AMERICAN JOURNAL OF PHYSICAL ANTHROPOLOGY 73:507–513 (1987)

Growth Status, Age, and Grade as Predictors of School Continuation for Guatemalan Indian Children

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KEY WORDS Height, Weight, Body composition

ABSTRACT Schooling is considered by many researchers and agencies as an important contributor to individual and national development for populations living in the less developed countries. Accordingly, programs to increase school enrollment and continuation from grade to grade are being developed for many of these countries. This paper investigates the relationship of physical growth status (height, weight, and body composition), grade in school, and age to school continuation for a sample of Indian children living in a village near Guatemala City. It was found that physical growth status, a reflection of health and nutritional status, does not predict school continuation. A child's age and current grade in school do predict continuation. Most children leave school after reaching 9 years of age or after completing the second grade. It is suggested that children may learn enough to satisfy their parents' expectations by this age or grade. Also, the child's economic value to his or her family may be a significant reason for school drop-out.

Most countries in the world today provide by law the right to at least 6 years of formal education. In the industrial market countries of Europe and North America and in Japan virtually all school-aged children attend primary school. In the less developed countries of Asia, Africa, and Latin America (excluding China and India) about 26% of school-aged children never attend any school, and many more receive only 1 or 2 years of formal education (World Bank, 1981). Research on children living in the developing nations shows that schooling has effects on cognitive abilities, either directly on levels of cognitive attainment (Greenfield and Brunner, 1966; Stevenson et al., 1978; Rogoff, 1981; Stevenson, 1982) or indirectly on the way in which cognitive abilities are organized and utilized by schooled or unschooled children (Cole et al., 1971; Scribner and Cole, 1973; Cole and Scribner, 1974; Sharp et al., 1979; Greenfield and Lave, 1982).

Schooling has effects beyond those on cognition. Engle (1982) found a negative correlation between years of schooling and fertility of rural Guatemalan women. It was also found that mother's education negatively correlated with infant and child mortality. Research conducted by The World Bank demonstrates that, on a population basis, schooling positively correlates with national economic development (Selowsky, 1976). These associations between schooling and individual or national development have led to interest in determining why some children do not attend, or do not complete, primary school.

To date, most research in this area has studied the economic, social, and psychological determinants of school attendance and continuation (Irwin et al., 1978). In contrast, this paper investigates the relationship of physical growth status, age, and grade in school to school continuation for a sample of Indian children living in Guatemala. There are practical and theoretical reasons for investigating the determinants of school continuation in Guatemala. The practical reason is that only about two-thirds of school-aged Guatemalan children attend any primary school. This rate of attendance is lower than the average rate for all low-income countries and points to the need for special attention

Received May 7, 1986; revision accepted October 31, 1986.

to the causes of such a low rate of school participation in Guatemala (World Bank, 1981). The theoretical reason relates to the relationship between physical growth status and school attendance. Previous research in Guatemala found that physical growth, which was used as a proxy for health and nutritional status during the preschool years, predicted school enrollment in rural Ladino villages (Ladinos are non-Indian Guatemalans of Spanish cultural heritage; Irwin et al., 1978; Freeman et al., 1980). However, subsequent studies found no correlation between physical growth status and school drop-out in school-aged children from these same rural villages (Klein et al., 1982).

Two questions arise from these findings. 1) Does the same relationship hold for Indian children in Guatemala? That is, are there cultural differences between Indian and non-Indian communities that might influence the relationship between physical growth status and school continuation? 2) If growth status of the child does not influence his or her continuation in school, what are the reasons for school drop-out? More generally, why are children sent to school if there is no expectation that they will finish more than 1 or 2 years?

MATERIALS AND METHOD

The study population consisted of children attending the public primary school in the village of San Pedro Sacatepequez. This village lies 22 km to the northwest of Guatemala City. San Pedro is the cabacera ("county seat") for the municipio ("county") of the same name. The municipio had a population of about 12,500 people, and about 5,600 people lived in the village of San Pedro (these figures are based on population estimates for 1980; Municipalidad del Guatemala, 1972).

Virtually the entire population of the municipio is ethnically Indian, belonging to the Cakchiquel language group. Native religion is widely practiced, and traditional Cakchiquel festival days are observed. There is only one paved street in the village and there are few modern conveniences or appliances. Most adults work as weavers or tailors using traditional technology, for instance, backstrap looms or hand-operated looms, to do their weaving. Foot-pedal sewing machines are used to sew clothing, though electricity is used to power television sets, which are becoming increasingly common (Pettersen, 1976).

