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Progressing in tandem: A Sure Start initiative for enhancing the role of parents in children's early education

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Abstract

The Tandem Project is an educational programme, targeting preschoolers, sponsored by the DfEE Sure Start initiative. It aims to encourage parents from low-SES backgrounds to take a greater role in preparing their children for school. Parents are given a series of games to play with their children designed to develop basic pre-reading and numerical skills. Pre-reading games include listening to stories, learning about the representational qualities of print, reciting nursery rhymes, recognising and discriminating shapes and letters, and analysing the sounds of words. Numerical games include learning about length, size, and quantity, linking concepts about quantity with the number system, counting, and recognising written numerals. A preliminary study found the programme was successful in developing children's skills although outcomes were moderated by family socio-economic status. The implications for involving parents in the education of their preschool children are discussed.

Announced in July 1998 as part of the Government's Comprehensive Spending Review, the Sure Start initiative aims to facilitate the physical, social, emotional and intellectual development of children aged below four years, particularly those from disadvantaged backgrounds. It forms one aspect of the Government's policy to eradicate social exclusion and is intended to achieve significant long-term benefits in both educational and social domains (Glass, 1999).

The Sure Start initiative follows the lead of similar programmes for disadvantaged children in the United States, including Head Start and the Perry Pre-School programme. An important component of many such programmes was the implementation of educational interventions for children carried out either in a preschool setting or in the home environment by a caseworker (Goodson, Layzer, St.Pierre, Bernstein & Lopez, 2000). Recent assessments of such interventions have revealed enduring benefits for children, including significant cognitive gains after 5 to 10 years (Barnett, 1995; Campbell, Pungello, Miller-Johnson, Burchinal & Ramey, 2001) and a reduced incidence of personal and social problems in adolescence and early adulthood (Gorey, 2001).

Parental involvement in children's early education was a feature of many of the Head Start programmes although its effects were not studied in isolation (Barnett, 1995). Nevertheless, such programmes stimulated an interest in the role of parents rather than intermediaries in delivering specific academic help to young children. Teachers often observe that when children enter reception class there are considerable differences in their readiness to acquire

basic curriculum skills. One important contribution to such differences appears to come from the learning opportunities that parents provide at home (Sammons, Sylva, Melhuish, Siraj-Blatchford, Taggart, Smees, Dobson, Jeavons, Lewis, Morohan & Sadler, 2000). For example, some parents teach their children about written language by identifying letters and letter sounds (Jackson, Donaldson & Cleland, 1988; Senechal & LeFevre, 2002). Even the simple activity of reading storybooks to children has been shown to develop their 'emergent literacy' reflected in such behaviours as pretend reading of books and scribble writing (Dickenson, 1994; Hannon, 1996), as well as to increase their vocabulary and awareness of written language (e.g. Mason & Kerr, 1992; Neuman, 1996; Weinberger, 1996).

Unfortunately, not all children receive these types of early learning experiences and, in particular, children from low SES backgrounds are less likely to be taught literacy-related skills by their parents than those from high SES backgrounds (Nicholson, 1997; Snow, 1994). This might indicate that low SES parents are unmotivated to engage in home teaching (e.g. Macleod, 1996). In developing a home literacy programme for low SES families, Handel and Goldsmith (1994) found that many parents were not good readers themselves, had early school experiences that were problematic, and were under a great deal of life stress. Alternatively, disadvantaged parents might lack confidence in their ability to help their children academically or be unaware of appropriate home-learning activities (Holloway, Rambaud, Fuller & Eggers-Pierola, 1995).

Importantly, initial inequalities in educational attainments persist over time such that children who perform poorly in reception class tend to lag behind throughout their school careers (Alexander & Entwisle, 1988). It therefore seems crucial that efforts to involve low SES parents in their children's education begin as early as possible (Ramey & Ramey, 1998). In the United Kingdom, educational initiatives for disadvantaged preschoolers have largely taken the form of programmes encouraging joint storybook reading and other literacy-related behaviours. Such programmes appear to be successful in increasing children's interest in books and readiness for reading instruction (e.g. Hannon, 1996; Hirst & Hannon, 1990). In other countries, attempts have been made to develop projects that teach a range of cognitive skills. One example is the Home Instruction Program for Preschool Youngsters (HIPPY), designed to help parents with little formal education and low incomes to prepare their four and five year old children for school (Lombard, 1981). Widely applied in the United States, HIPPY uses a structured approach in which para-professional home visitors provide parents with activity packs designed to develop children's sensory and perceptual discrimination, visual-motor and problem-solving abilities. A version of HIPPY used in the Netherlands (Opstap Opnieuw - Step-up Anew) additionally targets specific pre-reading and pre-mathematics concepts (Van Tuijl, Leseman & Rispens, 2001). These programmes have been reported to produce benefits for children's early school performance (e.g. Kagitcibasi, 1999; Lombard, 1981) although outcomes appear to be moderated by parental commitment to the intervention (Baker, Piotrkowski & Brooks-Gunn, 1999) and cultural factors (Van Tuijl *et al.*, 2001).

