

---

Social Policy

---

## Effects of an Intervention Program for Pregnant Adolescents: Educational Outcomes at Two Years Postpartum<sup>1</sup>

Victoria Seitz,<sup>2</sup> Nancy H. Apfel, and Laurie K. Rosenbaum

Yale University

*Examined postpartum effects of a school-based intervention program for pregnant adolescents. Interviews were conducted with 102 innercity black, low-income, school-aged mothers who had attended the program, and their academic and medical records were reviewed. For teenagers who had been poor students prior to becoming pregnant, a strong linear effect was found for duration of program attendance: with sufficient time in the program, poorer students became indistinguishable from better students in educational success. Most of the better students were educationally successful at 2 years postpartum, independent of their length of time in the program. For all students, longer durations of postnatal intervention were predictive of lower likelihood of subsequent childbearing. Numerous academic, medical, social, and demographic variables were ruled out as possible confounding factors that might have produced the positive educational outcomes for poorer students. The results suggest that adolescents who appear to have minimal academic promise prior to their pregnancy are nevertheless very responsive to school-based intervention.*

<sup>1</sup>This research was supported by grants (HD03008) from the National Institute of Child Health and Human Development and (90-C-912) from the Administration for Children, Youth, and Families, and by a grant from the Smith Richardson Foundation. The authors express their appreciation to Elizabeth Celotto and the staffs of the Polly T. McCabe Center and the other New Haven Public Schools. Other school districts that provided valuable assistance were Hamden, and West Haven, Connecticut. We are also indebted to Jean Davis and Kathryn Young who assisted with the data collection and to Robert Hodapp and Sally Styfco for their valuable editorial assistance.

<sup>2</sup>All correspondence should be addressed to Victoria Seitz, Department of Psychology, Box 11A Yale Station, New Haven, Connecticut 06520-7447.

In recognition of the problems associated with adolescent childbearing, many communities and researchers have established intervention programs for pregnant and parenting teenagers. Over a thousand such programs have been mounted within the last three decades (see Hofferth, 1987; Jekel, 1981; Jekel & Klerman, 1982); nevertheless, relatively little solid scientific evidence exists concerning their effects.

The primary reason for this lack of information is that it is difficult to establish adequate control groups for evaluation purposes. Given the well-documented problems associated with adolescent pregnancy (Hayes, 1987; Hofferth & Hayes, 1987), ethical concerns about denying pregnant teenagers access to services make it unlikely that investigators will employ random assignment with a no-treatment control condition to study program effects. Although some investigators examining hospital-based or home-visiting programs have assigned teenagers randomly to alternative treatment conditions (e.g., Furstenberg, 1976; Olds, Henderson, Tatelbaum, & Chamberlin, 1986), such a research strategy is less feasible in evaluating school-based programs. Especially given that many teenaged mothers have already demonstrated disinterest in regular schooling (Osofsky & Osofsky, 1978), a research design comparing attendance at a regular school versus an alternative school is likely to be compromised by selective attrition. In such a situation, the use of a careful quasi-experimental approach (Cook & Campbell, 1979) seems to offer a judicious research strategy.

As Cook and Campbell (1979) noted, one of the strongest quasi-experimental designs involves using a waiting-list control group. By studying persons who desire to receive a program but are prevented from attending because the program cannot currently accommodate them, many sources of selection bias are removed. A situation similar to a waiting list occurs in programs that operate on a school-year calendar. The summer vacation period delays the availability of services for some students, or interrupts ongoing services, or terminates them early for others. If the duration of the program is important in affecting outcomes, then it should be possible to evaluate the program by comparing students who receive it for different lengths of time.

The feasibility of such a research design is further indicated because school administrative policies place the decision concerning length of attendance beyond the student's choice. Policies governing when a student must leave a special program to return to her regular school are geared to administrative "cut dates" such as the beginning of a new marking period. The student who delivers her baby early in a marking period is allowed to remain longer postnatally than is a student who delivers near the end of a marking period. Thus, duration of services is often dictated by

administrative policies of school-based programs rather than reflecting the student's motivation to attend.

For several years, we have been studying the effects of the Polly T. McCabe Program, a school-based prenatal program in New Haven, CT, using a modified waiting-list control group design. Obviously, students who choose not to attend such a program would be likely to differ from attenders. However, by limiting the focus of the study to regular attenders, we hypothesized that positive selection bias—the tendency of more motivated students to stay longer in a program—should be greatly reduced or eliminated. The present study is unusual in having included a formal assessment of the amount of possible selection bias. The research strategy was to gather information predating the teenager's pregnancy, including family, school, and medical data about her, and information about the life circumstances after the birth of her baby that might affect her ability to return to school. The rationale was that with sufficient information, it should be possible to determine whether selection bias was operating and if so to make estimates of its effects.

The primary hypothesis of the study was that attending a school-based program such as McCabe has a positive effect on postpartum educational outcomes for pregnant teenagers. If such an effect exists, there are two likely forms it might take. One is a threshold effect, in which little benefit occurs until some specified length of treatment (an "effective dosage") is reached. A second possibility is that of a simple linear effect—the greater the treatment, the greater the effect. Since there is no a priori information concerning the value a threshold might assume, and since duration of intervention effects have been reported by several other researchers (Burt, Kimmich, Goldmuntz, & Sonenstein, 1984; Klerman & Jekel, 1973), the existence of a straightforward linear effect was postulated, that is, the longer the duration of the program, the greater its beneficial consequences.

