

# Type of Day-Care and Preschool Intellectual Development in Disadvantaged Children

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BURCHINAL, MARGARET; LEE, MARVIN; and RAMEY, CRAIG. *Type of Day-Care and Preschool Intellectual Development in Disadvantaged Children*. CHILD DEVELOPMENT, 1989, 60, 128-137. Levels and patterns of intellectual development of 3 groups of socioeconomically disadvantaged children were compared. The groups consisted of (1) children who were randomly assigned to receive extensive university-based intervention group day-care, (2) children whose parents placed them in community day-care centers for varying amounts of time, or (3) children whose parents chose little to no center-based day-care for their children. Two repeated-measures analyses of variance were performed to identify possible day-care effects on IQ level and on patterns of infant and preschool cognitive development. The results suggest that quality community day-care, as well as intervention day-care, may positively change both the level and pattern of preschool intellectual development of socioeconomically disadvantaged children.

Children born into impoverished families (25% of all children under the age of 6 in the United States) are significantly more likely to exhibit intellectual underachievement than are their middle-class peers (Schweinhart & Koshel, 1986). Poverty has been associated with both gradual linear declines in intellectual performances across the entire preschool period and with the sudden "dip" in the scores seen when the tests become predominantly verbal (i.e., from 18 to 24 months) (Belsky & Steinberg, 1978; Etaugh, 1980).

The detrimental effects of poverty on preschool intellectual development are believed to be lessened when children attend quality day-care centers. The intellectual development of socioeconomically disadvantaged children has been shown to be positively affected when they attend university-based intervention day-care centers (Lazar, Darlington, Murray, Royce, & Snipper, 1982; Ramey, Bryant, & Suarez, 1985). However, the effects of attending "quality" community day-care centers have been studied less fre-

quently, despite the fact that they are much more prevalent.

The effects of university-based day-care intervention have been widely publicized. The Consortium for Longitudinal Studies (Lazar et al., 1982) documents the effects of 11 university-based demonstration preschool intervention programs on the development of socioeconomically disadvantaged children. The use of random assignment to either a day-care or a comparison group in three of these studies allows causality to be inferred in the observed positive effects of day-care on intellectual development. These studies (Lazar et al., 1982) along with two recent projects employing random assignment (Ramey, Bryant, Sparling, & Wasik, 1985; Ramey, Yeates, & Short, 1984) show that university-based day-care intervention programs help prevent the decline in intellectual performance typically observed in socioeconomically disadvantaged children. In particular, the typically noted decline in intellectual performance beginning at about 18 months is much less pronounced in the children receiving the day-care intervention.

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While public policy has been based on the assumption that attending a quality community day-care center, like intervention day-care, prevents some of the intellectual underachievement that is typically observed (Zigler & Valentine, 1979), this assumption has not been widely tested. An indicator of quality care has been whether the day-care center met the federal day-care standards issued by the National Council for American Youth and Families. Two naturalistic longitudinal studies have shown an association between community day-care and intellectual development of poverty children but were unable to infer causality because random assignment to day-care was not possible. Only one large-scale longitudinal study has assessed whether community group day-care aids in preventing the negative effects of poverty on preschool intellectual development. The New York City Infant Daycare Study (Golden et al., 1978) followed 400 socioeconomically disadvantaged children whose parents elected to raise them at home exclusively or to enroll in one of 31 service-oriented, licensed, group and family infant day-care programs. Children attending day-care centers significantly outscored home-reared children on IQ tests administered at 18 and 36 months of age. Further support for the positive effects of community day-care centers was obtained when Head Start was associated with arresting the decline in IQ performance otherwise expected in disadvantaged children without comparable day-care experience (Datta, 1979).