The Tandem Project

The Tandem Project is a comprehensive early educational programme being carried out under the Sure Start initiative, targeting young children from districts in Swansea, United Kingdom, with markers of the most severe social and economic deprivation. The Tandem

Project encourages parents to develop their children's reading-related and numerical skills and, hence, to improve the chances that children will flourish in school. We are currently examining the effects of a prolonged intervention on children's scholastic performance over the first 12 months of formal schooling. However, we report here the findings of a large-scale preliminary study for which we assessed the effects of a six-week programme of activities on children's skills just prior to their entry to nursery class at age three years. This study was carried out to gain important feedback about several aspects of the project design, namely, the efficacy of strategies aimed at bolstering parents' motivation for the intervention, parents' achievements in carrying out the intervention relative to that of trained project workers, the effects of parental effort in delivering the intervention, as well as the progress made by Sure Start children compared to children from more affluent backgrounds.

The intervention used structured play activities to demonstrate to parents that simple, enjoyable games carried out at home can enhance the development of young children's academic capabilities. The games were designed to develop specific skills argued in the literature to be important precursors of children's reading development (Simmons & Kameenui, 1998; Stanovich, 1989) and numerical ability (Fuson, 1987; Green & Laxon, 1978). Pre-reading activities aimed to teach children about the representational nature of print (e.g. reading together, pointing out examples of print), heighten their phonological awareness (e.g. learning nursery rhymes, judging whether words either start or end with the same sound), and improve their visual discrimination (e.g. deciding whether abstract shapes are the same or different, identifying letters). Numerical activities aimed to develop children's concepts about size and quantity (e.g. making judgments about bigger versus smaller, more versus fewer etc.), link their concepts about quantity with the number system (e.g. counting small sets of objects to answer questions about more versus fewer), and practise counting skills (e.g. learning nursery rhymes involving number sequences, identifying written numerals). All the games used to develop children's skills were consistent with the curriculum for nursery children developed by the Education Department of the City and County of Swansea, thus complementing the learning experiences awaiting children in nursery class.

Several strategies were implemented in an effort to increase participants' enthusiasm for the programme. First, it was emphasized that the games were meant to be enjoyable and parents were encouraged to let children talk about the activities and to praise their performance as much as possible. Second, concerted efforts were made to boost parents' loyalty to the intervention by arranging weekly visits from project workers, commending the work of both parents and children in regular newsletters, and asking parents to record their reactions to the intervention in a diary. Third, parents were made to feel involved in the project's evolution by providing feedback about which aspects of the learning packs the children enjoyed and which, if any, they found problematic. Finally, we worked towards promoting a sense of community spirit among the participating families by bringing them together for awards' ceremonies at which children were congratulated for their work and presented with attractive certificates of achievement.

As well as studying the progress of children from Sure Start designated areas we deemed it important to evaluate the effectiveness of our intervention using families from geographic areas with few markers of deprivation. The literature indicates that high SES parents are likely to provide some form of home teaching for their preschoolers even without external incentives, suggesting they might show greater diligence in carrying out the intervention

than low SES parents. To measure the effects of parental effort on the programme outcomes, the project workers rated parents in both the Sure Start and non Sure Start areas in terms of how frequently they played the games with their children. In addition, we examined whether the degree to which children profited from the intervention was moderated by their receptive vocabulary (as measured by the British Picture Vocabulary Scale).

Depending on their family socio-economic background, children were assigned either to the Sure Start parent group (SS-P) or the Other parent group (O-P). Children in these groups were not attending nursery, although many attended playgroups, and they received the intervention from their parents. Funding restrictions precluded the possibility of our measuring the progress of these groups in relation to children not attending nursery who did not receive the intervention and instead we evaluated the programme's benefits using two groups of children who were all currently attending nursery on at least a half-time basis. This comparison represents a strong test of the efficacy of the intervention given that children attending nursery tend to accrue educational benefits relative to those who remain at home (e.g. Peisner-Feinberg, Burchinal, Clifford, Culkin, Howes, Kagan & Yazejian, 2001). Children in the nursery control group (N-C) did not receive the intervention although they were offered the opportunity to participate in the programme later. In contrast, children in the nursery intervention group (N-I) received the intervention from a project worker in the nursery environment. The Nursery Intervention group was included to see whether, even if our intervention failed to produce any benefits when carried out by parents, it might nevertheless improve children's skills when delivered by specially trained staff.