A second question of interest concerned whether the school-aged mother's level of academic achievement prior to her pregnancy affects her response to intervention. It is difficult to predict whether better or poorer students should be more likely to profit from a school-based program. Several investigators have reported that many school-aged mothers are educationally at risk prior to their pregnancy (Foltz, Klerman, & Jekel, 1972; Furstenberg, 1976; Osofsky & Osofsky, 1978). Osofsky and Osofsky, for example, reported that many who attended their special school for pregnant teenagers had "a long history of disinterest in school, repeated school absence, and even truancy . . . [with] educational attainment . . . below achieved grade level" (p. 1166). It is therefore possible that better students will be more responsive to an intervention program that is situated in a

school, whereas poorer students, who have already shown themselves to have school difficulties, will be less responsive. The reverse possibility, however, also exists: Better students may tend to have a high level of postpartum educational success regardless of the amount of intervention they receive, whereas poorer students will be those who show the greatest response to program efforts. This issue is a relatively unexplored one, and the second purpose of this study was to determine whether school-based intervention efforts help better or poorer students the most.

## METHOD

### *Description of the Polly T. McCabe Program*

*Educational Services.* The Polly T. McCabe Center is a separate school for pregnant students that is fully integrated into the New Haven school system. It is operated by the New Haven Board of Education and follows the regular school calendar, schedule, and curriculum. With one full-time head teacher, 15 part-time teachers, and an average enrollment at any given time of about 100 students, there is an adult-student ratio of approximately 1:14. Class sizes average 8-10 students and thus are smaller than typical classes in other city high schools. Students are referred to McCabe from their regular school when their pregnancy becomes apparent or when they notify a teacher or counselor that they are pregnant. Length of attendance at McCabe can be measured in academic quarters (each of which is slightly more than 2 months). Attendance can vary from a minimum of one quarter to a maximum of four. Typically, the student completes the quarter during which she delivers her baby at McCabe and returns to her regular school the following quarter. However, students who deliver during the third quarter are permitted to complete the fourth quarter as well, since little of the regular school year remains. For students returning to their original school, the postpartum transition is eased by liaison persons at each high school. These individuals meet the girls at McCabe and help them plan their return schedule with their parents and the McCabe staff.

*Medical Services.* Two nurses from the adolescent clinic at Yale New Haven Hospital and a public school nurse teach daily classes in prenatal health care, nutrition, childbirth preparation, contraception, and child care. In addition, the nurses provide individual counseling to the teenagers. The nurses also encourage regular attendance at the hospital's adolescent clinic.

*Social Services.* Counseling for the students is provided by a regular school social worker as well as by the nurses. The social worker helps with

a variety of issues from school attendance to family problems. By school policy, the school secretary investigates all absences with a phone call to determine if there is a health problem or other situation that needs attention and to urge the student to attend if there is not. Part of the McCabe outreach effort is to involve the girls' parents by inviting them to come to the school to participate in school events. Parents are encouraged to assist in planning their daughters' programs and arrangements for after the baby is born. McCabe staff also help the student in preparing for her transition to parenthood, from basics such as the provision of appropriate clothing and food for the baby to planning for child care so she can return to school.

In summary, the McCabe school-based model of programming for pregnant adolescents incorporates the triad of services that Jekel and Klerman (1982) have considered essential for a comprehensive approach to intervention, namely, health care, education, and social services.

### *General Method*

The present study is part of a longitudinal investigation of teenage mothers and their firstborn children. Because data collection was tied to the academic calendar (beginning in September) and subjects were first seen when their babies were 18 months old, defining a 1-year birth cohort of subjects began with the month of March 1979, and continued with births through February 1980. Although numerous types of information were gathered, only those measures relevant to evaluating the educational effects of the McCabe program are described in this paper.

### *Subjects*

To determine how well the McCabe program identified and served the teenagers who were eligible for it, the population of city residents who became mothers while they were or should have been students during the index period was identified. The population of school-aged mothers was defined as comprising all residents of the city of New Haven, CT, who delivered a live, firstborn infant between the dates of March 1, 1979 and February 29, 1980, inclusive; were less than 19 years of age on the date of delivery; and were not yet a high school graduate when they became pregnant.

A search of the list of admissions to the obstetrical floor of each of the city's two hospitals yielded names of individuals who met the age criterion or whose age was not specified. The medical records of these

individuals were screened for age at delivery and place of residence and to determine the child's birth order. Names of persons meeting age, residence, and parity criteria were then checked against enrollment lists at the city high schools and middle schools for the current and two preceding academic years. Mothers who were high school graduates prior to becoming pregnant were deleted from the sample. The total number of individuals in the defined target population was 230. Most of these young mothers ( $n = 200$ , 87%) could be determined to be from low-income families because they had received a referral to the WIC Program or because their birth expenses were paid for by the state or federal government.<sup>3</sup> In the present study, it was decided to limit consideration to the low-income portion of the population. Table I presents the age, ethnicity, and school status of these 200 teenagers.