Implicit in these findings is the assumption that quality day-care affects both the overall level and trends across time of intellectual development of socioeconomically disadvantaged children. While it has been implicitly hypothesized that disadvantaged children attending quality community day-care centers show a different pattern of cognitive development than do non-day-care disadvantaged children (Belsky & Steinberg, 1978; Etaugh, 1980), this hypothesis has not been empirically tested. The present study explicitly examines this assumption by comparing the level and the patterns of infant cognitive and preschool intellectual development of three groups of socioeconomically disadvantaged children: children who participated in a day-care intervention program for the entire preschool period, children who had at least some day-care in community centers that met concurrent federal standards, and children who had little or no group day-care experience. It was expected that children with varying amounts of community day-care would outscore socioeconomically disadvantaged

children without the day-care experience, but that the children attending the university day-care for the entire preschool period would outscore children with some community day-care experience. In addition, the effects of being randomly assigned to the university day-care were examined to ensure that similar patterns of development were observed in this study as were reported by the consortium.

## Method

**Subjects.**—Children determined to be “at risk” for school failure due to socioeconomic factors were recruited to participate in longitudinal studies on the effectiveness of early intervention enrichment day-care (see Ramey, Bryant, Sparling, & Wasik, 1985; Ramey et al., 1984, for details regarding recruitment and treatment). Most mothers were black (98%), single (80%), young ( $M = 20.4$  years,  $SD = 5.0$ ), and had less than a high school education ( $M = 10.5$  years,  $SD = 1.8$ ) at the time of the child’s birth. The first child in this sample was recruited in 1972 and the last in 1980. The children entered the program in six “cohorts.”

Of the original 151 children recruited, 131 were followed until they entered kindergarten (71 boys, 60 girls). The 20 children not followed were lost because the family moved to another locale ( $n = 10$ ), the family withdrew from the project ( $n = 4$ ), the child was diagnosed as moderately to severely retarded by the age of 9 months ( $n = 2$ ), and death of the child ( $n = 4$ ). Another 10 children were deleted from the present analysis because they lived in communities where day-care at centers meeting concurrent federal day-care guidelines was not readily available ( $n = 7$ ), or they attended day-cares that did not meet federal standards ( $n = 3$ ). The analysis sample and attrition group did not differ significantly on measures collected during recruitment (i.e., maternal IQ, maternal education, maternal age, marital status, race, and sex of the child).

About half (54%) of the analysis sample were male, and most (98%) were black. Children were randomly assigned to an experimental or control group. The experimental group attended a cognitively oriented university day-care center from infancy (beginning between 6 weeks and 3 months of age) until they entered kindergarten. Many children in the control group had at least some day-care at one of 11 local “quality” day-care centers. The university and 11 community day-care centers were certified by the state as meeting

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the concurrent federal standards; they were certified at the level II or AA standards, which were the most stringent state standards and were based on federal guidelines (North Carolina Department of Human Resources, 1979, 1982). Thus, both university and community day-care centers maintained at least the minimal recommended caregiver-child ratios (i.e., 1:4 for children less than 2 years of age, 1:5 for 2-3-year-olds, and 1:7 for 4-year-olds) and met criteria for safety, sanitation, nutrition, health, and educational requirements for the director. In addition, the day-care intervention program provided regular in-service training and had specified curricula. These curricula were designed to provide a stable, predictable, intellectually stimulating environment to enhance cognitive, social, and linguistic competence in socioeconomically disadvantaged children. (For details of the day-care curricula, see Bryant, Ramey, Sparling, & Wasik, 1987; Ramey & Campbell, 1987.)

Analysis groups were created by assigning children to one of three "day-care groups" based on treatment group and how much day-care they had received by the age of 54 months. It was decided that children who, by the age of 54 months, had attended community day-care centers for 11 months or less had received so little systematic day-care that this was similar to no day-care. The three day-care groups consisted of: (1) Intervention: children randomly assigned to attend the intervention day-care center ( $n = 61$ ), (2) Community: children randomly assigned to the control group whose parents enrolled them in a community day-care center for between 12 and 52 months ( $n = 41$ ), (3) Minimal: children randomly assigned to the control group with less than 12 months of group day-care experience ( $n = 19$ ).

