent opportunity to introduce new childcare practices regarding stimulation and nutrition in a small group of 8 to 15 mothers. The 20 topics offered to mothers and fathers should be carefully chosen to focus on child development, stimulation, and feeding. Nutrition and sanitation could be

addressed in a more concentrated way because both are very poor at this age. Mothers could also be asked which format is most interesting: activity from the training guide, storybook, and or open discussion. Almost half of the mothers and fathers had not attended any schooling. And according to the parenting findings for 3-year-olds, homes do not provide 2-piece learning materials like blocks and puzzles, and adults rarely speak with children about pictures. So it is clear parents need to hear about more effective parenting practices and their children need preparation for first grade.

Quality of the Program

The ECERS-R observational measure indicated an average of 3.30 on the 7 subscales. Interpersonal interaction scored particularly highly because children and adults have frequent friendly exchanges. Also the program structure is flexible with a lot of free play; opportunities for adults to talk with children about concepts and reasoning are varied. Several ECERS items received low scores, mainly because the materials were not present to implement an activity, such as materials for drawing, books for children look at, math materials to count, dress-up clothes to play imaginary roles, and puzzles.

Volunteer mothers had higher levels of education than expected. For this reason, perhaps, they obtained knowledge scores similar to preschool teachers and their supervisors assessed in 2003. Generally, what is learned from free and guided play is not understood; adults think it is the content of the activity, such as learning names, cooking and pouring. Mothers see only these superficial aspects of play, rather than its deeper meaning which entails making creative constructions by combining small parts, and acting out imaginary scenes and verbally negotiating role plays with peers. In general, children learn how the world works through trial and error by observing the consequences of their actions on materials and solving their problems.

The curriculum is a 2-year one for children who are 3- and 4-years old. Children are expected to learn two rhymes and one song per month; they play two circle games and two outdoor games per month; they hear one or two stories per month. Obviously this is not sufficient for language and cognitive development. The repetitious activities promote memorization rather than learning to understand; this is fine for rhymes and songs, but not for games and stories which have another purpose. The purpose of games is to encourage cooperation and following game rules. Children can learn a game in one day; it should be played for two days in a row at most, though it could be repeated weekly if the children asked for it. As more children's story books come on the market, they should be included to get the list up to 40 per year, or 80 for two years. The education level of teachers is high enough to offer good stories. Once again, a book should not be read for more than two days in a row, otherwise it will be memorized, and memorization prevents thought. The competency of story comprehension cannot be assessed if the children have memorized the story; they will repeat the lines of the story rather than their understanding of it.

A more general problem of the 2-year program is that mothers do not see sufficient difference between the first and second year – it is simply more of the same and not

geared to the child's higher level of development. If a child of 4 years entering the second year of SBK is given the same curriculum as a 3-year-old entering for the first year, this conveys the wrong message to parents. It conveys the message that nothing was learned by the 4-year-old who is now one year older and one year wiser than the 3-year-old. The mothers recognize that their child is ready for something different, so they prefer to send their children to a preschool after one year of SBK. But in fact, these children are too young for preschool. Consequently, there should be some activities that are different for the two age groups. This could be easily arranged with the two teaching mothers running the group care. Four-year-olds might have more reading, drawing, and math manipulatives to learn pre-literacy and numeracy skills during the 40 minutes in the middle of the morning (during circle play and story telling).

In conclusion, the program is very good and much appreciated by the mothers and teaching volunteers. It needs to accommodate better the second year students and it needs to include more daily variety in games, stories, songs, and rhymes. It would be wise to make yearly additions to the play materials in order to include puzzles, dress-up materials, drawing materials, picture books, and more blocks. This will improve cognitive levels of play for girls.

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Recommendations

1. Re-write parts of the curriculum

The curriculum should be re-written to incorporate more appropriate cognitive and language development for 3-year-olds (p.5), more cognitive and language competencies (other than memory), and more accurate story telling instructions so that children do not "learn" a story and repeat it (once learned this way, it cannot be "told in their own words"). Allow for more frequent rotation of rhymes, songs, games, and stories. All of these items lose their learning benefit if repeated 10 times in a row. They should be changed every week at least, and in the case of games, stories and songs every 2-3 days. They can be repeated again at a later date, but not so close in time. This recommendation is for preschools as well, where children are now required to play the same game every day for 2 weeks.

2. Devise a special curriculum for 4-year-olds

A curriculum should be geared to the competencies of 4-year-olds. It could be implemented during the 40-50 minutes in the middle of the morning. It should focus on hands-on activities such as drawing and math concepts, even puzzles, as well as more mature stories to be discussed. Books could be put out for children during the free play time, as well as drawing materials and puzzles.