A total of 135 of the 200 low-income school-aged mothers were referred to the Polly T. McCabe Center, and 114 were sufficiently motivated attenders to remain in the program until they delivered their baby, and to earn passing grades in at least one academic subject while enrolled there. Because all but 8 of the regular attenders were black, it was decided to further limit the scope of the study to black students. The final study sample consisted of 106 black, low-income teenagers who were regular attenders at the Polly T. McCabe Center. The mean age at delivery for these students was 202.1 months (16.8 years) with a standard deviation of 15.1 months. The range of ages was from 166.3 to 226.9 months (13.8 to 18.9 years). As Table I shows, the above sample represented 72% of all black low-income primiparous school-aged mothers in the city.

### *Method*

Beginning in September 1980, mothers who had delivered their babies in March 1979 were located and asked to participate in the study. During each of the subsequent 12 months, mothers whose infants were 18 months of age were similarly contacted. A total of 102 of the group of 106 agreed to be interviewed (96%) and to allow their school and medical records to be examined. Of those not interviewed, one was too ill to participate, one could not be located, and two declined. Two experienced interviewers shared the task of interviewing the teenagers. Information from academic records was collected by a research assistant and information from medical records by a person trained in abstracting medical data.

<sup>3</sup>In 1979-1980 financial eligibility for the WIC program in New Haven was limited to persons with family incomes below 195% of the federal poverty level.

Table 1. School Status of Low SES New Haven School-Aged Mothers Delivering a Firstborn Child March 1, 1979-February 29, 1980

	Attended McCabe	Attended other school	Dropout during pregnancy	Prepregnancy dropout	Unknown	Total
Age and ethnicity						
< 17 years						
Black	55	2	10	1	1	69
White	1	1	3	0	0	5
Hispanic	5	1	4	6	2	18
17 years						
Black	28	3	4	5	0	40
White	0	0	2	4	3	9
Hispanic	2	0	0	4	4	10
18 years						
Black	23	1	5	9	0	38
White	0	0	0	4	3	7
Hispanic	0	0	1	3	0	4
Total	114	8	29	36	13	200
Summary percentages						
Black (n = 147)	72	4	13	10	1	
White (n = 21)	5	5	24	38	29	
Hispanic (n = 32)	22	3	16	41	19	
Total (n = 200)	57	4	14	18	6	

### *Measures*

*Interviews.* The young mother was interviewed for approximately 1 hour about her current life situation, including her schooling, academic aspirations, child care arrangements, child-rearing attitudes and practices, contraceptive use, prenatal medical care, her child's health status and health care, and the sources of help that she had available to her.

*Academic Record.* Academic data were gathered from each student's permanent school records for a time beginning as close as possible to 18 months prior to the teenager's delivery date, and ending at 2 years postpartum. Data collected included school or program attended, grades received in all subjects, the student's grade level, the number of academic credits received each year, and the number of absences in each marking period.

*Medical Records.* Maternal medical records were reviewed for a period commencing with the data of the first prenatal checkup (or with the baby's data of birth if there was no prenatal care) and ending at 2 years postpartum. Information was gathered on number and dates of prenatal visits, complications during pregnancy and delivery, sickness, accidents, contraceptive use, and repeated pregnancy and its outcome. When the mother received care at more than one medical care facility, records from each were reviewed.

## RESULTS

### *Prepregnancy Academic Achievement*

Because performance was often variable across marking periods, the highest grade point average in academic subjects that the student attained in the year prior to entering McCabe was employed as an indicator of her best-known academic achievement. Grades were unavailable for two students. For the remaining 104 students, the highest attained grade point average in the year prior to pregnancy ranged from 0.00 (all Fs) to 4.00 (all As), with a median of 2.00 (all Cs). Dividing the sample at the median, those students who had never earned at least a C average in any marking period were defined as poorer students prior to pregnancy ( $n = 49$ ). The remaining students, who had earned a C average or better at least once, were defined as better students prior to pregnancy ( $n = 55$ ).

High absenteeism was defined (using school system criteria) as missing 20 or more days of school in the full academic year prior to entering the McCabe program. Attendance data were available for all but 8 girls (1



poorer student, 5 better students, and 2 students with unknown prior grades). Based on this definition, 56 students (57% of the sample) had shown serious absenteeism. Poorer students were more likely to have shown serious absenteeism than were better students (69 vs. 46%, respectively), Mantel-Haenszel  $\chi^2(1) = 5.12, p < .05$  (Mantel, 1963).

The grade that the student should have been in was calculated based upon her month and year of birth.<sup>4</sup> Grade level information was available for all teenagers except one of the poorer students. Overall, only 34 girls (32% of the sample) appeared to be in the correct grade for their age, with little difference between poorer (26%) and better (38%) students, Mancel-Haenszel  $\chi^2(1) = 1.68, ns$ .

### *Educational Outcome*

To examine the major hypothesis of the study, the teenager's educational outcome at 2 years postpartum was analyzed as a function of the length of time she had spent at the McCabe program. Educational outcome was classified into five categories: 1 = school dropout, 2 = enrolled in school, but earning failing grades, 3 = enrolled in a vocational program, 4 = enrolled in an alternative school program such as a GED class, and 5 = enrolled in regular school and earning passing grades, or a high school graduate. (Vocational and alternative programs did not give grades.) For analytic purposes, coded values of 1 and 2 were viewed as indicating educational failure and values of 3, 4, and 5 as denoting success.

