Health Status and School Achievement of Children from Head Start and Free School Lunch Programs

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AMONG THE MANY INTERVENTION PROGRAMS for disadvantaged children operating in the United States, Project Head Start and the Free School Lunch Program offer an opportunity to compare the effects of two different approaches to supplementary feeding and nutritional remediation. Head Start is a comprehensive program utilizing social, medical, and educational as well as nutritional intervention before the child enters elementary school; the Free Lunch Program simply supplies a meal of specified nutrient content to the child on school days. Although the choice of the most effective model is a significant question of public policy, research efforts to date that have attempted to show short- and long-term benefits of these programs for the health status and school achievement of disadvantaged children have had equivocal results.

Findings of Datta (*1*) indicated that children attending Head Start exhibited transient developmental improvements in the first year of school. The Westinghouse study (*2*) showed that Head Start children were still considerably below national norms on standard tests of language and school achievement, and the gains reported in the first year of elementary school by children who had attended Head Start were not continued into the second and third grades. Authors of a more recent national collaborative study concluded that even though initial advantages may not be sustained, programs such as Head Start improve the ability of low-income children to meet minimum requirements of their schools in that they reduce the probability that these children will be assigned to special education classes or held back a grade (*3*).

A review of literature from 1969 to 1976 yielded few studies of the impact of Head Start on the health or physical status of disadvantaged children (*4*). It has been suggested in several reviews that a short-term effect of the nutrition component may be reflected in adequate growth patterns among children during the preschool years (*5–9*). Long-term effects of Head Start on growth and health status have not been reported.

There is a similar paucity of data supporting long-term benefits of the Free School Lunch Program. The school lunches have been shown to contribute a signifi-

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cant proportion of nutrients to the diets of children from low-income families (*10,11*) and to improve behavior in the classroom when children come to school hungry (*12*), but lunch feeding alone has not been correlated with improvements in health or school performance over time (*13–15*). Smith, in a preliminary progress report on food consumption and school performance of adolescents, stated that children from disadvantaged homes continued to exhibit poor school performance despite regular participation in a school lunch program and that a greater number of boys receiving free school lunches fell below the fifth percentile for height (unpublished report by M. Smith, USDA/Current Research Information Service Abstract, Project MIS 1971–01, Alcorn A and M College, Lorman, Miss.). In a comprehensive study in Washington State, variables reflecting area of residence and ethnicity were found to be more significant predictors of health status and school performance than participation in the school feeding programs (*16*).

Objectives and Methods

Our study used cross-sectional, longitudinal, and mixed longitudinal approaches to analyze data from school records to determine whether the nutritional input of the Head Start and Free Lunch Programs could affect physical and educational outcomes for disadvantaged children. The subjects were students in a small, predominantly white, semirural school district in northern California. The records of the total school population of approximately 1,100 students were screened to select children for the study from two intervention programs that included a nutritional component and from two comparison programs without a nutritional component. A history of illness or a known handicap that could affect the results disqualified the student from further consideration.

The numbers and distribution of subjects in the cohorts follow:

Cohort	*Boys*	*Girls*	*Total*
Head Start	56	44	100
Free Lunch	42	71	113
Title I	29	26	55
Preschool	32	32	64
Total	159	173	332

All 100 Head Start graduates had received their noon meal from the school district cafeteria during the year

before they entered school as part of the Head Start nutrition program; some continued to participate in the lunch program after enrolling in the first grade. For these children, the nutritional benefits of Head Start began as early as 4 years of age.

The 113 Free Lunch participants did not attend Head Start but began receiving the same meal as the Head Start children from the school cafeteria in the first grade at about 6 years. These children continued to be regular participants in the Free Lunch program during their elementary school years.

Two groups of children were selected for purposes of comparison. Fifty-five students who had been in a compensatory education program funded by Title I of the Federal Elementary and Secondary Education Act were selected as a comparison group of disadvantaged children. The Title I students had received intervention without a nutrition component. These children were given remedial education in first through third grade but did not receive free meals. A second comparison group was composed of 64 students who had attended preschool programs requiring parent participation and tuition. These children were all from middle and upper income families. They did not receive free meals in the preschool program and were not eligible for free school lunches, although some may have participated in the School Lunch Program on a paying basis.

