Educational Considerations

Volume 7 | Number 1 Article 9

9-1-1979

Effect of an infant stimulation program on children

Grace E. Holmes

Richard L. Simpson

Lee Ann Britain

A planned stimulation program for infants with developmental problems utilizing individual program plans has greater beneficial effects than does traditional periodic follow-up care alone.

Effect of an infant stimulation program on children

by Grace E. Holmes, Richard L. Simpson and Lee Ann Britain

Inclusion of handicapped children in preschool programs has become increasingly common during the past decade. It has long been assumed that the most promising results in development might be expected in children who could be identified and remediated at a very early age. This assumption gave impetus to the designing of strategies for earlier diagnosis and intervention in children with developmental disabilities. Supported by state and federal monies and encouraged by a sense of ethical responsibility, numerous infant and preschool programs for exceptional children have been established recently in this country.

Many of these intervention programs were founded in the absence of a background of any established curricula or structure. Of necessity most have been innovative as reports by Gray & Klaus (1970), Berel, Diller & Orgel (1971) and Bradthe, Kirkapatrick & Rosenblatt (1972) indicate. Cornish (1970) suggested that even unsuccessful programs have provided worthwhile feedback regarding the efficacy of specific procedures. However, very few studies have been done to prove the long-term value of early intervention. Those studies that are reported generally have offered little objective evidence for the benefits of early intervention programs. Therefore, appropriate areas of investigation are two-fold; namely, establishment of the effectiveness of such programs in general, and the evaluation of the validity of specific intervention procedures.

The purpose of the present study was to compare the developmental progress of preschool handicapped children who were attending an infant stimulation center with a similar group of children not attending such a program, but who were receiving regular follow-up care as outpatients in a growth and development unit of a major university medical center.

Methods

Subjects and therapeutic environments

Children from two different therapy environments were compared in a retrospective study with regard to their developmental progress. Twenty-two children were seen regularly in a local infant stimulation program, the Infant Development Center (IDC), and 33 were followed through the Growth and Development Unit (GDU) of the University of Kansas Medical Center, College of Health Sciences and Hospital.

The Infant Development Center opened in 1972 as an early intervention and enrichment program designed to serve Kansas residents with delayed development between the ages of birth and three years. The purpose of the IDC program is to provide emotional support and development education and stimulation for both the infant and his family immediately upon identification of the child's problem. Individualized goals are set for each child by both his family and the staff and the child is encouraged to acquire optimum skills in all areas of development through a multi-disciplinary approach. The staff has training and experience in the fields of speech pathology, social work, nursing, early childhood education, occupational therapy, physical therapy and pediatrics. The center maintains close communication with the child's primary physician and referrals for additional services are made as indicated. Mothers accompany their children to the center and are taught developmental stimulation techniques in the areas of cognitive development, self-help skill, language stimulation and fine and gross motor skills. Children and mothers are seen either individually or in small groups often on a weekly basis. Parent counseling services and home visits are a part of the program. When the child reaches the age of 3, he and his family are guided toward placement in another program in the community.

The GDU is the service arm of the University Affiliated Facility (UAF) at the University of Kansas Medical Center, College of Health Sciences and Hospital, Kansas City, Kansas, and is the patient advocate for developmentally disabled children. The unit stresses liaison between patient, medical center and the community in both the states of Kansas and Missouri. Patients of the GDU receive services as a part of the UAF training vehicle. Students from various disciplines participate along with professional staff in the initial evaluation and in all facets of the care of the multiply handicapped child. This care includes integration into the community via day care centers, special education in the public schools, long-term follow-up by social and health agencies and participation in programs of voluntary agencies. The patients are recalled at intervals of 3 to 12 months for pediatric reevaluation or for return to another discipline, and are tracked through a pending file. Patient follow-up is facilitated by the participation of a nurse clinician who makes home visits and recommends reevaluation in appropriate areas.