The municipio has one public primary school located in San Pedro. The school provides education for grades 1–6 and also offers a kindergarten class for preschool children. The boys and girls measured for the present study attended this school. In 1980, there were 1,385 children in the village between the ages of 5 and 14 years, the age range during which children could attend the school. There were 855 children (61%) enrolled at the school. It is important to note that school enrollment is not synonymous with school attendance. For instance, in 1979, there were about 800 children enrolled at the school, but only 611 children were attending regularly enough to be measured for our study during the week measurements took place. The distribution of students by grade and sex for 1979 is given in Table 1.

The San Pedro school sample is part of a larger, ongoing, longitudinal study of child development in and near Guatemala City (Bogin and MacVean, 1983). The San Pedro sample was added to this study in 1979. Physical growth data are collected during annual visits to the school. The measurements are taken by a well trained team of Guatemalan technicians whose intra- and interobserver reliability are periodically checked. Measurements taken in 1979 and 1980 were used for the present analysis. In 1979, the entire school population present on the days of measurement was examined. Teachers' records demonstrate that virtually all the regularly attending children were examined during these visits. In 1980, only the students in grades 1, 2, 4, and 6 were examined. Thus evidence for school continuation is based on those students who were attending school in 1979 and were still attending grades 1, 2, 4, or 6, including those who repeated a grade, in 1980.

The variables reported are age, grade, height, weight, arm circumference, triceps skinfold, subscapular skinfold, arm fat area, and arm muscle area. Fat and muscle area were estimated from arm circumference and triceps skinfold using the formulae of Gur-

TABLE 1. San Pedro school enrollment 1979

	Grade					
	1	2	3	4	5	6
Boys	117	102	87	39	35	1
Girls	99	69	40	12	10	0

ney and Jelliffe (1973). Age and grade were taken from school records. Measurement procedures for height and weight are described by Bogin and MacVean (1978). Procedures and reliabilities for the body composition measures are also described by Bogin and MacVean (1981).

For this sample, height may serve as an indicator of past nutrition and health history, whereas weight indicates recent nutrition and health status (Waterlow et al., 1977). The skinfolds and arm fat area are widely used anthropometric indicators or energy (calorie) reserves on the body. Arm muscle area is commonly used as an indicator for the reserves of protein (Gurney and Jelliffe, 1973; Martorell et al., 1976; Frisancho, 1981). Thus the growth status variables reflect the nutritional and health environment in which the children have lived prior to and during their school attendance.

The sample was divided into two groups. The first group includes all children measured in 1979 and 1980 and is referred to hereafter as the *continuing* group (N = 218). The second group consists of children measured in 1979 but not in 1980, and these children make up the *noncontinuing* group (N = 296). The age, grade in school, and physical growth data of these two groups for the 1979 measurements were analyzed with the t test and multiple regression. The age range for analysis was 7.00–13.99 years. There were too few children younger or older than these ages for statistical comparisons. The data were also divided by sex in our original analysis. No sex differences existed between the continuing and noncontinuing groups and the data for boys and girls were combined in the present analysis.

RESULTS

Of the 216 children in the first grade in 1979, 149 of them were attending the second grade and 61 were repeating the first grade in 1980. Thus only six children dropped out of school. The 1980 fourth grade class had only three of the 178 students who were attending third or fourth grade in 1979. No student from the 1979 fifth grade class was attending sixth grade in 1980. Obviously, there was a sharp decrease in school continuation after the second grade.

The association between physical growth and school continuation was examined next. Descriptive statistics for age, grade, and physical variables are presented in Table 2 for the continuing and noncontinuing groups. The data for all ages, 7.00–13.99 years, are combined in this table. The differences between the means for these groups are compared using the t test. The noncontinuing group was significantly older, in higher grades, and larger for each of the anthropometric measures compared with the continuing group. The variances of the means for each variable also differ significantly. The continuing group had a smaller variance in every case (determined by the F test for equal variances). Thus the children of the continu-

TABLE 2. Descriptive statistics and significant differences between the continuing and noncontinuing groups for age, grade, and anthropometric variables[1]

Variable	Group means (SD) Continuing (N = 218)	Noncontinuing (N = 296)	t
Grade	1.15 (.40)	2.45 (.79)	22.33*
Age (years)	8.29 (1.39)	10.52 (1.69)	15.94*
Height (cm)	117.68 (7.51)	129.41 (10.24)	14.31*
Weight (kg)	22.38 (3.65)	28.89 (6.99)	12.55*
Arm circumference (mm)	171.94 (13.87)	190.17 (21.26)	10.98*
Triceps skinfold (mm)	6.32 (2.00)	7.23 (2.82)	4.07*
Subscapular skinfold (mm)	5.29 (1.81)	6.89 (3.70)	5.82*
Arm muscle area (mm^2)	1853.7 (305.6)	2257.8 (505.7)	10.41*
Arm fat area (mm^2)	515.34 (178.4)	657.50 (305.6)	6.10*

[1]Data for children between the ages of 7.00 and 13.99 years were combined to compute the statistics.
*$p < .001$.

