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*Concurrent Paper*

**An investigation of a home-based intervention program for children with developmental problems and their families**

**Dr Anne Rickards**

**Janet Walstab**

**Assoc Prof Dinah Reddihough**

Murdoch Childrens Research institute

Royal Children's Hospital

University of Melbourne

**Jacquie Simpson**

Murdoch Childrens Research institute

Royal Children's Hospital

**Objectives.** There is ongoing debate about the type and intensity of service that is most helpful to assist children with developmental problems. This study aimed to (1) investigate whether the provision of a home based program in addition to the program at a Centre improves development in the children and the coping ability of their families and (2) describe the characteristics of the children and families who benefit most from the intervention.

**Method.** Subjects were 59 children, aged three to five years with no physical disability attending one of two early intervention centres in Melbourne, Australia. Half of the group was randomised to receive an additional program in their homes. A special education teacher provided 40 visits over 12 months working with the families to help generalise skills to the home environment and work on issues as determined by them.

All children were assessed before and immediately after completion of the intervention. At both times families completed questionnaires assessing family stress, support and empowerment. Differences in change over time between the intervention and control group were analysed by t-Test and the association between characteristics of children and families with improved outcome by Chi Square test or Fishers Exact probability test.

**Results.** Change in cognitive development and behaviour (in the Centres) over time favoured the children who received the extra intervention ( $p = .002$  &  $p = .007$ ). The groups did not differ on any of the family measures of change. Improvement in outcome in the intervention group was significantly associated with younger age, higher level of functioning, higher family stress and less social support.

**Conclusions.** Results suggest the importance of involving families, especially those with few supports, in early intervention programs. Younger children and those functioning at a higher level appeared to benefit most from the extra intervention.

## Introduction

Early childhood intervention for preschool children with developmental delays and disabilities has a positive outcome for the children and their families. Meta analyses undertaken by Castro and Mastropieri and Shonkoff and Hauser-Cramm have found positive outcomes for a range of variables (Castro and Mastropieri, 1986, Shonkoff and Hauser-Cramm, 1987). However, many unanswered questions remain about the model and intensity of service delivery. For example, with respect to service delivery, there are questions about the benefits of home versus centre based programs (Parry, 1992), there are debates about the optimal extent of parental involvement (Dawson and Osterling, 1997), and questions are raised as to whether highly structured teaching or less formal programs best meet the needs of children and their families (Delprato 2001).

It is also important to consider the appropriate level of service provision, particularly as parents frequently ask for a greater number of hours than can be provided from the resources that are available. The term “developmental delays and disabilities” covers a spectrum of disorders including physical problems such as cerebral palsy, sensory problems such as hearing and visual deficits, and intellectual disabilities that in turn range from mild to profound. The intensity of intervention that may be most helpful will vary depending on the nature and type of the disability as well as the quality of the home environment and the cultural, social and educational background of the family. Further research into program intensity would be useful for both families and funding bodies.

The first aim of our study was to investigate whether children who received a home based service in addition to a centre based service would make greater progress in cognitive development and behaviour than children who received only a centre based service and to determine if their families would show better coping skills, less family stress and greater parental empowerment.. The second aim of our study was to describe the characteristics of the children and families who might benefit from the home based intervention.

## Methods

### *Subjects*

The participants in this study were children, aged 3 to 5 years, enrolled at Uncle Bobs Child Development Centre (UBCDC) or Westarc Early Intervention Centre, Melbourne during the period 2000 to 2003. Children were recruited from two centres to achieve adequate sample size. All children were eligible to be included except those whose families had inadequate English to enable them to understand the home based teacher and to complete the questionnaires, and those with primarily a physical disability. The latter were excluded because the focus was on special teaching rather than therapy and it was considered that additional therapy might be of more benefit for these children. Hence the children recruited had a variety of diagnoses including autism spectrum disorder, developmental delay and language disorder.