Variables used to reflect aspects of the students' backgrounds, school performance, and physical status were selected from the school records. Family size and birth weights of the children were compared among the four study groups. Educational outcome variables included scores on the Comprehensive Test of Basic Skills (*17*) routinely administered biannually to all students in the district; assignment to high, medium, or low track; birth dates to determine overage for grade; and placement in a special education program. Physical outcome variables studied were the number of absences from school excused for medical reasons, physical fitness as demonstrated by performance on the 6-minute jog-walk (*18*), and indicants of growth. Height for age, weight for age, and weight for height evaluated by norms established by the National Center for Health Statistics (*19*) were used as indices of growth status. Weights falling below the 10th percentile or above the 90th percentile were considered out of the normal range (*20*). These bounds correspond to 80 percent below or 120 percent above the ideal weight for height. The benchmark for height was set at the 25th percentile. Children below this percentile were considered short for their age.

Figure 1. Mean percentile scores on the Comprehensive Test of Basic Skills, by cohort

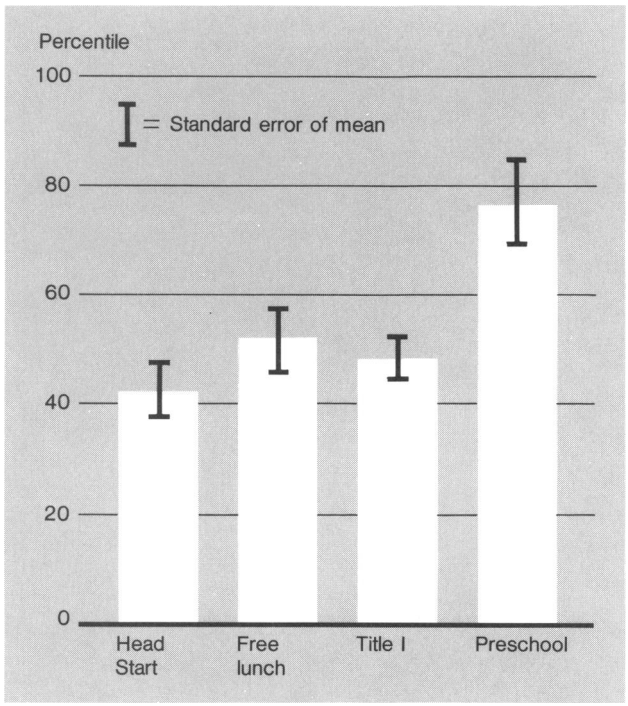


Figure 2. Mean height, by cohort, of boys at 6, 10, and 14 years

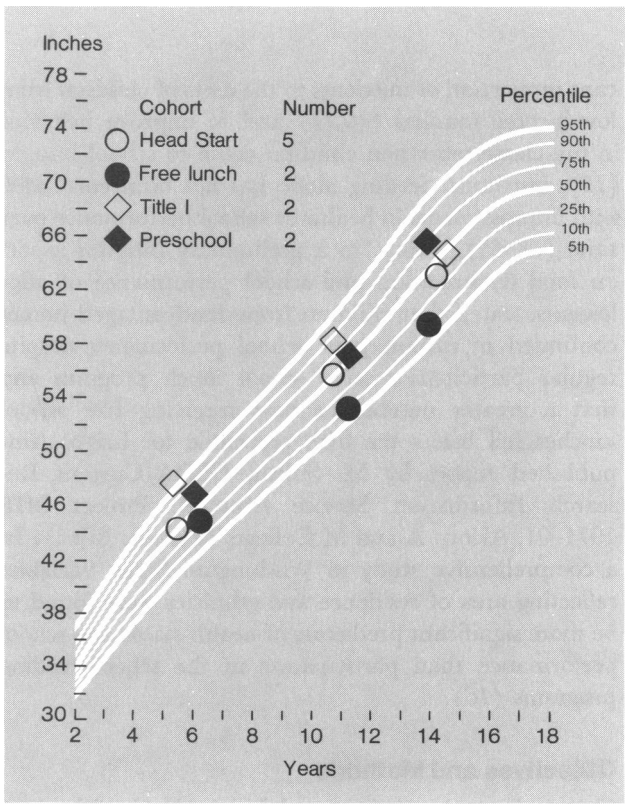
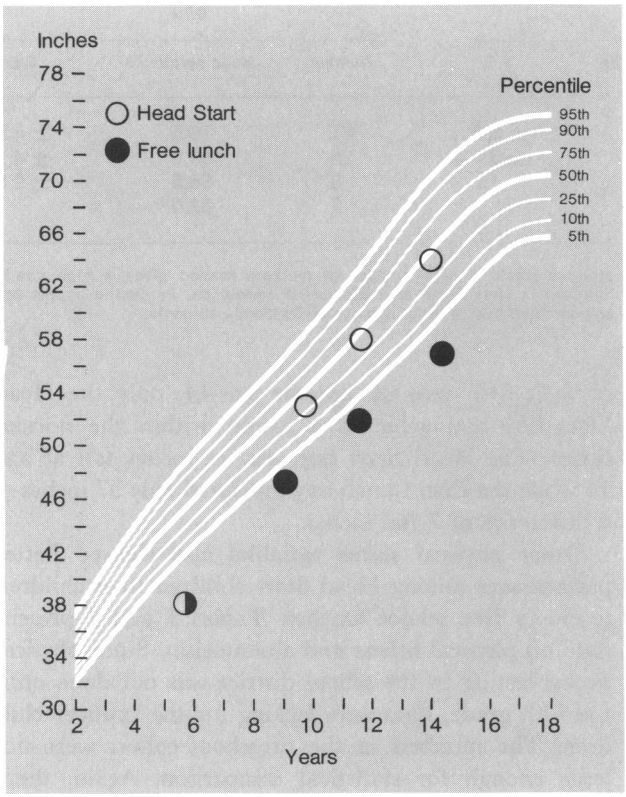


Figure 3. Longitudinal comparison of two case study boys' stature



The chi-square statistic was used to test the significance of differences in the distribution of children from the four cohorts for tracking, special education placement, and poor growth. Differences in means for the continuous variables were tested for significance using Student's t and analysis of variance with least significant difference (*21*). Significance was assigned at the 0.05 level or below.