It is readily apparent that these two treatment environments for developmentally disabled children differ in emphasis. Whereas the IDC is a service-oriented program, the GDU orientation is primarily that of a training setting for students in various professions in addition to offering services.

Children chosen for the study were born between 1968 and 1974 and were followed in one of these two treatment environments between 1970 and 1974. Three diagnostic categories represented in this study included Down's syndrome, mental retardation and cerebal palsy. The non-Down's syndrome mentally retarded group represented children functioning at a retarded level for which reason their parents were seeking help. Children with any of these diagnoses were chosen from the two environments and were selectively matched according to age and clinical condition. Attempts were made to exclude children who had multiple major problems complicating the basic diagnosis.

There were five children from IDC and 14 from GDU diagnosed with Down's syndrome. The mentally retarded group had 12 children from each of the two environments, while five of the cerebral palsied children were from the IDC and 7 from the GDU.

Of the 55 children 52 were white, the others were either Black or of Spanish-American background. The majority of the children in both groups came from homes in which the father was either a skilled laborer or a white collar worker. The fathers of a minority of both groups were professional people or unskilled laborers.

Twenty-nine of the 33 GDU children had been referred to the unit by physicians, while referrals of 16 of the 22 IDC children were usually the result of public news media, other agencies or were self-referrals.

The mean chronological age at both pre and post-testing of each group and sub-group with standard deviations are shown in Table 1. There were no significant pre or post-test mean chronological age differences between the children from the two environments or among the three diagnostic groups.

Procedure

The Denver Developmental Screening Test (DDST) was the instrument used to measure developmental progress. It should be noted that while the DDST may not be ideal in assessment of handicapped children, it currently serves as one of the most satisfactory means of gross assessment of children's development.

Children from the IDC were tested by an experienced examiner (LAB) shortly after their admission to the program and this initial evaluation constituted the pre-test. Because the Denver Developmental Screening Test had not been administered to each GDU child, the children were scored on the DDST according to exhaustive developmental histories recorded in the hospital records. The pre-test information of these children was from the time of initial contact with the patient and this scoring was done by the same examiner as above.

An analysis of the differences in developmental age at pretesting between the IDC and GDU subjects was conducted for the various factors in the DDST. The results obtained were as follows: gross motor development yielded a T value of 0.60 with 17 degrees of freedom, fine motor category had a T value of 1.00 with 15 degrees of freedom, personal-social category had a T value of 0.53 with 15 degrees of freedom and the factor of language yielded a T value of 0.18 with 16 degrees of freedom. In all cases the values were not significant (P .05). Thus the initial differences that did exist between the subjects in the two treatments were not found to be crucial by these tests.

Post-test scores were obtained at varying intervals, those of the older IDC children usually being at or close to their termination at the center or at two to three years of age. The post-test scores of the GDU children were obtained from the most recent comprehensive developmental history and physical examination available in the hospital record. Again, the DDST was administered to the IDC children by an experienced examiner (LAB), who also scored the DDST for the GDU children.

Table 1

Mean Chronological Age in Months of Children in Each Group and Subgroup at Time of Pre- and Post-Test Scoring

		Pre-test		Post-test	
Diagnosis	N	Mean chronological age (months)	Standard Deviation	Mean chronological age (months)	Standard Deviation
Down's					
IDC	5	13.4	6.80	30.0	5.34
GDU	14	12.1	13.12	32.1	25.03
M.R.					
IDC	12	13.7	9.08	22.0	10.52
GDU	12	15.0	8.97	22.4	9.78
C.P.					
IDC	5	17.2	5.07	32.4	2.88
GDU	7	15.7	3.55	25.9	1.95
Total					
IDC	22	14.4	7.07	26.2	9.36
GDU	33	13.9	10.13	27.2	17.54
TOTAL	55	14.1	9.16	26.8	14.72

https://newprairiepress.org/edconsiderations/vol7/iss1/9
DOI: 10.4148/0146-9282.1932