Most prior research has reported a two-level outcome of remaining in school versus dropping out. Our access to school records permitted us to distinguish between students who were still enrolled in school but earning failing grades from those who were likely eventually to graduate. Our definition of educational success does not distinguish between the outcome of high school graduation versus obtaining vocational or alternative training. Although a high school diploma may be more valued societally, vocational training may lead to substantial employment bene-

<sup>4</sup>The usual age for entering kindergarten in New Haven is 4 years 8 months, through 5 years 7 months as of September 1st. To determine a student's expected year in school, therefore, calculations were based using 5 years 7 months as the maximum age at which a student should have entered kindergarten. In an earlier study in this same city, Foltz et al. (1972) allowed an additional 6 months' leeway, setting the age of 6 years 1 month in September as the maximum age at which a child should have entered kindergarten. Examination of the birth dates of all children enrolled in the New Haven City Schools in 1984-1985, however, indicated that low-income parents in this community typically enroll their children in school as soon as they are legally permitted to do so. Thus, we have chosen a less lenient definition than Foltz et al.'s of a student being in the correct grade for her age as one that better reflects the probable history of school success or failure for the present sample.

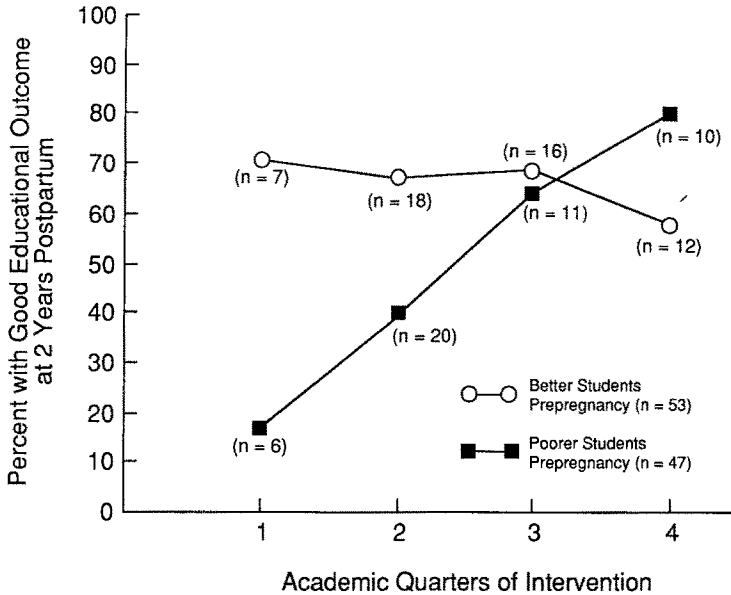


Fig. 1. Mother's educational outcome at baby's second birthday.

fits. No distinction is made in the scoring system between actual and probable high school graduation. To do so would place younger teen mothers at an artificial disadvantage, since they are not old enough for high school graduation to be an age-appropriate accomplishment, no matter how well they may have performed in school following the birth of their baby.

*Poorer Students Prior to Pregnancy (n = 49).* Verified outcome data were available for all but one student; one other student had died. Analyses were therefore based upon an *n* of 47. The percentage of students in each outcome category was 43% school dropouts, 6% in school and failing, 2% in vocational programs, 4% in alternative school programs, and 45% in school and passing or graduated. Overall, thus, 51% were educationally successful at 2 years postpartum. The relationship between educational outcome and the number of academic quarters of intervention was statistically significant,  $\chi^2(3) = 7.87, p < .05$ . Figure 1 illustrates the findings for this variable. As can be seen, there was essentially a linear relationship between the amount of intervention and the likelihood of educational success at 2 years postpartum for the poorer students. The percentage of educationally successful students rose from 17% for one quarter attenders to 80% for four quarter attenders.

*Better Students Prior to Pregnancy* ( $n = 55$ ). Verified outcome data were available for all but two students; analyses are therefore based upon an  $n$  of 53. The percentage of students in each outcome category was 19% school dropouts, 15% in school and failing, 0% in vocational programs, 2% in alternative programs, and 64% in school and passing, or graduated. Overall, thus, 66% were educationally successful at 2 years postpartum. Unlike the findings for poorer students, for better students there was no relationship between educational outcome and the amount of intervention,  $\chi^2(3) < 1$ , ns. Figure 1 illustrates the findings for this variable.

### *Search for Selection Bias*

As Cook and Campbell (1979) have noted, the use of a quasi-experimental design places the burden on the researcher to determine whether prior selection bias can reasonably be ruled out as an explanation for the study's results. In a true experiment, random assignment would have determined the number of quarters the student received at McCabe. If the present design approximates an experiment, some factor equally beyond the student's control should have determined her length of stay. A good candidate for such a factor is timing of pregnancy, given that month of conception is the principal cause of whether the summer vacation reduces the student's length of time in this school program. We therefore first performed a descriptive analysis to examine how timing of pregnancy was related to the amount of intervention received. To establish that the treatment groups were equivalent on background variables, we then performed a statistical analysis to compare the four length-of-attendance groups on a number of variables that might be pertinent to their subsequent academic success.