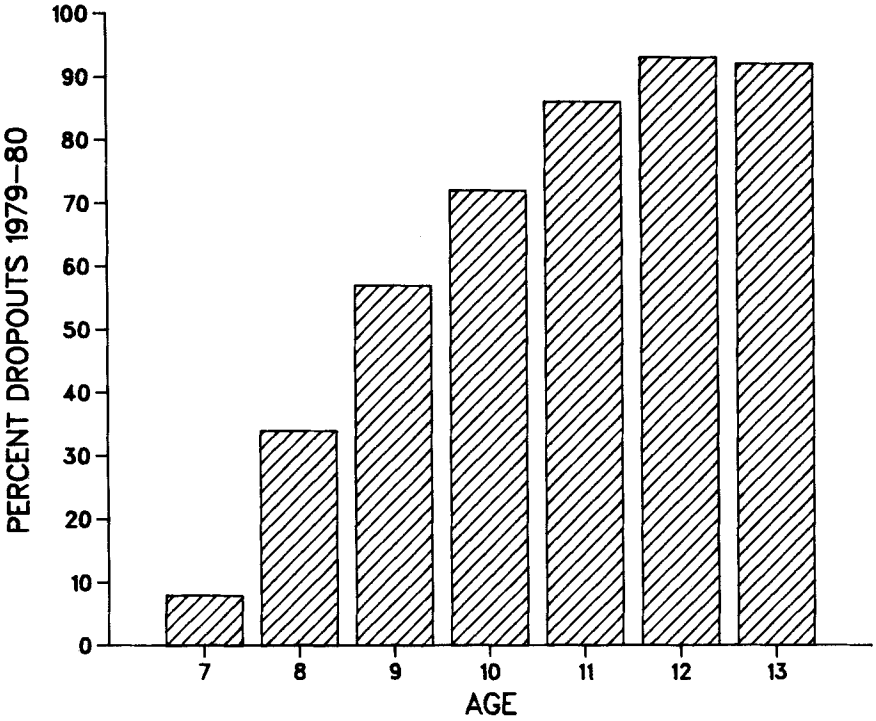

Fig. 1. Percentage of children not continuing in school by age. Numbers (N) of children upon which the percentages were calculated are: age 7 years, N = 83; age 8 years, N = 103; age 9 years, N = 89; age 10 years, N = 68; age 11 years, N = 65; age 12 years, N = 57; age 13 years, N = 49.

ing group were more homogeneous in age, grade, and physical size than the children of the noncontinuing group.

The larger average size and higher grade of the noncontinuing children likely were due to their advanced age. Even within any grade, children with larger measurements were probably older. This is because each grade included a wide age range. For instance, the first grade class included children aged from 6 to 15 years. To control for the variance in age within grade, mean values for each variable at each age (7, 8, 9, etc.) were compared statistically between the continuing and noncontinuing groups. There were no significant differences between the two groups for any of the anthropometric variables or grade at any age. This analysis did reveal a decrease in school continuation with increasing age, as is illustrated in Figure 1.

Finally, a multivariate regression was performed to assess the significance of each variable as a predictor of group membership. The results, shown in Table 3, include the significance of the overall regression, partial correlation coefficients, and beta weights (standardized regression coefficients) for each variable. There was a significant relationship between the independent variables and group membership. The r^2 of the regression is reasonably large. The partial correlation coefficients and the beta weights, however, show that only grade and age were significantly associated with school continuation.

DISCUSSION

This study of school continuation is limited to 2 years of data, and includes no examination of the reasons parents could give for returning their children to school or withdrawing them. The data we have presented, however, allow us to make some general inferences about factors likely to be associated with parents' decisions about school continuation.