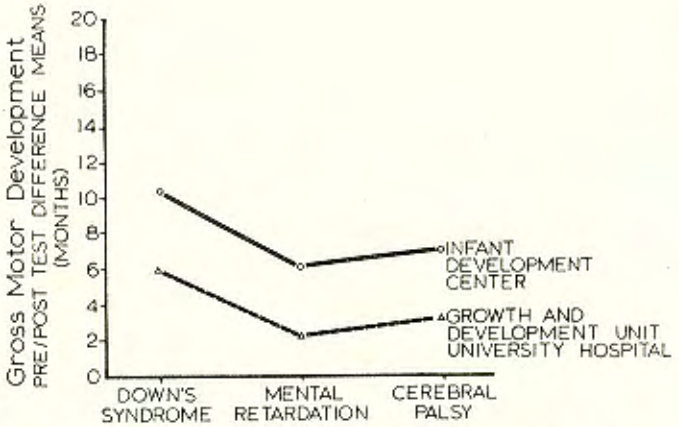

Figure 1. Mean gain in gross motor development measured by the Denver Developmental Screening Test.

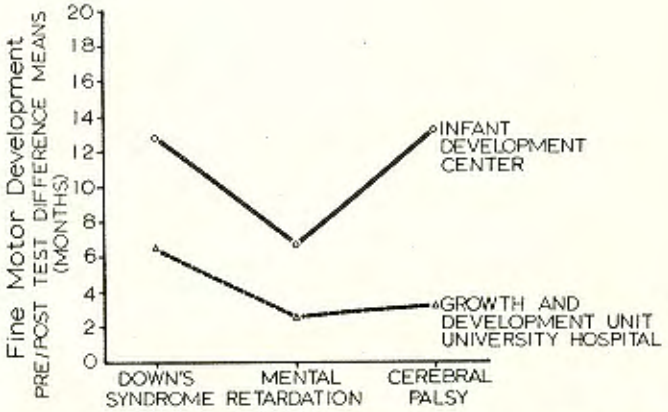

Figure 2. Mean gain in fine motor development measured by the Denver Developmental Screening Test.

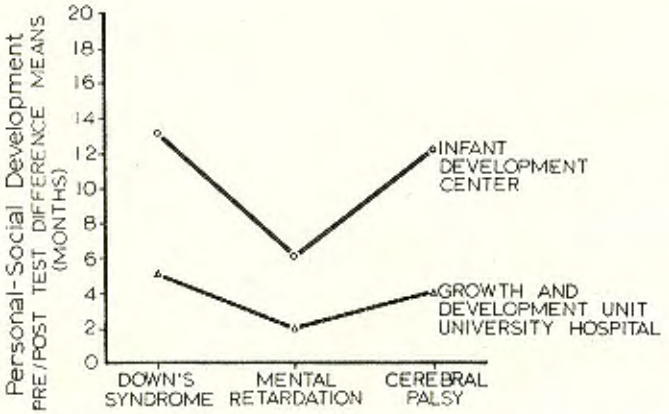

Figure 3. Mean gain in personal-social development measured by the Denver Developmental Screening Test.

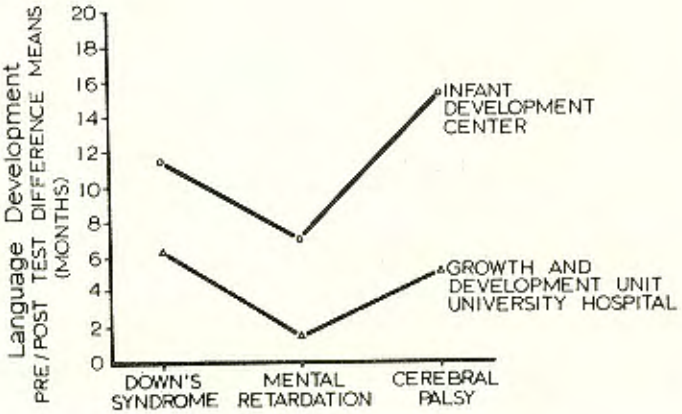

Figure 4. Mean gain in language development measured by the Denver Developmental Screening Test.