*Descriptive Analysis.* We expected to find that timing of pregnancy was responsible for the differences in amount of time students spent in the McCabe program. To examine this, records for the regular attenders were sorted by month of conception; for each month, the modal number of quarters of McCabe intervention the mothers received was determined. The modal number of quarters of intervention was lowest for students who became pregnant in January (1 quarter), rose to 2 quarters for February and March conceptions, and was 4 quarters for April, May, and June conceptions; girls with July and August conceptions received 3 quarters, and those with conceptions in September through December received 2. (The modal values were the same for better and for poorer students.) Small differences in the timing of delivery also affected the amount of intervention received. Delivering a baby on or soon after the first day of an academic quarter

enabled the student to receive an additional quarter of intervention. For example, students delivering in the second half of November received one more quarter than did students who delivered in the first half of the month. All exceptions to the mode were classified as reflecting positive or negative selection bias. The former was considered to have occurred when a student received more time at McCabe than did others who conceived in the same month because she was unusually fast to acknowledge her pregnancy, or less because she was unusually slow. Negative selection bias was considered to have occurred when a student received a different duration of the program for reasons beyond her control, such as delivering just prior to or after an administrative cut date. For initially poorer students, there were 11 cases of positive selection bias and 10 cases of negative bias. For poorer students, thus, incidences of apparent positive and negative bias essentially canceled each other. For initially better students, there was somewhat more indication of positive bias (15 positive and 8 negative cases of selection bias).

*Statistical Analysis.* In comparing the four different length-of-attendance groups, categorical variables were analyzed with chi-square analyses. Continuous variables were analyzed by analysis of variance with an a priori linear trend contrast. Even though many of the dependent variables were correlated, multiple univariate analyses were performed to make the test for selection bias as sensitive as possible (Hubert & Morris, 1989).

*Poorer Students Prior to Pregnancy.* As explained earlier, we expected that selection bias would be minimal because of the manner in which the program is delivered. Comparisons of the four duration-of-treatment groups confirmed this expectation. Poorer students receiving different durations of the McCabe intervention did not differ significantly in age, grade level, in whether they were in the correct grade for age, in whether they had been enrolled in classes for retarded students, in degree of absenteeism, or in their academic grades prior to the pregnancy. The four groups were also similar in the age at which they had reached menarche, in the percentage who had had prior pregnancies, in the week of pregnancy when they received their first prenatal checkup, and in the percentage known to have had serious life problems prior to the index pregnancy. These problems, as detected by medical record review, include depression, having been an abused child, or having an absent or substance-abusing mother. (Overall, 26% of the sample had one or more such problems.) The groups were also compared with respect to their life circumstances following the birth of their babies. Again, there were no group differences in the percentage who continued to reside with their mothers, who returned to a school that had a special program for parenting teenagers, who received sufficient child

care help daily to permit them to attend school, or in the size of their households.

*Better Students Prior to Pregnancy.* Comparisons were made in the same manner and for the same variables as for the poorer students. No significant differences across the four duration-of-treatment groups were found for any variable examined.

### *Other Factors and Educational Outcomes*

*Duration of Prenatal and Postnatal Intervention.* Duration of pregnancy at referral for intervention was significantly correlated with total quarters of attendance at McCabe ( $r = -.48$ ), as was the number of weeks of postnatal intervention ( $r = .65$ ; these correlations were nearly identical for poorer and for better students considered separately). For poorer students, stepwise hierarchical regression analyses were performed to compare the importance of total quarters of intervention versus each of these factors. Regardless of the order in which the variables were entered, only the total amount of intervention significantly predicted educational outcome in each analysis. For better students, also, neither of these factors significantly predicted educational outcome.

*Family Support.* Teenagers who were still living with their mothers at 18 months postpartum did not have a higher likelihood of being educationally successful at 2 years postpartum than did teenagers who no longer resided with their mothers (57 vs. 62%, respectively), Mantel-Haenszel  $\chi^2(1) < 1$ , ns; separate analyses for better and for poorer students also yielded nonsignificant results. Similarly, teenagers who received at least 6 hours of child care daily from relatives were not more educationally successful than were teenagers who did not receive such help (73 vs. 55%, respectively), Mantel-Haenszel  $\chi^2(1) = 2.87$ , ns. Separate analyses revealed that for better students, receiving this kind of family support did lead to a higher degree of educational success than was attained by comparable students who did not receive such help (88 vs. 57%, respectively), Mantel-Haenszel  $\chi^2(1) = 4.46$ ,  $p < .05$ .

*Prematurity.* Only five students delivered prematurely. Three of these students had good educational outcomes (about the same percentage as for the overall sample). Premature delivery was not confounded with total quarters of intervention. Two teenagers delivered in the same quarter they would have if they had carried the baby to term. The other students were allowed to remain in the program longer to compensate for the prematurity. Thus, in no case did premature delivery result in a student's

receiving less total time in the program than she otherwise would have received.

### *Other Outcomes*

*Incidence of Repeated Births.* For the 106 young mothers in this study, 25 (24%) delivered a second child within 2 years after the birth of their first child.<sup>5</sup> Prepregnancy academic performance did not predict this outcome (28% of initially poorer vs. 20% of initially better students had a second child within 2 years), Mantel-Haenszel  $\chi^2(1) = 1.03$ , ns. Total duration of McCabe attendance also did not affect repeated births for either better or poorer students. However, performing a median split on the number of weeks attendance after the baby was born, 35% of the 52 students who received less than the median of 6.8 weeks postnatal time delivered a second child within 2 years, whereas only 13% of the 54 students who received 6.8 weeks or more postnatally at McCabe did so, Mantel-Haenszel  $\chi^2(1) = 6.83$ ,  $p < .01$ .