The age of entry into day-care and months in care were highly correlated among children who attended community day-care for 12-52 months. These children typically received uninterrupted day-care from the time they began day-care until kindergarten (89% of children attending community day-care, 100% of children attending the day-care intervention). While half of the children in the Minimal day-care group attended at least one community day-care, these children had an irregular pattern of enrollment.

In addition, months of day-care experience and the day-care groups were confounded. All children in the Intervention group had similar amounts of day-care (i.e., 51-52.5 months by the age of 54 months),

while the number of months of day-care was used to define the other two groups. Thus, either months of day-care or type of day-care experience could be used for analysis. Type of day-care was selected since it could be used to examine whether similar levels and trends in preschool cognitive development were seen in children with varying amounts of quality community day-care as in children attending the intervention day-care center.

Table 1 describes selected maternal and child demographic characteristics, the day-care history, and a measure of the home environment, the total score from the Home Observation for Measurement of the Environment (Elardo & Bradley, 1981), collected annually during the preschool years of the children with varying amounts of community day-care or who were randomly assigned to university day-care. The analysis groups did not significantly differ on these characteristics.

*Procedure.*—The intellectual levels of the children were assessed semiannually between 6 and 54 months of age. Children were administered the Bayley Scales of Infant Development (Bayley, 1969) at 6, 12, and 18 months; the Stanford-Binet Intelligence Scale (Terman & Merrill, 1973) at 24, 36, and 48 months; and the McCarthy Scales of Children's Ability (McCarthy, 1972) at 42 and 54 months. Each child was given the appropriate test at each age by a trained female examiner. Each child's day-care history was collected annually in an interview with their mothers or guardians. The months each child attended a community day-care center between birth and 54 months were recorded.

*Data analysis.*—Two repeated-measures multivariate analyses of variance were performed to determine if there were group, time, or group  $\times$  time effects on preschool intellectual development. The MDI scores were analyzed separately from the preschool IQ scores. The cubic polynomial model was fit to the preschool scores because the quadratic term was the highest-order term for which a priori hypotheses existed.

Three a priori between-groups contrasts were selected to test the issues of interest. They were: (1) comparison of the experimental subjects with the control subjects (Intervention vs. the Community and Minimal day-care groups); (2) comparison of children who attended the intervention center for most of their preschool years with children who attended other community day-care centers for at least 1 of their preschool years (Interven-

TABLE 1  
SAMPLE DESCRIPTION

	TYPE OF DAY-CARE EXPERIENCE			F(2,118)	p
	Intervention (n = 61)	Community (n = 41)	Minimal (n = 19)		
<b>Maternal characteristics:</b>					
<b>Education:</b>					
M	10.6	10.5	9.9	1.3	.29
SD	1.7	1.8	1.8	...	...
med <sup>a</sup>	11.0	11.0	10.0	...	...
<b>IQ:</b>					
M	85.2	86.5	80.9	1.6	.21
SD	12.3	10.4	10.1	...	...
med	84.0	86.0	83.0	...	...
% married	19.7	12.2	36.8	5.0 <sup>b</sup>	.08
<b>Age:</b>					
M	20.0	20.2	21.7	.8	.46
SD	4.2	4.6	7.8	...	...
med	19.0	19.0	19.0	...	...
<b>Child characteristics:</b>					
Race (% black)	96.7	97.6	100.0	... <sup>c</sup>	...
Sex (% female)	42.6	41.5	63.2	2.9 <sup>a</sup>	.24
<b>Months of day-care:</b>					
M	51.8	31.8	2.6	...	...
SD	2.2	12.1	2.9	...	...
med	52.0	30.0	2.0	...	...
<b>Entry age:</b>					
M	2.2	20.7	38.7	...	...
SD	1.2	12.4	13.9	...	...
med	2.0	24.0	45.5	...	...
<b>Number of centers attended:</b>					
M	1.0	1.7	.7	...	...
SD	...	.8	.9	...	...
med	1.0	1.0	1.0	...	...
<b>Quality of the home environment:</b>					
<b>HOME, 6 months:</b>					
M	28.0	27.8	26.6	.6	.61
SD	5.1	5.4	4.8	...	...
<b>HOME, 18 months:</b>					
M	30.6	30.0	27.3	2.6	.08
SD	5.2	6.0	5.2	...	...
<b>HOME, 30 months:</b>					
M	30.3	30.9	28.6	1.0	.39
SD	6.5	5.3	5.0	...	...
<b>HOME, 42 months:</b>					
M	57.3	56.8	51.5	3.0	.06
SD	9.2	9.1	8.7	...	...