All DDST scores were determined by the same examiner, consequently providing uniformity in scoring. Scoring of IDC children was by observation, whereas information on the GDU children was from the parents' report and the GDU physician's observation. Although there is no precedent for scoring DDST items from historical reports and although the examiner recognized the intent of the study, the content and amount of data available from the GDU physicians were felt to be sufficient to give a valid picture of each child's developmental level.

Results

Data were analyzed using a 2 x 3 factorial analysis of variance design for unequal cell frequencies (Winer, 1962). Denver Developmental Screening Test (DDST) pre-test/post-test difference scores for the four developmental categories (gross motor, fine motor, personal-social and language) served as the major dependent variables.

The analysis of the DDST gross motor development difference scores revealed significant differences for the educational placement variable, F (1,49) =<7.25, p < .01. Children attending the Infant Development Center made significantly greater progress than did those followed in the Growth and Development Unit of the hospital setting. There were no significant gross motor development differences on the DDST for the three diagnostic categories, F (2,49) = 2.54, p > .05 and the interaction between the variables of educational environment and diagnostic category was not significant, F (2,49) = .74, p > .05. See Figure 1.

An analysis of the DDST fine motor development scores also revealed that children assigned to the IDC made significantly greater progress than did those not involved in the program, F (1,47) = 22.93, p <.01. In addition, this analysis also revealed significant differences within the diagnostic category variable, F (2,47) = 4.77, p< .05. This finding prompted further analysis using the Scheffe multiple comparison procedure for testing differences between means (Winer, 1962). This procedure revealed significant differences (P< .05) in fine motor development between the mentally retarded children and either the Down's syndrome group or the cerebral palsied group. In both comparisons, those subjects diagnosed as cerebral palsied or Down's syndrome made significantly greater progress in both treatment environments than did those children diagnosed as mentally retarded. The interaction of these two aforementioned variables was not significant, F (2,47) = 1.34, p > .05. See Figure 2.

Results of the analysis for change scores on the factor of personal-social development indicated significant main effects for both the intervention strategy variable, F (1,47) = 31.08, p< .01 and the diagnostic category variable, F (2,47) = 6.56, p < .01. In the case of the intervention strategy variable, those children participating in the IDC program again made significantly greater personal-social developmental progress than did those in the GDU group. The significant main effect finding for the diagnostic category variable led to an analysis of the mean change scores of the children of the three diagnostic groups by means of the Scheffe Multiple Comparisons Procedure. Those children having a diagnosis of cerebral palsy or Down's syndrome made significantly greater personal-social developmental progress (P .05) than did children diagnosed as mentally retarded. The interaction of the environment and diagnostic category variables was not statistically significant, F (2,47) = 1.25, p > .05. See Figure 3.

An analysis of pre-test/post-test DDST language differences by means of a 2 x 3 factorial analysis of variance also indicated significant main effect differences for both the variable of educational placement, F (1,48) = 14.73, p < .01, and the diagnostic category variable, F (2,48) = 3.90, p < .05. Thus, in the area of language development the children who attended the IDC made significantly greater progress in that setting than did the GDU children. As in other developmental areas, the children diagnosed as mentally retarded made significantly smaller gains (p .05) in language development as revealed by the Scheffe Multiple Comparison Test than did either the cerebral palsied or Down's syndrome subjects. The interaction of the educational environment variable and the diagnostic category variable was not significant, F (2,48) = .75, p < .05. See Figure 4.

Thus, in all four categories of the DDST the children from the Infant Development Center showed a significantly greater rate of developmental growth than did those not attending the IDC, but receiving treatment at the Growth and Development Unit.

Discussion

The development of normal children as well as those with some form of disability, has received a great amount of attention in recent years in medical, paramedical and educational circles. The growing interest of when and how best to stimulate learning in children has been translated into action for many normal children of varying socio-economic backgrounds.

