The Carolina Abecedarian Project: Intensive Child Focused Early Intervention Within A Full-Time Child Care Setting

Presentation for the Conference “Improving Low-Income Children’s School Readiness: New Perspectives on an Enduring Challenge”
Frances A. Campbell
University of North Carolina at Chapel Hill

Design and Theoretical Rationale

The Abecedarian* Project was a randomized controlled trial of the extent to which intensive early childhood education might reduce or prevent delays in cognitive development in children born into low income households. Treated children were provided with full-day child care year round for five years, from infancy to kindergarten entry. Born between 1972 and 1977, 111 children (98% African American) were admitted to the study in four cohorts. Those randomly assigned to the treated group (n = 57) could begin attending the center as young as 6 weeks; mean entry age was 4.4 months. Control children (n = 54) may or may not have had out of home care, depending on their families’ arrangements.

Study founders, Craig Ramey and Joseph Sparling, sought to prevent the apparent progressive decline in the intellectual development of children from poverty backgrounds. Because this phenomenon was found among those of lower SES backgrounds and not more advantaged backgrounds, the implication was that the etiology was related to the early learning environment. It followed that prevention was possible by environmental enrichment, and the Abecedarian study was construed as a test of the malleability of cognitive development. The “theory of change” was that learning was optimized when child actions evoked contingent responses from the surroundings, human or inanimate. Theoretical support was derived from General Systems Theory (von Bertalanffy, 1975) and Ecological Theories of Development (Bronfenbrenner & Crouter, 1983) both of which posit that development is influenced by a hierarchy of factors ranging from the child to its caregivers, family, child care and schools, and the community at large. Poverty impairs development to the extent that it interferes with the young child having a secure, predictable, and stimulating environment.

The child care center was housed in a University-owned building. The staff consisted of a Center Director (graduate level training in early childhood education), and at least two teachers and/or caregivers in all classrooms. Infants were in a nursery, and toddlers and preschoolers had age-appropriate classrooms. Adult to infant ratios were 3:1, 4:1 for toddlers, and 7:1 for preschoolers. Each preschool classroom had a lead teacher and a full time aide; staff educations ranged from high school to college graduates. Curriculum developers worked with caregivers and teachers in the classrooms: this
oversight was closest for the infants since their curricula were being developed during the earliest years of the program. New curricula were continually being developed for language stimulation, pre-phonics training, and use of computers; published preschool curricular were used in addition to those developed on site. Consultants on language stimulation and social skills were provided.

Because the Center operated for full days, treated children had breakfast, lunch, and a snack each day, a person was needed to help with food service. In addition, the child care center was some distance from children’s neighborhoods, requiring a Transportation Coordinator who, along with rotating teachers, drove vans to transport children; each of these also carried an aide to monitor the children in their safety seats.

Primary pediatric care was provided on site for treated children. Doctors were variously based at the Center and/or the medical school. A full time Family Nurse Practitioner and a full time aide were on site; the FNP provided routine well-child checkups and developmental screening. Child health was checked each day and medicines dispensed as needed. Medical staff also consulted on the physical set up and sanitations practices in the nursery and classrooms. Medical research at the Center included routine saline washes to learn what virii or bacteria were present in children. Because research indicated that children were most infectious before they were symptomatic, they attended child care sick or well, (except for chicken pox).

The Investigators who evaluated the program and conducted other research on-site operated independently from program delivery staff and caregivers were kept unaware of the contents of assessment instruments. Standardized assessments of cognitive development were the primary outcome measures during the early years, administered at 3, 6, 9, 12, 18, 24, 30, 36, 42, 48, 54 and 60 months. Mother and child were videotaped playing together in a laboratory environment at 6, 18, and 36 months, annual home visits were made by the evaluators to assess the quality of the learning environment within the family.

At kindergarten entry, the two preschool groups were re-randomized creating four treatment groups, thus the ultimate design permitted a comparisons of the relative academic performance of children who had early childhood treatment with and without primary grade follow-on, primary grade intervention alone, or no early childhood intervention. School children were administered academic tests of reading and math each of the first three years, as well as intellectual tests at 78 and 96 months, the intervention’s endpoint. Follow up studies at age 12 and 15 years brought further intellectual and academic assessments, culminating with those collected during a young adult follow-up at age 21. Currently, the sample has been followed up at age 30 to assess adult educational and vocational status.
Evidence of Efficacy, Effectiveness, and Cost Effectiveness

- At the outset, infants in the treated and control groups differed by one point on the Bayley Scales of Infant Development, favoring the control group. Thereafter, the treated group’s mean score exceeded that of the control.
- The mean difference in IQ tests was greatest during the preschool treatment; the treated/control difference was a full standard deviation in favor of the treated group. The difference narrowed thereafter, as the treated group’s mean score declined and that of the control group rose. The rapid changes in cognitive performance stabilized during the primary school years, and gradually declined in both groups, but the group difference remained reasonably stable. At age 21 years, the treated group’s mental test score remained significantly higher than that of the control group, with an effect size of .37.
- The four group model showed that the positive treatment effects on reading and math were related to the preschool intervention, with little added benefit accruing to the school-age program. That phase of treatment had no effect on IQ, and minimal effect on academics, although for reading, the standard score increased as a linear function of the years of intervention, such that the group with 8 years of intervention earned higher scores. The effect was less linear for mathematics; preschool treatment alone matched the effect of school-age treatment.
- Grade retention and special education placement were significantly reduced by preschool treatment.
- Primary grade teachers rated treated children as “intellectually brighter” than control children.
- Based on combined data from the Abecedarian and CARE studies, analyses indicated that the effect of early childhood treatment on 8 year old IQ performance was mediated through enhancing the infants’ responsiveness to the people and objects in his or her surroundings.
- The main effect of mother’s IQ on child IQ was moderated by an age by maternal IQ interaction, with the effect of maternal IQ being stronger in the later years. The children of brighter mothers had relatively higher test scores during middle childhood and adolescence.
- Children’s early verbal development wholly accounted for the treatment’s lasting effect on IQ development.
- At age 15, mothers of children in the treated group had attained more education themselves and had higher prestige jobs compared to mothers of control group children.
- At age 21, treated individuals were less likely to have become teen parents.
• Young adults with early treatment were less likely to endorse depressive symptoms than the controls. Early treatment buffered young adults against negative effects of poorer early home environments on young adult depressive symptoms.