The growth status variables were employed as proxies for the health and nutritional history of this sample of children. From this study, it appears that school continua-

TABLE 3. Analysis of variance for the regression of grade, age, and growth status variables on group membership (continuing vs. noncontinuing) and partial correlation coefficients and beta weights for each variable from the regression

Source of variation	df	SS	MS	F	r^2
Regression	10	63.87	6.39	52.74**	.51
Error	498	60.31	.12		
Total	508	124.18			
Variable		Partial correlation			Beta weights
Grade		.51**			.64
Age		.11*			.15
Height		.02			.06
Weight		−.04			−.16
Arm circumference		.07			.66
Triceps skinfold		−.02			−.15
Subscapular skinfold		.03			.04
Muscle area		−.06			−.53
Fat area		−.01			−.10

*p = .01.
**p < .001.

tion or drop-out was not influenced by the health or nutritional environment. Studies of rural Ladino Guatemalan children also find this to be true. Irwin et al. (1978) analyzed the relationship of children's preschool intellectual ability, and characteristics of their homes and families, to school attendance. Children with some schooling had consistently, and usually significantly, higher scores on a 22-test battery of preschool mental abilities than unschooled children. Children with schooling also had higher scores for several family variables, e.g., economic status, mother's vocabulary, mother's modernity, and mother's report of teaching her preschoolers in the home, than unschooled children. It was also found that parental perceptions of a child's readiness for school contributed to school enrollment. The parental perceptions of school ability, which seemed subjective, "agreed substantially" with the results of the 22-test preschool battery. Finally, the study found that length of school attendance was predicted by preschool tests of mental ability for the girls but by family economic level and mother's modernity for the boys. In another analysis of data from the same samples of rural Ladino children, it was found that a child's history of diet and disease influenced initial school enrollment, but, once this initial selection took place, these preschool environmental influences no longer have a significant effect on school continuation (Klein et al., 1982; Townsend et al., 1982).

The present study found that a child's school attendance is predicted by the child's age and grade in school. Once a child enters school, he or she will most likely leave school after reaching 9 years of age and/or completing the second grade. For children who begin school at the prescribed age of 7 years, these two thresholds are reached simultaneously. Indeed, entering school at or near the prescribed age of 7 is significantly associated with continuation. The mean age (8.29 years) and grade (1.15) of the continuing group were significantly lower than the age and grade of the noncontinuing group. The continuing group was also significantly more homogeneous (smaller variances of the means) in age and grade than the group dropping out of school. This may be evidence of the importance of external factors influencing school continuation. When children conform to the socially accepted age of school entry, they may have greater social, family, and economic support to continue in school. Entering school at a later age may be a symptom of the lack of such support and may predict earlier school drop-out.

Why the age 9 and grade 2 thresholds for dropping out exist is not known. However, in another ongoing study, we are investigating preschool mental and physical development of a sample of Guatemala City children living in a recently built urban neighborhood. During ethnographic interviews, the mothers of the children state that they view school as a place to learn to read and to learn "manners." Manners, in this case, means how to respect authority and how to present oneself to prospective employers to gain employment (Bogin, 1983). It is interesting to note that

Kpelle children in Liberia are taught to value respect for authority in informal educational situations. This value is now also taught as part of the formal school curriculum (Erchak, 1977). Perhaps, learning "manners" is a common function of schools in many developing nations.

The mothers interviewed for our Guatemala City study also say that older children are too valuable as babysitters for younger siblings, as mother's helpers, and for the pennies they can earn doing small jobs to spend all day in school. It comes as no surprise to anyone familiar with socioeconomic conditions in developing nations that children serve an important economic function that often takes them out of school. However, our studies do point to an unexpected reason for school attendance and drop-out. The parents' perceptions of the value of schooling are concrete. Children are not sent to school just because they are too young to work and the school provides a "babysitting" service. Rather, there are specific educational skills (reading) and social competencies ("manners") that parents value and that the schools provide.

If these same parental values apply in our Indian sample, the pattern of school attendance is explainable. By the second grade, children have learned to read, to respect the authority of teachers and principals, and to present themselves properly to authority figures. They have learned "manners." By the second grade, or by the age of 9 years, the children's economic value also becomes significant. Boys and girls can help around the house and look after younger siblings so that their parents can work. At this age, the children also begin apprenticeships to learn the weaving and sewing crafts of their parents. Thus schooling may well be important from the parents' point of view, but this viewpoint is not the same as that of the schools or the national government. These institutions consider school success to be the completion of at least primary school. Prior drop-out is viewed as failure.

Further study of the San Pedro community is necessary to determine if these extrapolations from other studies are justified. If they are justified, they indicate that these Guatemalan Indian parents view schooling as valuable for very specific and pragmatic reasons. To increase the number of years of school attendance of their children, these parents will have to be convinced that further schooling has additional pragmatic benefits.

ACKNOWLEDGMENTS

Data for this study were collected by the staff of the Office of Investigation of the Universidad del Valle. We thank the staff for their cooperation and dedication. We also thank Diane Jones, Daniel Moerman, and three anonymous reviewers for suggestions that improved the presentation of this paper.

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