## DISCUSSION

One of the most surprising discoveries in this study was that the school-based McCabe Program reached such a high percentage (72%) of all poor, black, first-time school-aged mothers in the city. Within the low SES black population, the overwhelming majority of first-time school-aged mothers (90%) were still enrolled in school at the time they conceived. Even though many of these girls attended school only sporadically, 90% were successfully referred to the McCabe Program. Of those who were referred, 89% became regular program attenders. The overall success rate of the program in serving pregnant black teenagers thus reflects the result of three successive 90% cuts in the population of all such teenagers in the city. Despite the limitation of the present study to program attenders, the generalizability of the findings is to nearly three quarters of the entire population of the city's poor, black, first-time teenage mothers.

In their evaluation of another school-based program, the Young Mothers' Educational Program, Osofsky and Osofsky (1970) observed, "What YMED, and other programs like it, demonstrate is that given a rea-

<sup>5</sup>Two mothers of the teenagers gave permission for their daughters' records to be reviewed when their daughters were ill or had recently disappeared; two teenagers who declined to be interviewed at 18 months postpartum agreed in a later phase of this longitudinal study to a full record review.

sonable—and not too costly—opportunity, individuals who are at high risk and who are supposedly uninterested will respond. Most individuals will take advantage of the offered options” (p. 832). Our findings strongly support this optimistic appraisal.

The present study also offers evidence that a specialized program is beneficial to the teenagers who choose to attend. The mechanisms by which this kind of program leads to better educational outcomes appear to differ depending upon the students’ prepregnancy academic achievement level. It had been postulated that the relationship between intervention and successful outcomes would be a linear one: the more the intervention, the better the outcome. For poorer students, this was true. For better students, the results are more consistent with a threshold model: Increasing the duration of the program beyond a minimal amount did not increase the likelihood of good outcomes.

Because of the way the McCabe program is administered and the limitation of the study sample to regular attenders, selection bias appeared to be minimal. In this study design, we viewed timing of pregnancy as a naturally occurring form of random assignment. Summer vacation and eligibility rules for attending McCabe made it impossible for students who conceived in the autumn and winter months to receive four quarters in the program, no matter how quickly they acknowledged their pregnancy. In contrast, students conceiving in late spring were relatively unaffected by the summer vacation and were the beneficiaries of a policy allowing students with late-winter deliveries to complete the school year at McCabe. The policy requiring rapid return to regular school for most students was necessitated by severe space limitations and was intended to give priority to currently pregnant students. Given the very low rate of premature delivery for McCabe attenders, such a policy clearly makes sense in terms of improving birth outcomes. It appears to exact a cost with respect to educational outcomes, however, as well as with respect to the prevention of rapid repeated childbearing.

The present quasi-experimental design appeared to yield a good approximation of the conditions that a true experiment would have provided. Students who attended only one quarter did not differ from those attending for a full school year on any background variable examined. The duration-of-intervention groups were comparable in age, grade level, the kind of students they had been prior to pregnancy, speed of acknowledging the pregnancy, selected factors from their medical and family histories, and their living circumstances following delivery.

Other factors that might affect educational outcomes, but did not, were the duration of pregnancy at referral to the program, length of time spent postnatally in the program, and premature delivery. Apparently it

was total time in the program, rather than whether that time was spent pre- or postnatally, that was the important factor. (Postnatal time in the program was, however, important for preventing the rapid conception of a second child, as we discuss below.) Premature delivery occurred very infrequently among these closely monitored teenagers, and in no case did it result in the student's receiving less total time in the program than she otherwise would have received.

One potential alternative explanation for favorable outcomes is family support, given prior reports that a supportive family is important to how well teenage mothers adjust in the first few years after their baby is born (Furstenberg & Crawford, 1978). In the present study, indications of family support included continued residence of the teenager with her mother and the availability of child care help from her family. Overall, 59% of the teenagers were still living with their mothers at the time of the interview, and 35% were receiving at least 6 hours daily child care assistance from relatives (an amount that would permit them to attend school). In keeping with Furstenberg and Crawford's results, better students who received child care help from relatives did have a higher likelihood of remaining in school than did students whose families did not provide this kind of help. However, for poorer students, neither continued residence with the mother nor child care help from relatives was associated with greater educational success. Evidently, for students who already have a history of serious school failure, even help from their families will not lead them to return to school and remain there. Students at high scholastic risk appear to require a specialized school program.

The most striking discovery in this investigation was the finding that adolescents who appeared to have little academic promise prior to their pregnancy were very responsive to school-based intervention. With sufficient time in the McCabe program, they became indistinguishable from better students in the likelihood of postpartum educational success. The students who responded most strongly were those who might easily have been regarded as beyond the reach of practical efforts to help them perform adequately in school. Nearly three quarters of this group of poorer students had already failed one or more grades, nearly two thirds had shown serious absenteeism, and all of them had been earning predominantly Ds and Fs without attaining a C average at any time during the year prior to their pregnancy. It is not that these previously poor students became excellent ones, but they were able to remain in school, and earn enough credits to graduate or to be progressing toward graduation at a steady pace.

For poorer students, the McCabe Program apparently did something more than provide a bridge during pregnancy and a transition back to regu-



lar school. In a specialized program such as McCabe, more individual attention is possible due to the small class sizes. Also, support is available to help a student overcome personal problems that could interfere with academic success. In such an individualized setting, the marginal student who is able to attend for a longer time may be able to establish an increasingly strong sense that she is capable of being an adequate student. This positive response of poorer students to a smaller, personalized setting is congruent with evidence from many studies of scholastically at-risk nonpregnant students. In an analysis of such studies, Hodgkinson (1985) reported that a small student-teacher ratio is consistently one of the most important factors in preventing marginal students from becoming school dropouts.