Method

Participants

The participants were 128 young children, ranging in age from 33 to 46 months (M = 39.9, SD = 2.6), 73 boys and 55 girls. This sample comprised 63 children from low-income families living in Sure Start designated areas of Swansea and 65 children from other areas of Swansea that did not have the same economic markers. Analysis of the demographic data revealed a number of striking differences between the Sure Start and non-Sure Start families. Whereas 51 per cent of the Sure Start sample reported no earned income, this was true of only six per cent of the non Sure Start sample. A single mother headed the family in 47 per cent of cases for the Sure Start group but in only 11 per cent of cases for the non Sure Start group. Furthermore, 85 per cent of the Sure Start mothers reported leaving school at or before the age of 16 years in comparison to 53 per cent of the non Sure Start mothers.

There were 33 participants in the Sure Start Parent group (18 boys and 15 girls, mean age = 38.7 months), 27 participants in the Other Parent group (18 boys and 9 girls, mean age = 38.6 months), 35 participants in the Nursery Intervention group (18 boys and 17 girls, mean age = 38.7 months), and 33 participants in the Nursery Control group (19 boys and 14 girls, mean age = 39.5 months).

Materials

The games eventually used in the Tandem Project were piloted and developed over a period of 18 months using a sample of about 30 low-income families. This groundwork

produced a number of activities designed to develop the children's pre-reading and numerical skills, each designed to last about five minutes. The pre-reading games comprised parental picture-book reading, reading together, distinguishing between and matching abstract shapes, listening to nursery rhymes, searching for real household objects to match line drawings with written labels, and deciding whether words either begin or end with the same sound. The numerical games comprised learning about length, size, and quantity, comparing and counting small sets of objects to answer questions about quantity, number recognition, and listening to nursery rhymes about number sequences. Materials for the activities were provided by the researchers and took the form of pictures and instructions on laminated cards. The story used for the 'reading together' exercise was created specifically for the project and was personalised for each child. A digital camera was used to take photographs of the child that were downloaded into a computer, with text and pictures then added to generate a short story in which the child was protagonist. Using colour coding of pictures and text, the story was designed to teach children the representational properties of written words and the difference between words and pictures. In addition to the prescribed tasks, parents were given written suggestions for additional activities that could be carried out without any specially prepared materials (for example, counting the stairs as children go up to bed, pointing out examples of printed words, letters and logos in the child's environment).

Procedure

Our aim for the parent groups was to recruit children with little or no experience of private nursery care who were, in the main, being looked after by their mothers. We first identified a number of infant schools in the targeted Sure Start and non Sure Start areas and contacted the head teachers, outlining our proposal and seeking their support. The head teachers provided us with contact details for children on the enrolment lists for nursery class for the coming term and a letter was despatched to their parents. This letter briefly described the aims and method of the intervention programme, asked for details about the child's pre-school childcare experiences (if any), and requested the parents' participation. A reply slip and a stamped, addressed envelope were provided for their response. These letters were followed up by home visits to suitable families at a later date at which we discussed the intervention programme more fully, showed parents examples of the games, and reassured them about the levels of support they could expect to receive from the project worker. This persistent approach eventually succeeded in recruiting to the programme about one in 10 of the parents we initially solicited via our letter.

To recruit participants for the nursery groups, we approached nurseries in the same Sure Start and non Sure Start areas from which children in the parent groups were obtained. If the nurseries agreed to be involved then we wrote to the parents describing the project and asking their permission either to carry out the intervention with their child on the nursery premises (the nursery intervention group) or to assess their child's progress over time on the various cognitive measures without any intervention (the nursery control group). For both nursery groups, about half the participants were from Sure Start areas (N = 30) with the remaining participants being drawn from non Sure Start areas (N = 38).

The intervention lasted for six weeks and the learning activities were presented at a rate of three or four per week over the first three weeks, repeated with the addition of new, more diffi-

cult, material over the final three weeks. It was recommended to parents that they play each of the games with their children at least once a week, bearing in mind they should choose a propitious time for these sessions when they judged their child to be in a receptive mood. Parents were also asked to keep a journal describing how their child fared with each task and any difficulties that were noted. A project worker visited each family weekly to exchange the intervention materials, to provide encouragement and to answer questions. These visits were also used to demonstrate to parents how the games should be carried out, although some flexibility in methods was allowed. For the Nursery Intervention group, participants received a single 20-minute session with the games every week in the nursery classroom.