<sup>a</sup> Median presented because sample distribution is skewed.

<sup>b</sup> Test statistic is  $\chi^2$  with 1 *df* rather than *F*.

<sup>c</sup>  $\chi^2$  is inappropriate because 50% of cells had expected frequencies of less than 5.

tion vs. Community); (3) comparison of control children with less than 12 months of group day-care with control children who had attended a day-care center for 12–52 months (Community vs. Minimal).

The final IQ score collected during the preschool period was analyzed to identify day-care effects at entry to kindergarten. The proportions of children in the day-care groups

scoring below 84, a criterion for borderline intellectual functioning according to DSM III, were compared using log-linear models.

## Results

The mean IQ scores for these three groups across the eight assessment periods are displayed in Figure 1 and listed in Table 2. The results of the analysis, reported in

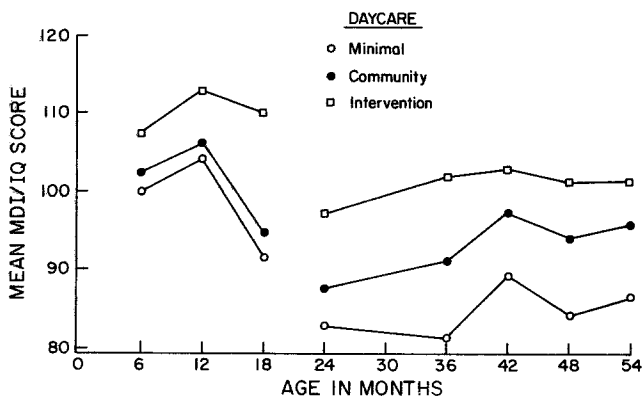


FIG. 1.—Patterns of preschool cognitive development: mean cognitive scores for three day-care groups at eight ages.

Tables 3 and 4, confirm the trends seen in the plot. Significant group, time, and group  $\times$  time effects were detected in the infant cognitive and preschool intellectual development of these poverty children.

The analysis of the infant MDI scores demonstrated that the Intervention day-care children showed a different pattern of infant cognitive development from the other children. They scored higher and displayed less linear decline than the control children as a whole or than the subgroup of control children in the Community day-care group. The Community and Minimal day-care groups did not show different cognitive levels or trends across time during the infancy period. Quadratic change characterized the pattern of development across time for children as a whole

(i.e., their MDI scores tended to increase followed by a decrease during the infancy period).

The analysis of the preschool IQ scores produced a somewhat different pattern of results. While the Intervention children still scored higher on the average across time than the Community children, the Community children tended to score higher across time than the Minimal day-care children. No consistent group differences emerged in the analysis of trends across time. Linear and quadratic change described the development of the children as a whole.

Two sets of post hoc descriptive analyses were performed. The first set examined whether the day-care group differences were

TABLE 2  
MEAN MDI/IQ SCORES ACROSS PRESCHOOL YEARS FOR THREE GROUPS

	TYPE OF DAY-CARE EXPERIENCE		
	Intervention (n = 61)	Community (n = 41)	Minimal (n = 19)
<b>Bayley:</b>			
MDI, 6 months	107.4 (15.0)	102.5 (15.0)	100.0 (14.0)
MDI, 12 months	113.0 (14.3)	106.1 (15.9)	104.3 (13.6)
MDI, 18 months	110.1 (14.6)	94.7 (14.8)	91.5 (12.1)
<b>Stanford-Binet:</b>			
IQ, 24 months	97.2 (11.6)	87.6 (11.7)	82.8 (5.7)
IQ, 36 months	101.9 (12.5)	91.2 (13.6)	81.3 (10.6)
<b>McCarthy:</b>			
GCI, 42 months	103.0 (10.2)	97.3 (13.2)	89.2 (8.9)
<b>Stanford-Binet:</b>			
IQ, 48 months	101.1 (11.0)	94.0 (13.2)	84.2 (10.8)
<b>McCarthy:</b>			
GCI, 54 months	101.4 (10.1)	95.7 (13.0)	86.5 (10.5)

NOTE.—Group standard deviations are in parentheses.