All variables were first examined for all children and then separately by sex in cross-sectional fashion by cohort. In the second approach a mixed-longitudinal model was used for the growth data only. In this model, we used heights and weights recorded at half-year intervals in the growth records of the total population of students. The mixed-longitudinal model makes it possible to utilize more of the available anthropometry data by allowing members of the cohorts to enter and leave the study according to the availability of data over time (*22*). The analysis therefore included subjects for whom there were several measurements and some for whom only one measurement had been recorded.

In the third approach to analysis, a selected sample of subjects whose growth records were complete and who best represented their cohorts were evaluated on a retrospective longitudinal basis. A growth record was considered complete if there were at least 3 measurements made at approximately 6, 10, and 14 years. Depending on their cohort, students were considered representative if they had participated for at least 1 school year in Head Start, or Title I, or the private preschool or had received free school lunches regularly since the first grade. As an additional check on the appropriate assignment of these children, teachers who were familiar with the children were asked to screen them for inclusion in the study groups. These more rigid criteria resulted in a smaller sample of 20 subjects for longitudinal study. Height for age, weight for age, and weight for height measurements were compared to validate the cross-sectional and mixed-longitudinal results and to provide a long-term look at a parameter of nutritional status.

Finally, to illustrate further and amplify the findings, two boys who represented the Head Start and Free Lunch cohorts were selected as case studies. These two boys had been weighed and measured in the last half of their fifth year and at that time had had identical measurements for weight and height.

Results

Results of the cross-sectional analysis showed that the Head Start and Free Lunch children came from larger families than the two comparison groups. The mean number of children per family were as follows: Head Start, 3.5; Free Lunch, 3.4; Title I, 2.8; preschool, 2.3. No significant differences in mean birth weights for boys or girls were found among the cohorts.