The project workers assessed the children's skills both one week before and one week after the intervention. Participants in the parent groups were assessed in their home whereas those in the nursery and control groups were assessed in a secluded area of their nursery classroom. On each occasion they were tested for their letter recognition (using a set of 14 letters), number recognition (numbers 1 to 5), rhyme detection, non-word repetition, shape discrimination, judgments about size, length and quantity, ability to count freely to 10, and ability to count small sets of up to five objects. Most of the tests used attractive pictures and all were presented in the form of enjoyable games. The letter and number recognition tests involved asking children to search for a particular item on the page (in both cases, test items were intermixed with pictures). The rhyme test assessed children's rhyme detection indirectly by asking them to select one picture from a set of three (e.g. boy, ball, clown) to complete a sentence (e.g. Down, down, fell the ...?). The non-word repetition task scored children for their ability to repeat after the project worker various nonsense words (e.g. ballop), starting with two syllables and progressing to four syllables. The rhyme detection and non-word repetition tests were not given to the first few children to be assessed, who instead were asked to make explicit judgments about rhyme. However, this task proved to be too difficult and thus the replacement phonological measures were administered to the remainder of the sample (N = 102). For the shape discrimination test, children were presented with four sets of abstract shapes and, for each set, were asked to find two shapes 'the same'. Children's understanding of size, length, and quantity was estimated by asking them to make judgments about pairs of pictures that were identical apart from one attribute (e.g. 'Which cat has the shorter tail?' and 'Which jug has more juice?'). Children's ability to count freely was assessed by asking them to count to 10 twice, taking as their score the highest number that they reached on both occasions without errors. Finally, the counting objects test involved a tea party using cutout pictures of five dolls, five teddies, and five cups. Children were assessed for their ability to count these sets of objects consistently, as well as to answer correctly questions about cardinal numbers (e.g. 'You have just counted three dolls in front of you. How many cups will we need to give each doll a drink?') and about order irrelevance (e.g. 'You have just counted four teddies in front of you. What if I take the teddies and move them into new positions like this (rearranging the teddies)? How many teddies are there now?').

For the initial assessment only, children's receptive vocabulary was assessed with the British Picture Vocabulary Scale (Dunn & Dunn, 1982). To see whether any gains resulting from the intervention were maintained over time, we additionally tested children's skills six weeks after the intervention was completed. Although the departure of one project worker by this stage meant that data collection had to be curtailed, over 80 per cent of the sample were assessed on this final occasion.

Results

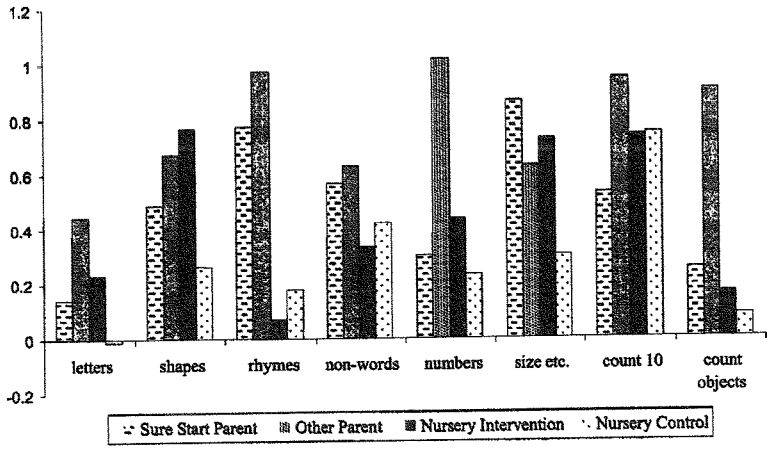
Table 1 shows group means of children's attainments on each of the eight measures immediately before and after the intervention (N = 128) and six weeks following the intervention (N = 104). Figure 1 shows children's gains over the duration of the intervention expressed as z scores.

Table 1. Group means of children's attainments, expressed as percent accuracy, for each of measures on the pre-intervention test (1), the first post-intervention test (2) and the second post-intervention test (3).

		letters	shapes	rhymes	non-words	numbers	size etc.	count to 10	count objects
SS-P	1.	0.7	59.9	13.0	47.3	9.1	70.2	30.3	34.6
	3.	3.0	78.8	32.8	64.6	19.4	88.9	51.8	39.8
	4.	2.9	80.7	36.7	75.9	33.6	95.2	70.3	51.0
O-P	1.	6.6	63.9	29.2	51.2	27.4	82.7	44.8	33.9
	2.	14.0	85.2	48.1	70.4	62.2	96.3	83.3	52.4
	3.	13.1	90.4	57.0	79.9	63.7	98.2	95.4	58.3
N-I	1.	5.3	49.3	31.3	71.0	12.0	68.1	37.7	44.5
	2.	9.2	73.5	35.2	81.2	26.9	83.8	67.7	49.2
	3.	12.8	91.3	42.4	78.7	44.2	91.7	75.2	55.3
N-C	1.	5.0	56.8	28.8	59.6	15.8	75.3	2.1	46.8
	2.	4.8	65.1	34.1	72.4	23.6	81.8	62.4	48.5
	3.	4.5	61.9	50.0	82.5	26.7	87.3	63.5	51.0

