Reduced School Dropout Rates Among Adolescent Mothers Receiving School-Based Prenatal Care

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Background: Adolescent pregnancy is associated with increased school dropout rates. Dropping out amplifies the probability of persistent social and economic disadvantage. Whether school-based health centers might help reduce school absenteeism and dropout rates in this group has not been well studied.

Objective: To examine the association of school-based prenatal services on school attendance and dropout rates.

Methods: In this retrospective cohort study, using school rosters from an alternative school, we identified adolescents aged 18 years or younger who delivered a baby between July 1, 1995, and August 30, 1997, in Baltimore, Md. We linked school records spanning 3 years with medical records and birth certificates. School variables such as attendance and dropout rates were examined in relation to the teen’s year of pregnancy and prenatal care setting (school-based vs non–school-based). Hierarchical logistic regression was used to examine effects of school-based prenatal care on dropout and promotion or graduation rates, with adjustment for baseline group differences.

Results: We identified 431 predominantly African American, low-income adolescents who attended the alternative school in their pregnancy school year. In the year prior to pregnancy, most performed poorly in school and had significant absenteeism. During their pregnancy school year, teens receiving school-based prenatal care were absent 12 fewer days, as compared with those receiving non–school-based care (P = .001), and their dropout rate was half that of those receiving non–school-based care (6% vs 15%; P = .02). Hierarchical logistic regression analyses, with adjustment for baseline prepregnancy differences, demonstrated that teens receiving school-based prenatal care were less likely to drop out of school during the pregnancy year (adjusted odds ratio, 0.39; 95% confidence interval, 0.15-0.99; P = .048).

Conclusions: Absenteeism and dropout rates were reduced for pregnant adolescents receiving prenatal care at a school-based health center in an urban alternative school. Findings underscore the importance of funding and evaluating school-based health centers and other interventions that may ameliorate negative outcomes among childbearing adolescents.

One such strategy may be school-based health centers (SBHCs), which enhance access to and compliance with care while promoting school continuation for populations with high dropout rates. Theoretically, receipt of school-based care might reduce absenteeism because teenagers would go to medical appointments on-site and then return to class instead of missing whole days of school. Absenteeism is one of the most important predictors of dropout rates. Reducing days absent through on-site health care may be particularly important for pregnant adolescents whose recommended prenatal care schedule includes at least 9 visits for a full-term pregnancy. Moreover, SBHCs that provide comprehensive medical and mental health services may help address critical aspects of dropping out for youth at high risk by providing intensive and sustained counseling for students who need assistance with social services and personal and family issues.

Authors of a number of studies have investigated the effect of SBHCs on access to health care, sexual behavior, and contraceptive use. Some have evaluated the effect of SBHCs on school attendance in general. However, we found only 1 study in which the effect of SBHCs on educational outcomes for pregnant adolescents was evaluated. Authors of this study in Dallas, Texas, evaluated school outcomes of 339 pregnant teenagers, some of whom attended an SBHC. They found that 54% of teen mothers dropped out of school before, during, or after their index pregnancy. There were no differences in school dropout rates during or after pregnancy between those receiving prenatal services in an SBHC and those receiving non–school-based care. However, methodological problems included missing school data for 20% of the cohort; defining a dropout as someone who missed 15 or more days of school, which likely caused overestimation of the dropout rate; and failure to control for potential confounding variables such as baseline school performance and prior childbearing, which may be important factors in school absenteeism and dropout rates.

The objectives of this study were to evaluate the effect of school-based prenatal services on school attendance, achievement, and dropout rates, while controlling for the confounding variables of prepregnancy school performance and prior childbearing. We hypothesized that teens attending the SBHC for their prenatal care would miss fewer days of school and, as a result, have lower dropout rates.

**METHODS**

**STUDY SETTING**

Baltimore's pregnant teenagers may attend a public alternative junior-senior high school for pregnant and parenting adolescents; about one third of them choose to do so. The alternative school has rolling admissions for adolescents with newly diagnosed pregnancy throughout the academic year. Therefore, duration at the school for individual students may vary from as little as a few days to the entire school year. Most teens who attend the alternative school return to their regular home school the next year. The alternative school provides both traditional academic studies and specialized services such as parenting classes, health care, and day care (limited to about 30 infants and toddlers) for pregnant and parenting teens. Among the alternative school's services is an on-site SBHC that offers comprehensive adolescent-focused primary and prenatal care.

During this study, the SBHC provided comprehensive services that included primary, prenatal, delivery, and postpartum care for students; family planning services; primary care for infants and children; episodic care; case management; nutrition education; parenting education; and mental health services. Medical care was provided primarily by family physicians. Other staff included a social worker, part-time psychiatrist, medical assistant, health educator, and receptionist.