These attempts to provide early stimulation have been the impetus for early intervention programs also for children with developmental disabilities. Very few studies to date, however, have substantiated the improved rate of development which was anticipated in these children.

This study has attempted to measure the rate of development in two populations of handicapped children. All of the children were receiving some form of therapy because of their disabilities. Adequate developmental information was available on all children in both groups studied, because of the thoroughness of the follow-up evaluations and the nature of the clinical settings. The children enrolled in the IDC lived in the Greater Kansas City area and as Kansas residents were eligible to attend the infant center. They had access to necessary pediatric, orthopedic and other appropriate specialty care, but, in addition, received individualized programs designed to meet their specific needs. Weekly sessions at the center included involvement with the parent who observed and then demonstrated the home stimulation techniques in the presence of professional therapists. The individualized and repeated contacts with both child and parents were considered the vital aspect of this program. Children attending the GDU received periodic pediatric evaluations and attended appropriate specialty clinics at the university hospital. Although many of these children lived in a geographic area lacking special enrichment programs, they were in a traditional treatment environment which has been considered to be adequate, if not optimum. Although both treatment programs were conceptually ap-

https://newprairiepress.org/edconsiderations/vol7/iss1/9
DOI: 10.4148/0146-9282.1932

propriate for the needs of the children, the strong parental involvement component of the IDC group, the opportunity of shared parent contact and repeated individual attention to child, parent and family may have been the determining factors for the observed differences between the two environments.

The development of these groups of children as measured by the DDST indicated a statistically significant increased rate of development among the children attending the IDC as compared to those followed by the GDU. It is of interest to note that this improved developmental rate pertained to all four categories of the Denver Developmental Screening Test.

Although the DDST is primarily a screening procedure to measure development, it has been assessed empirically to be a reliable and valid instrument both with normal and developmentally delayed children. In addition, the DDST has been shown by Frankenburg, Goldstein & Camp (1971) to be capable of accurately evaluating several salient areas rather than simply providing a nondefinitive global score.

In addition, it was noted that generally the groups of mentally retarded children of both environments progressed at a slower rate than did their environmental counterparts with Down's syndrome or cerebral palsy. Though the differences in developmental rate were statistically significant, they may be merely a reflection of the shorter time interval between pre- and post-testing for the mentally retarded group. This does not detract from the primary finding of the benefits of an appropriate early intervention environment to all three diagnostic groups. This study has not attempted to determine the stability of gains by the children in the two treatment environments.

It appears that the program of early intervention as described in this study, and presumably other similar enrichment programs, has a definite and significant beneficial effect on the development of handicapped children. Since such a program appears to constitute another form of therapy for developmental disability, it is imperative that medical and paramedical personnel working with infants be aware of community facilities which offer such early intervention programs. In addition, it is the responsibility of medical personnel to recognize developmental delays early and to make appropriate referrals.

References

Berel, M.; Diller, L.; and Orgel, M. Music as a facilitator for visual motor sequencing tasks in children with cerebral palsy. **Developmental Medicine and Child Neurology,** 1971, *13,* 335-342.

Bradthe, L.; Kirkapatrick, W.; and Rosenblatt, K. Intensive play: a technique for building affective behaviors in profoundly mentally retarded young children. **Education and Training of the Mentally Retarded,** 1972, *7,* 8-13.

Cornish, R. Effects of neurological training on the psychomotor abilities of kindergarten children. **Journal of Experimental Education,** 1970, *39,* 15-19.

Frankenburg, W.K., and Dodds, J.B. The Denver Developmental Screening Test. **Journal of Pediatrics,** 1967, *71,* 181-191.

Frankenburg, W.K.; Goldstein, A.D.; and Camp, B.W. The revised Denver Developmental Screening Test: its accuracy as a screening instrument. **Journal of Pediatrics,** 1971, *79,* 988-995.

Gray, S., and Klaus, R. The early training project: a seventh year report. **Child Development,** 1970, *4,* 909-924.

Winer, B.J. **Statistical Principles in Experimental Design.** New York: McGraw-Hill, 1962.