TABLE 3

DAY-CARE EXPERIENCE AND TIME EFFECTS ON INFANT COGNITIVE DEVELOPMENT

SOURCE	df	F	CONTRASTS		
			Intervention vs. Control F(1,118)	Intervention vs. Community F(1,118)	Community vs. Minimal F(1,118)
Day-care .....	2,118	11.3***	22.1***	15.0***	.6
Time .....	3,116	19.6***	...	...	...
Linear .....	1,118	2.6	...	...	...
Quadratic .....	1,118	35.4***	...	...	...
Day-care × time .....	4,234	3.6*	...	...	...
Linear .....	2,118	5.3**	10.6***	8.33**	.0
Quadratic .....	2,118	1.7	3.3	2.2	.1

\*  $p < .05$ .  
 \*\*  $p < .01$ .  
 \*\*\*  $p < .001$ .

observed when potential confounding factors were considered. The second set attempted to disentangle the confounding effects of months in day-care and type of day-care. These analyses were performed on the preschool data only because community day-care effects were detected only during that period. Examining the effects of covariates on the infant cognitive scores was regarded as unnecessary because it was the comparison of Community effects with the other groups that was of primary interest. Since these post hoc analyses were performed without regard to a priori hypotheses or concern for Type I error rates, the tests were regarded as descriptive rather than inferential.

Several potential confounding variables were entered as covariates into these reanal-

yses of preschool intellectual development. Maternal IQ, maternal education, whether the mother was married, and a measure of the quality of the home environment were selected as covariates because each has been shown to predict intellectual development. The distributions of some of these variables were not normal, as was to be expected since they were criteria used to define risk for school failure. Maternal IQ and education were transformed with a natural logarithm transformation. The mean of the standardized HOME total scores collected at 6, 18, 30, 42, and 54 months indexed the quality of the home environment. These reanalyses, shown in Table 5, revealed the identical pattern of day-care group differences as was reported above.

TABLE 4

DAY-CARE EXPERIENCE AND TIME EFFECTS ON PRESCHOOL INTELLECTUAL DEVELOPMENT

SOURCE	df	F	CONTRASTS		
			Intervention vs. Control F(1,118)	Intervention vs. Community F(1,118)	Community vs. Minimal F(1,118)
Day-care .....	2,118	21.9***	35.2***	15.4***	9.6*
Time .....	3,116	16.6***	...	...	...
Linear .....	1,118	31.6***	...	...	...
Quadratic .....	1,118	18.0***	...	...	...
Cubic .....	1,118	.1	...	...	...
Day-care × time .....	6,232	1.6	...	...	...
Linear .....	2,118	2.4	2.6	4.5	2.1
Quadratic .....	2,118	1.4	1.4	.3	1.4
Cubic .....	2,118	1.6	3.0	1.7	.3

\*  $p < .05$ .  
 \*\*  $p < .01$ .  
 \*\*\*  $p < .001$ .