### *Assessment procedure*

Following ethics approval from the Royal Children’s Hospital Ethics Committee, letters were sent to parents whose children fulfilled the criteria for the study. Following parental consent, each child and family member (usually the mother) was seen by the same psychologist experienced in the assessment of young children with developmental problems. Children were then paired according to their developmental quotient, their names placed on cards, folded to hide the names and one of each pair was randomly chosen for the home based intervention and the other for the control group.

The psychologist who performed the assessments was blind to the child's group assignment. However it was not possible for the parents or teachers to be blind to the children's group membership. Parents were given three questionnaires, to complete at home and they were requested to return them within a week of the child's assessment. Thirteen months following the first assessment and at the conclusion of the intervention period, the children and families were re-assessed using the same measures.

### *Measures*

Measurements were undertaken in three areas; cognition, behaviour, and family measures. Cognition was evaluated using the Bayley Scales of Infant Development (Bayley 1993) if the children were functioning at or below 3 years 6 months and the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R) (Wechsler 1989) for those functioning above this level. Behaviour was assessed in three ways: firstly, by observation during the cognitive assessment using the Bayley Behaviour Rating Scale (BRS) (Bayley 1993); secondly, by maternal interview using the Behaviour Screening Questionnaire (BSQ) (Richman, Stevenson and Graham 1982) providing information about the child's behaviour at home; and thirdly, the teachers at the early intervention centres rated the children's behaviour with the Preschool Behaviour Checklist (PBCL) (McGuire and Richman 1988). Family measures used were the short form of the Questionnaire on Resources and Stress (QRS) (Friedrich, Greenberg and Crnic, 1983), the Family Empowerment Scale (FES) (Koren, De Chillo and Friesen, 1992) and the Family Support Scale (FSS) (Dunst, Jenkins & Trivette 1993).

### *Interventions*

Children in both the control and home based groups participated in a centre based program either at UBCDC or Westarc consisting of five hours spread over two sessions weekly during school terms. In conjunction with parents, the multidisciplinary team at the centres formulated an individual program for each child that was determined by the child's developmental level, learning style and interests. An important principle of the program was learning through play with a focus on building self-esteem. Communication systems (eg picture exchange communication system) and behaviour modification techniques were used if appropriate. Speech pathology and occupational therapy were provided if necessary. An important aim of the centre based program was to develop the ability to separate from the family and establish independence within the context of a preschool program.

The additional home program (intervention group) was based on the needs of the child and undertaken at a convenient time for families with the aim of providing continuity between the child's environments. A specialist preschool teacher visited each family weekly for between 1 to 1 1/2 hours during school terms over a 12 month period (40 weeks). This provided opportunity for more direct work with the parents and their children at home and facilitated continuity between the centre and home based program. The family and the teacher identified relevant issues and this helped to establish goals and priorities. The parents worked in partnership with the teacher who provided role modelling opportunities. The weekly home visits included three main aspects: firstly, one to one work with the child; secondly, assisting families with developing routines involving daily living skills, and thirdly, techniques for further development of abilities and modification of maladaptive behaviours. For example, in assisting families with developing toileting or dressing skills, strategies were explored and where necessary the teacher could model for the parent, in a step by step fashion, the manner in which to approach the activity until the routine was established and the parent was comfortable in assisting the child to achieve the desired outcome.

### *Data analysis*

Data were analysed using SPSS for Windows and Stata. Univariate analyses included Pearson's Chi Square test (Yates adjusted) or Fisher's Exact Probability test where appropriate, and t-tests for normally distributed variables. A p value of <.05 was considered to be statistically significant.