About one fourth of the alternative school's students used the on-site SBHC for primary and prenatal care. Adolescents with baseline conditions (eg, sickle cell anemia, type 1 diabetes mellitus) or acquired serious conditions (eg, hypertension, insulin-requiring diabetes) were given the option of comanagement with or referral to high-risk obstetric services at the University of Maryland Department of Obstetrics and Gynecology, Baltimore, Md. Ten percent of the SBHC group were in this high-risk category, and all elected to remain with the SBHC care with comanagement with high-risk obstetric services. Students who elected not to receive care in the SBHC went to hospital-based clinics, community clinics, or private physician offices. The most common reason cited by teens and their parents for choosing the SBHC for prenatal care was convenience. The most common reasons for their choosing non–school-based care were wanting to deliver at a hospital not served by the SBHC and having managed care insurance that did not cover care at the SBHC.

**STUDY DESIGN**

In this retrospective cohort study, we used existing data sources: school records, medical records, and birth certificates. The study was approved by the institutional review boards of the University of Maryland School of Medicine, Baltimore, Md, and the Maryland Department of Health and Mental Hygiene, Baltimore, Md.

**PATIENT POPULATION AND INCLUSION CRITERIA**

The study sample was selected from a cohort of teenagers aged 18 years or younger at the time of conceiving who delivered a baby in Baltimore, Md, between July 1, 1995, and August 30, 1997. Teens were identified from 2 sources: the rosters of the alternative school, which included teens receiving school-based and non–school-based care, and computerized lists of teenagers who received care at the University of Maryland's hospital-based comprehensive adolescent-focused pregnancy program. The latter group's school status was either attending the alternative school or "regular" school or not attending school.

Because prior research results have shown that teenagers who transfer to the alternative school tend to be younger and more academically motivated and to have more family support than do those who remain in regular school, to minimize bias we excluded from analyses pregnant teens who remained in regular school. Our final sample consisted of adolescents who transferred to the alternative school during their pregnancy year. After review of medical record data, the sample was categorized into 2 groups: teens receiving school-based prenatal care and those receiving non–school-based prenatal care.

**DATA COLLECTION**

Data were collected from individually matched school, medical, and birth certificate records.
School Records

The Baltimore City Department of Education Office of Research, Evaluation, and Accountability maintains computerized data on all registered students. Records from the academic school years 1993-1994 through 1998-1999 were used to determine the school trajectory of each subject. Individual student files consisted of academic year, demographic information (name, date of birth, race, address), schools attended and school name and number, whether the student was active or withdrawn from school, dates of school entry and withdrawal, grade in school, number of days on roll, number of days absent, courses taken and numerical grades, promotion to next grade, and graduation status. For each member of the cohort, we reviewed school records corresponding to the year prior to the pregnancy, the year of the pregnancy, and the year after delivery. To obtain this information, we provided the Office of Research, Evaluation, and Accountability a file containing the name, birth date, address, and Social Security number for each member of our cohort. The Office of Research, Evaluation, and Accountability staff matched this file with the school records and returned to us an ASCII file (American National Standards Institute, Washington, DC) with the school records of each subject.

School records for each member of the cohort were then abstracted by 1 of us (B.B.) so that the data could be linked and merged with the other data sources. We organized school data according to the timing of delivery date in relation to the school year. We defined the pregnancy year as the school year in which most of the pregnancy occurred. For example, if delivery occurred in the summer months of 1996, then the pregnancy year was the 1995-1996 school year, the prepregnancy school year was 1994-1995, and the postpregnancy school year was 1996-1997. If delivery occurred in January 1996, the pregnancy school year was considered to be 1995-1996. If a teen delivered in the first week of a school year (ie, between September 1, 1996, and October 14, 1996), we defined the pregnancy year as the 1995-1996 academic year. If she delivered after October 15, 1996, we defined the pregnancy school year as 1996-1997. We chose an October 15 cutoff to define the pregnancy school year because a pregnancy that ended in delivery between September 1 and October 14 spanned the prior academic year and summer months, and did not overlap much of the subsequent academic year.

Although a school record was obtained for each adolescent, 9% of the cohort had missing attendance data in the prepregnancy year, 1% had missing attendance data in the pregnancy year, and 15% had missing attendance data in the postpregnancy year. Grades were missing for about 20% of the cohort in the prepregnancy year, 40% in their pregnancy year, and 30% in their postpregnancy year. We thought that the missing data would introduce serious bias and a loss of power, so we used multiple imputation methods that captured the distributional relationship between observed and missing data.