TABLE 5

## DAY-CARE EXPERIENCE AND TIME EFFECTS ON PRESCHOOL INTELLECTUAL DEVELOPMENT GIVEN SELECTED COVARIATES

SOURCE	df	F	CONTRASTS		
			Intervention vs. Control F(1,118)	Intervention vs. Community F(1,118)	Community vs. Minimal F(1,118)
<b>Between-subjects factors:</b>					
<b>Maternal characteristics:</b>					
IQ	1,114	11.0**	...	...	...
Education	1,114	5.7*	...	...	...
Married	1,114	.4	...	...	...
HOME	1,114	27.2***	...	...	...
Day-care	2,114	25.0***	46.2***	25.4***	5.4*
<b>Time × between-subjects factors:</b>					
<b>Maternal characteristics:</b>					
IQ	4,111	2.5*	...	...	...
Education	4,111	.0	...	...	...
Married	4,111	1.3	...	...	...
HOME	4,111	1.6	...	...	...
Day-care	2,114	25.0***	46.2***	25.4***	5.4*

NOTE.—Only multivariate statistics for the TIME × between-subjects analyses are reported because the day-care × time test was nonsignificant.

\*  $p < .05$ .\*\*  $p < .01$ .\*\*\*  $p < .001$ .

TABLE 6

POST HOC ANALYSIS: EFFECTS OF INTERVENTION, TWO LEVELS OF COMMUNITY DAY-CARE,  
AND MINIMAL DAY-CARE ON PRESCHOOL INTELLECTUAL DEVELOPMENT

SOURCE	df	F	CONTRASTS		
			Intervention vs. Community, 30-52 months F(1,117)	Community, 30-52 months vs. 12-29 months F(1,117)	Community, 12-29 months vs. Minimal F(1,117)
Day-care .....	3,117	14.5***	10.2**	.0	9.5**
Time .....	3,117	17.1***	...	...	...
Linear .....	1,117	32.8***	...	...	...
Quadratic .....	1,117	17.9***	...	...	...
Cubic .....	1,117	.1	...	...	...
Day-care × time .....	9,351	1.7*	...	...	...
Linear .....	3,117	3.5*	.1	5.7*	2.4
Quadratic .....	3,117	.9	.3	.1	1.4
Cubic .....	3,117	1.1	.8	.1	.3

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

The effects of time in day-care were examined next. The preschool IQ levels and trends across time were studied after the Community day-care group had been divided into two groups, children with 12-29 months of day-care and children with 30-52 months of day-care experience. This analysis, reported in Table 6, included contrasts that compared these two groups as well as comparing the Intervention group with the children receiving the most community day-care. The two community day-care groups did not differ significantly on levels or trends of preschool development, but the comparison of linear trends suggested that more positive linear change was observed across time among the children with less day-care experience. Significant IQ-level differences were detected when the Intervention group was compared with the Community (30-52) group and when the Community (12-29) group was compared with the Minimal group.

The final assessment of intellectual achievement during the preschool years examined day-care effects when these children entered public schools. The proportion of children scoring at least 1 SD below the norming population's mean on the McCarthy General Cognitive Index (GCI) at 54 months was analyzed with a log-linear model. Marked day-care group effects emerged,  $\chi^2(2) = 13.73, p < .0001$ . Only 7% of the Intervention children scored 84 or below, compared to 20% of the Community day-care and 47% of the Minimal day-care children. The same day-care group contrasts described above

were computed. The contrasts revealed that proportionately fewer children scored below the normal range in the Intervention than in the control group,  $\chi^2(1) = 7.81, p = .0002$ , and in the Community children than in the Minimal group,  $\chi^2(1) = 4.70, p = .03$ . The proportion scoring below 85 in the Intervention group was lower, albeit nonsignificantly, than in the Community group,  $\chi^2(1) = 3.63, p = .057$ .

A post hoc analysis was performed to examine the effects of varying amounts of community care. The four day-care groups were compared on the proportion scoring below the "normal" range. This revealed that the two community groups did not significantly differ,  $\chi^2(1) = 0.77, p = .38$ . In fact, fewer of the children with 12-29 months of day-care at a community center scored in the borderline range (11%) than did children with 30-52 months of day-care (27%).

## Discussion

These results provide additional evidence that group day-care affects both the level and the pattern of infant and preschool intellectual development of socioeconomically disadvantaged children. Comparisons of the overall level and trends over time of cognitive development exhibited within the three groups suggest that while extensive day-care experience at a university intervention demonstration day-care center is the most successful in preventing intellectual underachievement, at least a year of day-care expe-



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rience at a "quality" community day-care also appears to positively enhance both the overall level and trends across time of the intellectual development of socioeconomically disadvantaged children. These results can be discussed in two contexts.