## **Results**

Fifty-nine out of 65 children (91%) completed the study. At the initial assessment (Time 1), there were no statistically significant differences between the 30 children who received the home based intervention and the control group (29 children) in child, maternal or paternal mean ages, diagnoses, gender, early intervention experience prior to study commencement, socio-economic status, maternal education, marital status and whether or not English was spoken in the home. There were no statistically significant differences in the children's mean IQ, or behaviour as measured by the BRS, BSQ, and PBCL. The intervention group improved from Time 1 to Time 2 on the IQ measure by a mean of 5.36 points compared to the controls who deteriorated by 3.48 points, giving a mean difference of 8.84 points ( $p=0.002$ ). Improvement for the 16 intervention group children with WPPSI-R scores was in the nonverbal cognitive area (a mean 19 performance score improvement compared to a mean improvement in performance score of 4 points for the controls,  $p=.02$ ). The IQ change measure was highly correlated with the three behaviour measures. Change in IQ with change in PBCL, ( $R= -0.379$ ,  $p =.005$ ); change in IQ with change in BRS, ( $R=0.599$ ,  $p=.001$ ); change in IQ with change in BSQ, ( $R= -0.350$ ,  $p=.008$ ). In other words the trend was for the greater the increase in IQ, the greater the decrease in problem behaviours at the early intervention centre, the more appropriate the behaviour observed during the psychological test and fewer difficult behaviours observed by the mothers.

At Time 2 the intervention group improved relative to the controls at a statistically significant level in their behaviour at the preschool centre (PBCL,  $p=0.007$ ), but not in their behaviour as rated by their mothers (BSQ) and as rated by the psychologist (BRS). The groups did not differ in change on any of the three family measures at a statistically significant level. Improvement in IQ in the intervention group was significantly associated with the following Time 1 variables: younger age (<42 months), high family stress (QRS-F>160) and low family support (Family support weighted score < 10). No child who received the home based intervention deteriorated in IQ in sub-groups defined by younger age and high family stress, whilst by contrast no control child improved in their IQ in these same sub-groups.

## **Discussion**

The results of this study indicated that the children who received the additional home based Intervention benefited in terms of their cognitive functioning and behaviour which is consistent with reports that have demonstrated that children improve in a range of areas when families are involved in intervention programs (Dawson and Osterling, 1997, Gibbard, Coglan and MacDonald, 2004, Sandow, Clarke, Cox and Stewart, 1981). The WPPSI-R Verbal and Performance Mean Scores, available for 27 children, indicated that at least for these higher functioning children, improvement in the intervention group was in the nonverbal cognitive area which accords with a study using the TEACCH program (Lord and Schopler, 1994) which has many similarities with the extra intervention program of our study, including a home based individualized program for each child depending on their developmental needs and parental concerns. Ozonoff and Cathcart (1998) reported, after an average of 10 visits, an 11 point improvement in cognitive performance skills compared to no difference in the controls. They also reported an improvement, albeit less marked (4 points,  $p<.15$ ), in verbal skills.

Contrary to our expectations, the home-based intervention had no direct effect on the functioning of the families. There was no significant difference between intervention and control group in the three measures designed to assess different aspects of resource provision, distress, support and empowerment. This may be because the home-based intervention was designed to assist the carers in helping the children; it was very child focussed. Improvement in family functioning may require programs that are designed specifically for the carers in addition to programs for the children. Some of the family measures recorded at Time 1 were useful to determine which children benefited from the home-based intervention. Our data confirmed that younger children were more likely to benefit from home-based intervention in terms of both their IQ and their preschool behaviour. The children whose families had greater stress, fewer resources and less social support were more likely to benefit from the home based intervention. Children of corresponding families in the control group were more likely to either stay the same in terms of IQ or to deteriorate. Because of small numbers in these sub-groups we interpret these results with caution, but it makes clinical sense that those families who are receiving little help and support from elsewhere would be most in need of home based intervention, and that they were assisted with strategies to enable their children to progress.

We have now followed the children for a further year following the completion of the additional home based intervention and the results will be reported at a later stage, as any intervention will only be of use if sustained over time.

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Dr Anne Rickards,  
132 Gatehouse St, Parkville  
[rickards1@bigpond.com](mailto:rickards1@bigpond.com)