3. Training for Mother Volunteers

These mothers have more education than expected. They are able to tell/read more sophisticated stories and to do special activities with 4-year-olds, given the training. They also need training in free play – to see for themselves that there is something more than what appears on the surface. In particular, they do not understand the purpose of block play and puzzles. During training, mothers might be given time to construct as many sophisticated things as they can with 25 blocks. There should be no demonstration and no instruction. The goal is to create as many sophisticated things as they can – things that are so complex they cannot be given a label (i.e. no houses). Trainees can look at others from where they are seated, but should not spend their time walking around to view others' creations. Ditto drawings and puzzles.

4. Non-instructional talk

Teaching mothers need to learn the skill of talking with children in an way that promote a non-instructional form of learning, such as trial and error, problem solving, and peer collaboration. This is easily practiced in the SBK setting where the adult:child ratio is 1:4 or 1:5 on most days. Adults should sit at opposite ends of the veranda so they are giving due attention to children in the block and imaginative corners. Water/sand play, being in the courtyard could be visited periodically but not have a person stationed there. Non-instructional talk should be based on what the child is doing, by asking children to talk about what they are making, what roles they are play, what they plan to do next, whether they could make it more sophisticated and so forth.

Appendix on Cost and Management

Cost of Preschool

The cost of each preschool in 2003 was approximately US\$ 200.00. This included supplies and materials, along with training and salaries of personnel (not preschool teachers whose pay came at least partly from parents). This was obviously too low: rooms in primary schools were often not repaired or painted by Plan, and play materials were old and in poor repair. Some materials need to be made or bought fresh at the start of the year. You cannot expect a puzzle made with coloured pencils to last more than one year. Materials should be rotated, not just when they become too worn but on a regular basis for the sake of attracting the children with novelty.

The cost of preschools in 2004, including the 11 pilot preschools, may be US\$ 230.00. This includes new play materials and story books for all preschools, and special math bags, pocket charts and journal books for children in the 11 pilot preschools. It also includes the extra training given to technical officers and preschool teachers concerning new math and literacy activities for the classroom.

Cost of Parenting Program

The cost of the parenting program is approximately 600 tk per mother. It includes the cost of training the women facilitators, the manual, and some materials.

Management

Although program coordinators in each unit encourage community participation in arranging for ECD programs, the technical part of the program is heavily top-down in its approach. This is reasonable given that expertise about early child development and education is currently not strong at the community level. However, the women who implement the program at the community level have a reasonably high level of education, a lot of Plan ECD training, and most stay in the job long enough to gain experience. When given an opportunity to speak freely, they have identified problem areas. There should be more open discussion of these areas during the monthly meetings with technical officers and supervisors, and these problems should be passed up to the country office.

Here are some examples of problems that should have been solved more quickly:

- a. Preschool teachers were told not to instruct the children during free play, but to use non-instructional talk. This was to eliminate the practice of telling children which corners to play in, and the finding that teachers were not conversing with children during play. But teachers felt that some instructional talk was necessary to attract children to a corner where no child ever played, or if one child was harming another. They did not learn how to be creative about non-instructional talk to suit their purposes, how to attract children without instructing, and that directive language in the face of aggression is appropriate. This problem reached our ears in June, but should have been solved in March.
- b. Structured games were not liked by teachers or students. After the preschool evaluation, we eliminated the stretching exercises for children because these are appropriate for older women or for relaxing. Gross motor activities were lacking in the syllabus. So the suggestion was to keep mid-morning playtime for free play every day,

and move the group structured games to the early morning. If children want to move their bodies in between classes, they should stand up, sing, clap and dance. After talking about the structured games, we found that the children were required to do the same game repeatedly every day for 2 weeks, before playing a different game. Learning how to play a particular game is not the purpose of structured game time. The purpose is to engage in a gross motor activity that is fun, learn to follow game rules, cooperate, and only incidentally to learn or practice a skill. Having to repeat the game again and again for 10 days in a row is not serving the intended purpose. I cannot emphasize enough that games, stories, and songs should not be repeated until learned by heart. Besides 10 days goes well beyond the time required by a young mind to memorize a game, story or song – it moves the activity into the domain of child-unfriendly, boring and mind-numbing repetition. Two days for one game, story or song is sufficient; it can then be done again several weeks later for one day, and again later. I wonder if the need to have a uniform and simple monthly schedule for teachers has led to this problem. Work plans should be worked out for each week, not for each month, with 2 games, stories, songs/rhymes each week and child-chosen games etc on the extra days.

Different people have different skills and these should be identified and used. Some people are creative, some are reflective and critically constructive, some are good at coordinating, others good at observing and research. Technical officers and ECD staff should work together to improve the curriculum, materials, and activities, so there is enough rotation to make the days varied. When people work in small groups of 4 or 5, they come to know their individual skills and to use them appropriately.