First, this study provides further evidence that "good" day-care positively affects the overall preschool cognitive level of socioeconomically disadvantaged children. Specifically, the results provide further evidence that intervention day-care contributes to higher preschool IQ scores. This finding supports the conclusions of the Consortium for Longitudinal Studies (Lazar et al., 1982) of intervention programs which demonstrated that university cognitively oriented day-care intervention programs have positive effects on the intellectual and academic development of poverty children. In addition, this study replicates the results of Golden et al. (1978) which suggested that socioeconomically disadvantaged children attending quality community day-care centers outscored their home-reared peers on preschool measures of intellectual development. These day-care group differences were observed even after adjusting for the effects of maternal and home characteristics. Moreover, the current project extends the work of the consortium (Lazar et al., 1982), Golden et al. (1978), and Datta (1979) by documenting cognitive growth during the entire infant and preschool period.

Second, this study makes a unique contribution since it explicitly examines the effect of day-care on the trends of intellectual development of socioeconomically disadvantaged children. In particular, the present work demonstrates two phenomena: (1) a linear decline and quadratic change in cognitive scores during late infancy and early preschool characterizes the intellectual development of socioeconomically disadvantaged children, and (2) intervention day-care tends to lessen this decline. In fact, the post hoc analysis in which the community day-care group was subdivided into groups of children with 12-29 and 30-52 months of day-care experience hinted that children with less community day-care were "catching up" on the average with the children with the most community day-care.

Unfortunately, this study cannot address the question of the sudden "dip" reported in the cognitive development of poverty children. A dip (i.e., the quadratic trend) was detected in the analysis of the infant cognitive scores for the children as a whole, but the

groups did not differ significantly in the degree of the quadratic trend. A dramatic dip was observed between 18 and 24 months but was not examined analytically because different tests were used during the infant and preschool periods.

While these results provide support for the general assumption that at least 1 year of community day-care has similar, albeit slightly less intense, positive effects as the well-documented effects of extensive university intervention day-care on the cognitive development of poverty children, certain caveats must be recognized. The legitimacy of inferring causality from the comparison of the children assigned to the day-care intervention with the children assigned to the control group is based on the random assignment to treatment. However, the extent to which conclusions regarding the efficacy of community day-care can be made from the observed effects in this sample is limited by the degree of potential selection bias among families who chose to place their children in a community day-care center. While the three groups did not differ significantly on initial characteristics or on measures of the quality of the home environment during the preschool years, and the day-care differences were observed when the effects of these confounds were held constant analytically, this analysis does not allow the conclusion that community day-care causes the observed positive effects on preschool intellectual development. Nevertheless, it does provide support for the generalization from the intervention literature to community day-care because similar effects on intellectual development were observed.

In addition, the analysis groups were defined by three confounded factors—months of day-care experience, age of entry to day-care, and type of day-care. Whether the observed differences between the intervention and community day-care groups were due to months of day-care, age of entry, or to type of day-care cannot be determined from these data. However, post hoc comparisons of children with 30-52 months of community day-care with children who had 12-29 months of community day-care revealed no significant differences in level, trends over time, or proportion scoring below 84 on the final preschool assessment. These analyses suggest that amount of day-care and age of entry may not be the most important factor. It may be that attending a "good" day-care for the 12-18 months prior to entry to kindergarten is sufficient to ameliorate some of the negative effects of poverty.

The results of this study and previous studies indicate that more research on the effects of day-care on intellectual development of socioeconomically disadvantaged children is needed. The issues of selection bias, age at entry to day-care, and amount of time in day-care are important issues that have not been addressed adequately. The studies that randomly assigned children to either day-care intervention groups or control groups varied markedly on age at entry to the intervention and on amount of time in day-care (Ramey, Bryant, & Suarez, 1985). The previous studies examining community day-care centers (Datta, 1979; Golden et al., 1978) were unable to control for either age-at-entry effects or parental self-selection of day-care in the design of their studies. The lack of control over these confounds limits the generalizability of this study as well. These important issues should be examined in a study in which children enter community and intervention day-care centers at the same ages and remain in these centers for equal durations. Only then can the effects of time of entry and duration in various types of day-care be assessed.