Figure 1 shows the mean percentile scores from the Comprehensive Test of Basic Skills. The disadvantaged children in all three programs had poorer scores compared with children who had attended the private preschool. No significant differences were found among the disadvantaged groups. This pattern was seen consistently in all other measures of school achievement examined in the study. Fewer children who had attended the private preschool were placed in the lower tracks and in special education, compared with the disadvantaged children, and fewer preschool attendees had been held back in grade. The disadvantaged children showed no significant differences that could be attributed to participation in any of the three intervention programs.

Results of the cross-sectional analysis of the growth indices did not reveal significant differences among the cohorts in the weight for age or weight for height measures. The Head Start boys, however, were significantly taller than the Free Lunch boys on measures of height over the total age range. Although only 16 percent

Table 1. Physical test scores in the 6-minute jog-walk for boys and girls

Cohort	Boys			Girls		
	Number	Mean percentile	S.E.	Number	Mean percentile	S.E.
Head Start	22	70.4	± 3.9	21	70.5	± 4.6
Free Lunch	19	[1] 57.9	± 5.4	25	68.0	± 4.7
Title I	[2] 4	82.5		8	66.8	± 2.8
Preschool	[2] 2	77.5		[2] 2	82.5	

[1] $P < 0.05$.
[2] Numbers too small for statistical analysis.
NOTE: The jog-walk test is scored in terms of the distance covered in 6 minutes, measured by the number of evenly spaced markers placed along a track. A high number of markers passed gives a high score. The test is considered an indicator of endurance. Percentile scores are standardized over a large number of California students.

of the Head Start boys had heights below the 25th percentile, 40 percent of the Free Lunch boys were below that mark. Differences among Head Start, Title I, and preschool boys and among all groups of girls were not significant.

The tendency for Free Lunch boys to lag behind the other three groups was also seen in the mixed-longitudinal analysis of the growth data. In the mixed model, mean heights at half-year intervals did not differ among the disadvantaged cohorts but a significantly greater number of the means for Free Lunch boys fell below the 50th percentile over the total age range.

A plot of the mean heights for the 11 boys in the longitudinal analysis at ages 6, 10, and 14 is shown in figure 2. Although the mean heights for the Head Start and preschool boys remained in approximately the same percentile ranges over the years, the mean heights for both Title I and Free Lunch boys dropped markedly from age 6 to age 14. The mean height for Title I boys went from the 95th percentile to slightly below the 50th percentile while the mean height for the Free Lunch group fell from the 25th percentile to the 10th percentile.

Differences in growth between Head Start and Free Lunch boys are illustrated most dramatically by the two case study examples (fig. 3). Both boys started out below the 5th percentile for height, measuring 38 inches in their fifth year of age. By age 14, only the Head Start boy had achieved a height within the normal range. The Head Start boy was 64 inches tall at age 14 while the Free Lunch boy measured only 57 inches—a difference of 7 full inches.

Other physical status variables also showed better performance among Head Start children than children receiving free school lunches. Tables 1 and 2 present data on physical fitness and absenteeism. Since physical fitness testing in the school district was not done until the fifth grade, data were lacking for the younger children. The numbers in the preschool cohort were not large enough for statistical comparison. Again, there were no significant differences among the girls, but Free Lunch boys had a lower mean score on the 6-minute jog-walk than boys from Title I and Head Start. The data on absenteeism show that, although none of the disadvantaged children had fewer days of absence than the preschool cohort, children from Head Start had significantly fewer absences due to illness than children from either the Title I or Free Lunch group.

Discussion and Conclusions

The variables used in this study to determine the effects of different types of intervention for disadvantaged children were divided into three categories for analysis.

Table 2. Days of absence per school year due to illness, by cohort

Cohort	Boys			Girls			Total	
	Number of children	Mean days	S.E.	Number of children	Mean days	S.E.	Mean days	S.E.
Head Start	55	[1] 6.3	± 0.9	43	[1] 8.8	± 1.0	[1] 7.5	± 0.7
Free Lunch	41	11.6	± 2.3	68	11.6	± 1.4	11.6	± 1.2
Title I	29	[1] 8.5	± 1.0	23	12.0	± 0.4	10.0	± 1.1
Preschool	30	[1] 3.9	± 0.5	30	[1] 6.7	± 0.9	[1] 5.3	± 0.5

[1] $P < 0.05$.