SS-P = Sure Start parent group
O-P = Other parent group
N-I = Nursery Intervention group
N-C = Nursery Control group

Figure 1. Group means of children's gains on the skills' tests (z scores) during the intervention



Children's initial skills

A series of 1-way ANOVAs was carried out to see whether there were differences between the groups in children's skills before the intervention. For each measure, group means were compared using planned contrasts that fixed the overall typeI error rate at $p < .05$. These contrasts compared the performance of each intervention group with the control group, and the performance of the Sure Start parent group with the Other parent group. Although group means for most measures were similar, both parent groups lagged behind the control group at counting objects (SS-P: $t(124) = -2.43$; O-P: $t(124) = -2.45$). In addition, the Sure Start parent group performed worse than the control group at rhyme detection, $t(98) = -.12$. The Other parent group surpassed the Sure Start parent group at number recognition, $t(124) = 2.45$, and judgements about size, length and quantity, $t(124) = 2.22$. To see whether children in the nursery groups differed in their achievements depending on SES background (i.e. Sure Start versus non Sure Start), their scores for each measure were compared using independent sample t-tests. None of these tests revealed a significant difference in the group means (all p values > .05, 2-tail).

Gains in children's skills between the pre- and post-intervention tests

The progress of the four groups on the individual measures was studied in a series of 4 x (2) ANOVAs for group (SS-P vs. O-P vs. N-I vs. N-C) by time (pre-intervention vs post-intervention). Planned contrasts using an overall type 1 error rate of $p < .05$ were used to examine whether time-related gains in performance differed between each intervention group and the control group, and between the Sure Start parent group and the Other parent group. Because several children failed to complete one or more of the skills' tests on at least one occasion, missing data were excluded on an analysis-wise basis. The analyses found significant gains, averaged across groups, on all measures (letter recognition, $F(1, 124) = 8.26$, $p < .01$; number recognition, $F(1, 124) = 40.39$, $p < .01$; judgements about size, length and quantity, $F(1, 124) = 45.49$, $p < .01$; counting to 10, $F(1, 124) = 61.15$, $p < .01$; counting objects, $F(1, 123) = 15.69$, $p < .01$; shape discrimination, $F(1, 122) = 37.49$, $p < .01$; rhyme detection, $F(1, 98) = 21.54$, $p < .01$; and non-word repetition, $F(1, 97) = 20.95$, $p < .01$). As shown in Table 1, however, these improvements were moderated by group membership. The Sure Start parent group made greater gains than the control group for judgements about size, length and quantity, $t(124) = 2.16$, and rhyme detection, $t(98) = 2.17$. The Other parent group made greater gains than the control group for letter recognition, $t(124) = 2.23$, number recognition, $t(124) = 3.45$, counting objects, $t(123) = 3.17$, and rhyme detection, $t(98) = 2.57$. The nursery intervention group made greater gains than the control group for shape discrimination, $t(122) = 1.95$. Finally, the planned comparison of the two parent groups showed superior gains in the Other parent group for number recognition, $t(124) = 3.14$, and counting objects, $t(123) = 2.52$.

To gain an overarching picture of the success of the intervention, children's progress across all measures was averaged. Because the measures were assessed on different scales, the distribution of scores in each case was normalised by conversion to z-scores. An analysis of variance was then conducted using the same planned contrasts as before to compare the mean progress scores of the four groups (i.e. the difference between z-scores prior to the intervention and z-scores immediately after the intervention: SS-P = .52, O-P = .81, N-I = .47, N-C = .27). The analysis found the control group made less overall progress than either

the Sure Start parent group, t (124) = 2.22, or the Other parent group, t (124) = 4.59, although their gains were equivalent to those of the nursery intervention group, t (124) = 1.79. In addition, progress was significantly greater in the Other parent group than the Sure Start parent group, t (124) = 2.49.