In addition to smaller class sizes, intervention research with academically troubled nonpregnant students (Felner, Ginter, & Primavera, 1982; Ruby & Law, 1982) suggests two other program strategies that are effective in preventing school leaving. These researchers placed a mentor, the homeroom teacher, in a counseling role; the mentor offered support and encouragement to the students and closely monitored their school attendance and performance. The Felner et al. (1982) project added another component—relatively small and unchanging peer groupings—by keeping students from the same homeroom in classes together throughout the day, creating the feeling of a small school within a large high school. Both groups of researchers reported substantially higher subsequent high school graduation rates in their intervention groups (Felner & Adan, 1988; Ruby & Law, 1982). The McCabe intervention incorporates all three of these factors—small student-teacher ratio, mentoring and support, and small, consistent peer groupings—suggesting that these program components are as effective with pregnant as they are with nonpregnant academically troubled students.

Without a no-intervention control group condition, we cannot be certain that the relatively high level of postpartum success for the initially better students was due to the McCabe program rather than to a tendency for better students to remain in school despite pregnancy. The pattern of results, however, is consistent with the explanation that intervention is effective with this group, but that it need not be as extensive as is necessary with poorer students (i.e., the threshold model). The threshold explanation is given greater weight by the fact that “better” students for this population was a relative rather than an absolute term. These students were “better” only relative to other pregnant students. Although all of these better students had been able to obtain a C average occasionally, only half of them had attained an overall C average for the full year prior to their pregnancy. Also, nearly half showed serious absenteeism during their pre-McCabe

year, and almost two thirds were at least 1 year below grade level. As Jekel and Klerman (1982) have argued, teenagers "who may benefit from a separate school, even though it is not essential for their well-being, are those who are behind grade or having other educational problems" (p. 306). The present results suggest that this description fits the overwhelming majority of school-aged mothers in an inner-city area.

A final important finding in this study was that postnatal intervention was effective in reducing the likelihood of rapid subsequent childbearing. Although students attended McCabe primarily during pregnancy, many were able to spend some time there postnatally as well. Students who received little or no postnatal intervention had a relatively high likelihood of delivering a second child within 2 years after their first. With as little as 6-7 weeks intervention in the postpartum period, far fewer did so.

The mechanism by which postnatal intervention works to prevent repeated childbearing is not obvious from our data. One possibility is that educational efforts directed toward avoiding a second pregnancy are most effective when given at a time that the teenager can immediately utilize the information. Although instruction about pregnancy prevention is given to attenders throughout their time at McCabe, adolescents may be most receptive to such information when it is currently relevant. During pregnancy, the teens may be too preoccupied with their bodily changes and with the upcoming delivery to anticipate and plan for life postpartum. They also may be too cognitively immature to conceptualize the future in terms of potential needs and consequences (Hamburg, 1981).

Another possibility is that by remaining in the McCabe program long enough to receive a 6-week postpartum medical checkup, the teen receives further counsel on pregnancy prevention from her physician. Such information can then be clarified and reinforced by the school nurses in a supportive environment where questions can be asked and fears addressed. Olds et al. (1986; 1988) found that nurse home visitors are very effective in such a role. It may thus be that the hospital and school personnel reinforce each others' impact on the teenager. Whatever the mechanism, the present results are consistent with those of other programs in suggesting that postnatal intervention with school-aged mothers can be effective in reducing the incidence of rapid subsequent childbearing whether such programs are provided through clinics (Hardy, King, Shipp, & Welcher, 1981), schools (Osofsky & Osofsky, 1970, 1978), or nurse home visitation (Olds et al., 1988).

The present results add to a growing body of evidence concerning the potential role of schools in addressing problems associated with adolescent pregnancy. Health clinics in schools, for example, appear to be ef-

fective in reducing the incidence of teenage pregnancies (Edwards, Steinman, Arnold, & Hakanson, 1977, 1980; Zabin, Hirsch, Smith, Streett, & Hardy, 1986). The present study, as well as other research (Furstenberg, Brooks-Gunn, & Morgan, 1987; Klerman & Jelke, 1973; Osofsky & Osofsky, 1970) indicates that school-based programs for pregnant students can also play a role in preventing subsequent educational failure. Our results further suggest ways in which such programs could be strengthened.

An implication of our educational findings is that if they were allowed to remain for more than one semester in the program, about two thirds of the poorer students (a similar percentage as for the better students) would later succeed in school. This is a major success rate for a dropout prevention effort with such academically unpromising teenagers. It is possible that providing suitable programs postnatally might increase educational success rates still further, especially if child care is provided, and it is probable that postnatal intervention could reduce the incidence of rapid repeated childbearing.

There now seems little question that school-based programs can offer an important tool for communities to employ in addressing the multiple problems of adolescent pregnancy. Schools can reach a surprisingly high percentage of high-risk target populations. Collaborative efforts between health care professionals and the public schools appear to be a promising means for addressing such concerns as poor birth outcomes and rapid repeated childbearing among adolescents. Finally, there is considerable evidence that even very high-risk individuals are often responsive to school-based efforts on their behalf. In conjunction with other research, the results of the present study offer strong encouragement for communities to experiment creatively in developing and implementing school-based programs.