Background variables were selected to provide a social and environmental base. School performance variables were chosen to evaluate the children's academic function in relation to participation in the four different programs. Physical performance was evaluated by measures of health and nutritional status.

For children who had received different forms of public aid, it seems clear that none of the assistance programs resulted in improved educational outcomes that enabled the children to achieve at a level comparable to the advantaged children who attended the private preschool. To this extent, the findings are consistent with other studies of the effects of nutritional intervention on mental performance. Studies of the feeding of children in many parts of the world have produced indications that some benefit may be derived from nutritional supplementation in infancy and early childhood but that the effects of intervention are less noticeable after 3 years of age (*23–25*). By the time children come to school, improved nutrition seems to have little effect on their scores in tests that measure scholastic achievement or learning ability (*26,27*).

All three indicators of physical status chosen for examination in this study indicated a potential for better performance among children from Head Start compared with children who simply received a free school lunch. The Head Start boys were significantly taller on all measures used over the total age range. Compared with the Free Lunch boys, boys from Head Start also performed better on the test for physical fitness and had fewer excused absences from school.

The distribution of heights among Free Lunch boys in this study was similar to findings of the Ten State Nutrition Survey for poor children in the United States (*28*). Compared with the Free Lunch boys, boys who had attended Head Start were more nearly at the 50th percentile or at the national average for their age. The longitudinal analysis suggests that neither Title I or Free Lunch boys were able to maintain consistent growth patterns over time. The fact that these patterns were seen only among the boys is in line with reports in the literature indicating sex differences in vulnerability to mild nutritional stress (*28–30*).

It is not appropriate to state definitive conclusions based on this study. Some obvious limitations of the methods must be taken into account. A rather pragmatic approach was used in selecting measures to reflect the various parameters of interest and in analysis of the data. Although additional information might have been desirable to assure similarity among the disadvantaged groups, it was not feasible to follow the students or to subject them to further tests and measurements. The data base, therefore, was limited to what was available in the school records at the time of analysis. Furthermore, while recordkeeping in the school is done by fairly standard procedures, some variability is inevitable when measurements are performed by different persons over time.

In view of these problems, it is all the more important that the three methods—cross-sectional, mixed-longitudinal, and traditional-longitudinal—were used in concert. Because of the consistency of the results it is possible to place more confidence in the conclusion that early and comprehensive intervention programs such as Head Start may be an effective means of assistance to improve the health and nutritional status of disadvantaged children. Although this conclusion must be verified by more carefully controlled research, the results of this study rather clearly imply that receiving free lunches beginning in the first grade is not sufficient to compensate for the educational and physical disadvantages suffered by children from low-income families.

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SYNOPSIS

GIETZEN, DOROTHY (University of California, Davis) and VERMEERSCH, JOYCE A.: *Health status and school achievement of children from Head Start and Free School Lunch Programs. Public Health Reports, Vol. 95, July–August 1980, pp. 362–368.*

School health records of 332 children through the eighth grade were examined in a retrospective comparative analysis of physical health status and school achievement of children from Head Start and Free School Lunch Programs. The objective was to determine if nutrition early in the lives of children as a part of a comprehensive health and education program such as Head Start produces greater or different benefits for disadvantaged children than nutrition intervention later through free lunches when the child enters school. Cross-sectional, longitudinal, and case-study approaches were used in the analysis. A group of no-food-program disadvantaged children and a group of advantaged children served as comparisons.

Results showed that advantaged children performed better on all parameters of school achievement and health status compared with the disadvantaged children, regardless of the form of intervention. Measures of school achievement of Head Start and Free Lunch children did not differ from those of the disadvantaged comparison group, but there were significant differences in measures of health status between the disadvantaged groups. Fewer boys from Project Head Start fell below the 25th percentile for height compared with boys in the Free Lunch Program. Head Start children also scored higher in physical fitness and had fewer reported absences from school due to illness.