Children's progress following the intervention

Results were also examined for the 104 children tested again six weeks after the intervention was completed. For each measure, children's progress was examined in a 4 x (2) ANOVA for group (SS-P vs O-P vs. N-I vs. N-C) by time (post-intervention 1 vs post-intervention 2). There were reliable gains, averaged across groups, for number recognition, F (1, 88) = 12.97, $p < .01$, judgements about size, length, and quantity, F (1, 35) = 23.78, $p < .01$, counting to 10, F (1, 95) = 11.30, $p < .01$, counting objects, F (1, 97) = 14.44, $p < .01$, rhyme judgements, F (1, 93) = 4.53, $p < .05$, and shape discrimination, F (1, 99) = 7.69, $p < .01$. These gains were largely consistent across groups. The same set of planned contrasts used previously found greater improvements in the Sure Start parent group than the control group for counting to 10, t (91) = 2.00, and greater improvements in the nursery intervention group than the control group for shape discrimination, t (95) = 2.88, but no other significant group differences. None of the measures showed a reliable drop in performance accuracy in the intervention groups, indicating that children maintained their skills even after they ceased practising them as part of the educational programme.

The effects of parental effort on children's progress

The results reported so far indicate that, in general, children in the Other parent group benefited more from the intervention than children in the Sure Start parent group. We therefore examined whether the unequal levels of progress could be explained by differences in parental effort for carrying out the intervention. Whereas ratings of parental effort (maximum possible score = 4) were slightly lower in the Sure Start parent group than the Other parent group (SS-P: M = 1.79, SD = .82; O-P: M = 2.04, SD = .94), an independent samples t-test found no significant difference between the means, t (58) = 1.10, $p > .05$ 2-tail.

In addition, the effects of parental effort in carrying out the intervention were examined separately for the two groups using Pearson's correlations. For these analyses, pre- and post-intervention performance was represented by children's composite reading-related skills (created by averaging the normalised data for letter recognition, shape discrimination, rhyme judgements, and non-word repetition) and their composite numerical skills (created by averaging the normalised data for number recognition, judgements about size, length and quantity, counting to 10, and counting objects). Parental effort showed no reliable association with children's achievements before the intervention for reading-related skills (SS-P: r = 0.19; O-P: r = 0.15, both p values > .05 1-tail). However, parental effort was significantly correlated with initial numerical skills in the Other parent group (SS-P: r = 0.23, $p > .05$ 1-tail; O-P: r = 0.42, $p < .05$ 1-tail). Partial correlation coefficients were then used to examine the relation between ratings of parental effort and children's post-intervention scores, in each case controlling for pre-intervention performance. For the Sure Start parent group, the parental effort variable failed to correlate significantly with post-intervention reading-related skills, r = .28, $p > .05$, 1-tail, although it did correlate with numerical skills, r = .42, $p < .05$, 1-tail. The Other parent group showed no significant association between

parental effort in carrying out the intervention and children's scores on either measure (reading-related skills: r = .17; numerical skills: r = .09, both p values > .05, 1-tail).

The effects of receptive vocabulary on children's progress

Mean BPVS scores were found to be higher in the Other parent group than the remaining groups (SS-P: M = 37.3, SD = 9.46; O-P: M = 42.9, SD = 5.90; N-I: M = 35.6, SD = 4.65; N-C: M = 39.8, SD = 5.71). A 1-way ANOVA comparing the means produced a significant outcome, F (3, 125) = 6.65, p < .01, with Tukey comparisons revealing superior performance in the Other parent group than either the Sure Start parent group or the nursery intervention group (both p values < .01). However, an independent samples t-test comparing the mean BPVS scores of the Sure Start and non Sure Start children within the nursery groups found no reliable difference (Sure Start = 36.4, non Sure Start = 38.6; t (66) = 1.67, p > .05 2-tail).

To see whether superior BPVS scores in the Other parent group might account for their greater progress during the intervention, relations between BPVS scores and children's skills were examined individually within each group. First, simple correlations showed BPVS scores were reliably and positively associated in all groups with achievements before the intervention for both reading-related skills (SS-P: r = .66; O-P: r = .47; N-I: r = .36; N-C: r = .32, all p values < .05 1-tail) and numerical skills (SS-P: r = .61; O-P: r = .41; N-I: r = .65; N-C: r = .41, all p values < .05 1-tail). Accordingly, to examine the relation between children's receptive vocabulary and their post-intervention attainments, partial correlations were calculated between these variables that controlled for levels of performance on the corresponding pre-intervention measures. These partial correlations produced reliable results for the intervention groups but not the control group. The associations were significant for reading-related skills (SS-P: r = 0.32; O-P: r = .35; N-I: r = .45; N-C: r = 0.06, significant p values < .05 1-tail) but not numerical skills (SS-P: r = 0.13; O-P: r = .00; N-I: r = .26; N-C: r = 0.09, all p values > .05 1-tail). When results for the various measures were examined individually, the significant association between BPVS scores and children's gains in reading-related skills held up most strongly for the rhyme detection and non-word repetition tests. The association was not apparent for the shape discrimination test in any of the groups and was reliable for the letter recognition test only in the nursery intervention group, r = .38, p < .01 1-tail.