## REFERENCES

- Burt, M., Kimmich, M., Goldmuntz, J., & Sonenstein, F. (1984). *Helping pregnant adolescents: Outcomes and costs of service delivery*. Final report to Office of Adolescent Pregnancy Programs. Washington, DC: Urban Institute.
- Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Chicago: Rand McNally.
- Edwards, L., Steinman, M., Arnold, K., & Hakanson, E. (1977). An experimental comprehensive high school clinic. *American Journal of Public Health, 67*, 765-766.
- Edwards, L., Steinman, M., Arnold, K., & Hakanson, E. (1980). Adolescent pregnancy prevention services in high school clinics. *Family Planning Perspectives, 12*, 6-14.
- Felner, R. D., & Adan, A. M. (1988). The school transitional environmental project: An ecological intervention and evaluation. In R. H. Price, E. L. Cowen, R. P. Lorion, & J. Ramos-McKay (Eds.), *14 ounces of prevention* (pp. 111-122). Washington, DC: American Psychological Association.

- Felner, R. D., Ginter, M., & Primavera, J. (1982). Primary prevention during school transitions: Social support and environmental structure. *American Journal of Community Psychology, 10*, 277-290.
- Foltz, A., Klerman, L. V., & Jekel, J. F. (1972). Pregnancy and special education: Who stays in school? *American Journal of Public Health, 62*, 1612-1619.
- Furstenberg, F. F., Jr. (1976). *Unplanned parenthood: The social consequences of premature parenthood*. New York: Free Press.
- Furstenberg, F. F., Jr., Brooks-Gunn, J., & Morgan, S. P. (1987). *Adolescent mothers in later life*. New York: Cambridge University Press.
- Furstenberg, F. F., Jr., & Crawford, A. G. (1978). Family support: Helping teenage mothers to cope. *Family Planning Perspectives, 10*, 322-333.
- Hamburg, B. A. (1981). Teenagers as parents: Developmental issues in school-aged pregnancy. In E. Purcell (Ed.), *Psychopathology of children and youth: A cross-cultural perspective* (pp. 299-320). New York: Josiah Macy, Jr., Foundation.
- Hardy, J. B., King, T. M., Shipp, D. A., & Welcher, D. W. (1981). A comprehensive approach to adolescent pregnancy. In K. G. Scott, T. Field, & E. G. Robertson (Eds.), *Teenage parents and their offspring* (pp. 265-282). New York: Grune & Stratton.
- Hayes, C. D. (Ed.) (1987). *Risking the future; Adolescent sexuality, pregnancy, and childbearing* (Vol. 1). Washington, DC: National Academy Press.
- Hodgkinson, H. (1985). *All one system. Demographics of education, kindergarten through graduate school*. Washington DC: Institute for Educational Leadership.
- Hofferth, S. L. (1987). The effects of programs and policies on adolescent pregnancy and childbearing. In S. L. Hofferth & C. D. Hayes (Eds.), *Risking the future: Adolescent sexuality, pregnancy, and childbearing* (Vol. 2, pp. 207-263). Washington, DC: National Academy Press.
- Hofferth, S. L., & C. D. Hayes (Eds.) (1987). *Risking the future: Adolescent sexuality, pregnancy, and childbearing* (Vol. 2). Washington, DC: National Academy Press.
- Hubert, C. J., & Morris, J. D. (1989). Multivariate analysis versus multiple univariate analyses. *Psychological Bulletin, 105*, 302-308.
- Jekel, J. F. (1981). Evaluation of programs for adolescents. *Birth Defects: Original Article Series, 17*(3), 139-153.
- Jekel, J. F., & Klerman, L. V. (1982). Comprehensive service programs for pregnant and parenting adolescents. In E. R. McAnarney (Ed.), *Premature adolescent pregnancy and parenthood* (pp. 295-310). New York: Grune & Stratton.
- Klerman, L. V., & Jekel, J. F. (1973). *School-age mothers: Problems, programs, and policy*. New Haven, CT: Linnet.
- Mantel, N. (1963). Chi-square tests with one degree of freedom: Extensions of the Mantel-Haenszel procedure. *Journal of the American Statistical Association, 58*, 690-700.
- Olds, D. L., Henderson, C. R., Jr., Tatelbaum, R., & Chamberlin, R. (1986). Improving the delivery of prenatal care and outcomes of pregnancy: A randomized trial of nurse home visitation. *Pediatrics, 77*, 16-28.
- Olds, D. L., Henderson, C. R., Jr., Tatelbaum, R., & Chamberlin, R. (1988). Improving the life-course development of socially disadvantaged mothers: A randomized trial of nurse home visitation. *American Journal of Public Health, 78*, 1436-1445.
- Osofsky, H. J., & Osofsky, J. D. (1970). Adolescents as mothers: Results of a program for low-income pregnant teenagers with some emphasis upon infants' development. *American Journal of Orthopsychiatry, 40*, 825-834.
- Osofsky, J. D., & Osofsky, H. D. (1978). Teenage pregnancy: Psychosocial considerations. *Clinical Obstetrics and Gynecology, 21*, 1161-1173.
- Ruby, T., & Law, R. (1982). School dropouts—They are not what they seem to be. *Children and Youth Services Review, 4*, 279-291.
- Zabin, L. S., Hirsch, M. G., Smith, E. A., Streett, R., & Hardy, J. B. (1986). Evaluation of a pregnancy prevention program for urban teenagers. *Family Planning Perspectives, 18*, 119-126.