• The Abecedarian study found no self-reported reduction in crime rates between its treated and control groups in young adulthood (we do not have access to juvenile records).

• Based on outcomes at age 21, which included a reduction in smoking, more years of education, higher rates of being in college or working at skilled jobs, it was estimated that the Abecedarian study saved society 2.63 for each dollar spent on the early childhood program.

**Major Improvements that Should be Made in the Model**

**Time and duration confound.** The model confounds duration and period of treatment so that it is impossible to ascertain exactly what having intervention for the full five years from infancy to school entry contributed to school success as compared with only three years provided from age 5 to age 8. The data suggest that the relative value of earlier treatment is much stronger than that provided only in the primary grades.

**Weak measures of early attention skills.** At the time the infant/toddler program was underway, less was known about how to measure self-regulation, task orientation, and joint attention. These attributes appear to contribute a great deal to cognitive development. The Abecedarian data show a great deal about the longitudinal course of cognitive development, but far less about abilities such as self-regulation, curiosity, eagerness to learn, a good working memory, and good communication skills. Next generation programs for high risk young children need to monitor development in these areas with the same intensity that the Abecedarian study monitored cognitive and academic outcomes.

**Lack of comparable longitudinal medical data on control children.** The medical team arm conducted extensive studies of the transmission of disease, especially URIs among the treated children, and much research on the relationship of early childhood illness and cognitive and academic outcomes resulted. Unfortunately, comparable levels of medical monitoring were not possible for children in the control group and far less is known about how their illnesses as they were growing up. An initial plan to have both groups come to the Child Care Center for primary pediatric care proved infeasible.

“Toddler Trauma” Once toddlers were walking well, they graduated from the crib nursery to toddler classrooms - usually around 14 months of age, a period of powerful attachment to their familiar caregivers. This adjustment was not always easy. Subsequent to the Abecedarian program, research on mixed age classrooms was tried; eventually, the solution proved to be to have the infants and their familiar teachers graduate to toddler status together.
Child centered treatment. By having the intervention so closely focused on the child, the Abecedarian Project might be judged (unfairly) to have been neglectful of parents. Efforts to involve them were made—but these were not systematic. Data collected during home visits indicated no reliable differences in quality of the home environment as a function of the parent having or not having access to the early child care experience.

Small sample size. A major improvement made would have been to double or triple the numbers of children who took part. As it was, it took 7 years to accrue the 111 children enrolled, but even though attrition was minimal, we lack statistical power to use some of the predictive models that larger studies can mount. The effect size must be very large for us to detect it, thus we may under estimate the potential benefits from the program.

Potential Constraints for Scaling the Intervention

The Abecedarian study has been widely cited as support for other early childhood program that provide services for children from infancy forward, thus has had an impact on the field of early childhood education. The major constraint to exporting it, as it was actually carried out over thirty years ago, would likely be that the program was too expensive and too rich in services to be practical in the real world of low-income neighborhoods were today's services need to be provided. It might be countered that the core of the program exists in the intensive focus on each child, which is more a matter of orientation and understanding of the importance of responsive adults than of fancy equipment or ancillary services. However, adequate well trained staff would be essential to provide each child the kind of contingent learning atmosphere that would optimize development.

Caring for infants in groups imposes stringent requirements for sanitation, and the caregiver to child ratio must be very high if each baby is to have its needs quickly met. I would not minimize the difficulty in providing group care for infants. Nevertheless, it has been successfully done, and the need for very high quality child care, starting in infancy, is growing as new welfare regulations require mothers to work.

Qualified staff may be hard to find, given that child care has traditionally been a low-paid profession with high turnover. Community colleges are increasing their offerings for certification in Child Care, thus a work force capable of providing quality care is growing.

One factor in the success of the Abecedarian program may have been a by-product of the fact that staff salaries and benefits were at a level that fostered low turnover. This had the effect of increasing the stability of the emotional climate of the children.
One difficulty in going to scale would be having sufficient amounts of infant curricula whose efficacy is known and enough trained personnel to teach all caregivers to apply them appropriately. The staff described above was needed to care for up to 50 infants/preschoolers at one time, once all cohorts were admitted and attending. The program would work as well with fewer children at each age. Transportation costs could be reduced or eliminated by having centers easily accessible for parents living in high poverty neighborhoods.

Subpopulation Issues

In the Abecedarian study every slot was needed for a high risk child, hence only those from such backgrounds were admitted. In the local area, low income and minority status were confounded. Thus, few high risk white families were available and at first, most of those recruited refused to take part. Over the years, especially in the follow-on study, Project CARE, a more racially diverse sample was recruited, but not by much. CARE also had socioeconomic integration in that only half its slots were filled by high risk children.

*One who learns the elements or the alphabet.

References