To see whether the non-significant association between BPVS scores and gains in reading-related skills for the nursery control group might be an artefact of their lesser improvements relative to the intervention groups, additional partial correlations were calculated using only the composite data from the rhyme detection and non-word repetition tasks. As shown in Figure 1, the nursery control group achieved gains on these measures at least as great as those achieved by the nursery intervention group. Once again, though, results were reliable only for the intervention groups (SS-P: r = .34; O-P: r = .52; N-I: r = .65; N-C: r = .10, all significant p values < .05, 1-tail).

Parents' evaluations of the Tandem Project

Parents' comments about the project were overwhelmingly positive. These comments made it clear they viewed the programme as a valuable experience and felt a sense of achievement at contributing to their child's development. Many parents were eager to

continue with the learning activities even after the formal intervention had finished. A resounding non-verbal expression of support for the project can be inferred from the fact that, despite the difficulty in recruiting families to the parent groups, all those who consented to participate went on to complete the intervention.

Discussion

The recently introduced Sure Start initiative aims to improve the social and academic prospects of young children, especially those born into low SES families (Sure Start, 2002). The starting point for the Tandem Project was the observation that inequalities in educational opportunity often are apparent before children start school. Although many young children have parents who encourage their early learning, through such methods as joint storybook reading or teaching them letters and numbers, others do not have this advantage. Some parents might be ill equipped to help their children because they had largely negative school experiences and little out-of-school support from their own parents. The Tandem Project works towards breaking this cycle of educational deprivation by informing such parents about the potential value of home teaching and by providing them with simple but effective means of preparing their children for school.

The initial findings of the project have been extremely encouraging. Despite lasting only for six weeks, the intervention produced significant improvements in children's skills relative to a control group and their parents reported very favourable attitudes towards the programme. The intervention groups made superior progress in a variety of pre-reading and numerical skills and, importantly, they maintained their newly acquired competencies over the six weeks following the intervention's completion. As shown in Figure 1, those measures where we failed to find greater progress in any of the intervention groups relative to the control group were those where the latter group made major gains anyway (namely, counting to 10 and non-word repetition). It seems reasonable to suppose that children's skills in these domains were well practised by normal nursery activities during the period of the intervention but this suggestion would need to be confirmed by studying the progress of children in the same age group who are not attending nursery.

The attainments of the children educated by their parents at least matched those of the children educated by the project workers, suggesting the learning activities were simple to grasp and easy for parents to carry out. Indeed, progress in the nursery intervention group did not significantly exceed progress in the control group despite the fact that the project workers were highly motivated to achieve the best possible results for the children. Although this finding could implicate a special role for the parent/child dyad in children's learning (e.g. Edwards & Warin, 1999), we cannot at this stage rule out other explanations. Apart from the fact that participants in the nursery intervention group received the games just once a week in a single session, the nursery classroom proved to be a noisy and distracting environment in which to carry out the intervention. Also, whereas parents were able to choose an advantageous time for engaging in the learning activities when they judged their child to be in the right frame of mind, this kind of planning was impossible for the project workers.

Our intervention aimed especially to improve the prospects of those children at risk of educational disadvantage, namely, children from families of low socio-economic status

living in deprived communities. A crucial finding, therefore, was that the programme succeeded in improving these children's cognitive skills beyond the levels of unassisted progress shown by the control group, even though the control group had the advantage of attending nursery. Importantly, our strategies for maintaining the motivation of the Sure Start families clearly worked. All our participants remained involved for the duration of the intervention and we had many requests from parents for further educational materials after the intervention was finished. In addition to the extensive help and encouragement we provided, parental enthusiasm for our programme might have been helped by its relatively short duration. In extending the Tandem project longitudinally, we have chosen to use a series of short bursts of intervention each lasting only a few weeks as opposed to protracted aid over a period of months. We hope this strategy will be effective in maintaining the same high level of parental loyalty as shown in our preliminary study.