In conclusion, group day-care appears to affect positively both the intellectual level and the patterns of cognitive growth in socioeconomically disadvantaged children. Moreover, these results suggest that quality community day-care, as well as university intervention day-care programs, may aid in preventing the patterns of intellectual underachievement that are too often observed in poverty children.

## References

- Bayley, N. (1969). *Manual for the Bayley Scales of Infant Development*. New York: Psychological Corp.
- Belsky, J., & Steinberg, L. D. (1978). The effects of day care: A critical review. *Child Development*, *49*, 929-949.
- Bryant, D. M., Ramey, C. T., Sparling, J. J., & Wasik, B. H. (1987). The Carolina approach to responsive education: A model for daycare. *Topics in Early Childhood Special Education*, *7*, 48-60.
- Datta, L. (1979). Another spring and other hopes: Some findings from national evaluations of Project Head Start. In E. Zigler & J. Valentine (Eds.), *Project Head Start: A legacy of the war on poverty* (pp. 405-432). New York: Free Press.
- Elardo, R., & Bradley, R. H. (1981). The Home Observation for Measurement of the Environment (HOME) scale: A review of research. *Developmental Review*, *1*, 113-145.
- Etaugh, C. (1980). Effects of nonmaternal care on children: Research evidence and popular views. *American Psychologist*, *35*, 309-319.
- Golden, M., Rosenbluth, L., Grossi, M., Policare, H., Freeman, H., & Brownlee, E. (1978). *The New York City Infant Day Care Study*. New York: Medical and Health Research Association of New York City.
- Lazar, I., Darlington, R., Murray, H., Royce, J., & Snipper, A. (1982). Lasting effects of early education: A report from the Consortium for Longitudinal Studies. *Monographs of the Society for Research in Child Development*, *47*(2-3, Serial No. 195).
- McCarthy, D. (1972). *McCarthy Scales of Children's Abilities*. New York: Psychological Corp.
- North Carolina Department of Human Resources (1979). *Child daycare: Standards for certification of daycare centers*. Raleigh: North Carolina Department of Human Resources.
- North Carolina Department Human Resources (1982). *Child daycare standards*. Raleigh: North Carolina Department of Human Resources.
- Ramey, C. T., Bryant, D. M., Sparling, J. J., & Wasik, B. H. (1985). Project CARE: A comparison of two early intervention strategies to prevent retarded development. In R. Fewell (Ed.), *Topics in early childhood special education* (pp. 12-25). Austin, TX: PRO-ED.
- Ramey, C. T., Bryant, D. M., & Suarez, T. (1985). Preschool compensatory education and the modifiability of intelligence: A critical review. In D. K. Detterman (Ed.), *Current topics in human intelligence* (pp. 248-296). Norwood, NJ: Ablex.
- Ramey, C. T., & Campbell, F. (1987). The Carolina Abecedarian Project: An educational experiment concerning human malleability. In J. J. Gallagher & C. T. Ramey (Eds.), *The malleability of children* (pp. 127-139). Baltimore: Brooks.
- Ramey, C. T., Yeates, K. O., & Short, E. J. (1984). The plasticity of intellectual development: Insights from preventive intervention. *Child Development*, *55*, 1913-1925.
- Schweinhart, L. J., & Koshel, J. J. (1986). *Policy options for preschool programs*. Ypsilanti, Michigan: High/Scope Educational Research Foundation.
- Terman, L. M., & Merrill, M. A. (1973). *The Stanford-Binet Intelligence Scale*. New York: Houghton Mifflin.
- Zigler, E., & Valentine, J. (Eds.). (1979). *Project Head Start: A legacy of the war on poverty*. New York: Free Press.

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