Whereas our project clearly achieved its aim of better preparing disadvantaged children for school, however, other aspects of our findings highlighted the difficulties of eradicating the early effects of socio-economic status on children's cognitive growth. The Sure Start children were the group we most wanted to help, but their progress overall was significantly outstripped by that of the children from the more affluent backgrounds. This was despite the fact that the groups performed equivalently on most of our initial skills' tests. The greater benefits reaped by the Other parent group could not be attributed to extreme parental diligence in carrying out the intervention. Not only did mean ratings of parental effort fail to differ reliably between the Other parent and Sure Start parent groups, the Other parent group showed no significant relation between parental effort and children's progress for either reading-related or numerical skills. In contrast, parental effort was significantly and positively associated with children's gains, at least for the numerical measures, in the Sure Start parent group. Interestingly, ratings of parental effort in carrying out the intervention were predictive in the Other parent group of children's achievements on the numerical measures before the intervention. This might indicate that parents who were motivated to engage in home teaching had already begun the necessary groundwork for their children's passage to formal schooling by instructing them in basic numerical skills. Once the intervention commenced, however, the diligence with which parents carried out the intervention apparently had no further impact in determining how quickly children progressed.

Neither was there strong evidence that the greater progress of the Other parent group could be attributed to their superior BPVS scores, as might occur if children's receptive vocabulary affected their comprehension of the tasks. BPVS scores showed reliable, positive correlations with pre-intervention competencies in all groups. However, when we examined BPVS scores in relation to children's progress while controlling for pre-intervention achievements, little association was noted. Such associations were observed only for the intervention groups and, even then, were restricted almost entirely to attainments on the rhyme detection and non-word repetition measures. If the degree to which children improved their skills over the period of the intervention had depended largely on their receptive vocabulary then BPVS scores should have correlated positively in all groups with children's gains for most measures. As they stand, the present findings suggest instead that children's receptive vocabulary was linked with their capacity to improve their phonological skills through explicit training. This conclusion accords with two other studies reported in the literature. Torgesen and Davis (1996), and also Hecht and Close (2002), reported that vocabulary knowledge in disadvantaged kindergarteners, as well as other emergent

literacy skills, was predictive of children's gains in response to an intervention aimed at developing their phonological awareness. Consistent with the findings of the present study, this relation failed to emerge for control participants who did not receive any intervention.

Other explanations for the unequal attainments of the parent groups must obviously look to variables we failed to measure. One important consideration is the home environments of the children. The project workers noted considerable disruptions to the daily routines of many of the Sure Start children, often stemming from parental health problems or sudden and unexpected changes to living arrangements. It is easy to imagine that such exigencies would severely have hampered methodical use of the pre-reading and numerical games. Additionally, the groups might have differed in influential aspects of the programme delivery. For example, the high SES parents might have conveyed greater enthusiasm for the games, been more successful in making the learning interactions enjoyable, or provided higher levels of praise and emotional support. Such arguments are consistent with the extensive body of work emphasising the impact of proximal social processes on children's cognitive development (e.g. Bornstein & Bruner, 1989; Bronfenbrenner & Morris, 1998; Vygotsky, 1978). Indeed, differences between the high and low SES groups in the quality of parent/child interactions might have contributed to their unequal BPVS results prior to the intervention. An association between socio-economic status and children's receptive vocabulary has been widely reported in the literature (Duncan & Brooks-Gunn, 2000). Inferior verbal skills in low SES children might reflect a lack of access to toys, books and other educational materials useful for stimulating social interactions with parents, a restricted variety of new experiences outside the home, or damaged parent-child relations reflecting parents' psychological stress from financial difficulties (Goodson *et al.*, 2000).

But despite such concerns, it is important not to lose sight of the fact that the intervention was effective for the Sure Start group and that its benefits were both immediate and enduring. Thus, there is every reason to believe these children entered school better prepared for reading and mathematics instruction than if the intervention had not taken place. They might also have reaped various long-term advantages. It has been argued that getting parents involved in their children's education at an early stage should foster an informal learning environment within the family that perpetuates such behaviours over time (Bempechat, 1992). In addition, we have not yet had the opportunity to measure possible delayed consequences for children's academic progress, such as a heightened interest in books and reading.

In conclusion, children vary widely in their cognitive skills on entry to school with repercussions for their later progress. The present work demonstrates that parents from even the most deprived SES backgrounds are capable of helping their children academically at this early stage given help and encouragement. As discussed, however, the finding that our intervention was less effective for low than high SES families might indicate an influence of lifestyle and parenting factors on the programme outcomes. Accordingly, we are exploring ways of integrating our intervention into other forms of provision for young children in Sure Start targeted areas, such as playgroups and toy libraries, as well as extending the range of activities used by the programme to include creative, expressive, and dramatic games. Not only will such tactics increase the numbers of families that can be recruited to the programme and improve their access to books and other educational materials, we hope that by inviting parents to participate in a wider variety of learning experiences with

their children we can further improve the cognitive gains of preschoolers from disadvantaged backgrounds.

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