Dropout Definition

Prior studies lack consensus on how a dropout is defined. The National Center for Education Statistics defines a dropout as a person who has not graduated from high school and is not currently enrolled in full-time secondary education. Critics of this definition say it causes underestimation of the dropout rate because many truant students are not officially categorized as withdrawn. Authors of other studies have defined dropping out as "excessive absences," defined as more than 15, 20, or 30 days of unexcused absence, a definition that is probably an overestimation of the dropout rate. In our cohort, many adolescents had excessive absences, including 100% absenteeism during a school year. Yet, despite not attending school, they were still counted on school rosters as enrolled. Consequently, we defined dropping out of school by using 2 methods. First, we categorized a student as a dropout if her school records documented a withdrawal date. Second, if she was present at school in a given academic year fewer than 20 days of the 180-day school year (ie, unexcused absence of more than 88% of the school year), she was classified as dropped out.

Medical Records

Medical records were reviewed by trained research assistants blinded to study hypotheses by using standardized data collection forms. For this study, we abstracted information about demographic variables, prenatal care visits and location of care, parity, and complicating medical conditions. We were able to obtain medical records for 46% of the sample: all teens who received school-based prenatal care had their medical records reviewed, but only 30% of those receiving non–school-based prenatal care had their medical records reviewed. Most teens who received non–school-based prenatal care and whose records we obtained attended 1 of the University of Maryland clinics.

Teens whose medical records did not review were all identified from the alternative school rosters and received their care from multiple types of providers around Baltimore, including hospital clinics, community clinics, and private physician offices. Because this group was attending the alternative school, we knew they did not receive prenatal care in the alternative school’s SBHC. It is unlikely that teens attending the alternative school received primary and prenatal care at a different SBHC because they were not attending those schools. If they did receive care at another SBHC, their care was by definition off site and not school based for them. Therefore, this group who attended the alternative school but did not receive care in the alternative school’s SBHC was classified as receiving non–school-based care. Review of available medical records demonstrated that 50% of the sample received care at 1 site; the remainder received care at 2 or more sites. The site where most visits occurred was defined as the site of prenatal care.

Birth Certificates

Birth certificate information was available for the full sample. Birth certificates were used to determine the infant’s birth date and as a second source for demographic information, parity, and complicating conditions such as prior preterm birth. The birth certificate contained census tract of residence at birth. We used the census tract median household income as an indicator of socioeconomic status.

ANALYSES

After defining a pregnancy year for each member of the cohort, we identified whether the teen was in school or not in school in each year during a 3-year span: 1 year prepregnancy, the pregnancy year, and 1 year after pregnancy. Next we examined whether the teens in school attended regular school or the alternative school. Because adolescents who chose regular vs alternative school were significantly different from each other in a number of baseline characteristics, to minimize bias we excluded from analyses teens who remained in regular school.

Among those who transferred to the alternative school, we examined whether there were differences in demographic characteristics, prior childbearing, and prepregnancy school variables according to prenatal care setting (school-based vs non–school-based). Measured school variables included days absent, whether the teen was age appropriate for grade, numerical grades in math and English, and the proportion of days at the alternative school. Attendance measures were calcu-
In bivariate analyses, we examined the association of school-based and non–school-based care with days absent, dropout rate, and promotion or graduation rate in the pregnancy and post-pregnancy school years. Dropout analyses were performed in 2 ways and compared: using imputed data for missing values and again excluding from analyses subjects with missing data. Results were not appreciably different. Binary and continuous variables were analyzed with \( \chi^2 \) and t tests.

Hierarchical logistic regression analyses were conducted to test the association of school-based prenatal care with school dropout and promotion or graduation rates during the pregnancy school year and post-pregnancy school year. In each model, demographic variables (eg, age, race, income, Medicaid status) were entered into the model first, followed by prior childbearing, then prenatal care school year variables (eg, whether the teen was in school, number of days absent, whether she was age appropriate for grade, and mean English and math grades), and then number of days at the alternative school adjusted for total days in school. Finally, receipt of prenatal care in the SBHC was entered into the model. For post-pregnancy year promotion or graduation rates, we examined results for the entire cohort and then separately for the subsets of adolescents who remained in the alternative school or returned to regular school during the post-pregnancy school year. Results were not appreciably different for the 2 groups. Data were entered and analyzed (Statistical Package for the Social Sciences version 11.5; SPSS Inc., Chicago, Ill).

### RESULTS

We identified 780 teenagers, aged 11 to 18 years at the time of conceiving, who delivered a live infant during the study time frame. We excluded from analyses 195 who attended a regular school and 154 who were not in school during their pregnancy school year. The remaining 431 attended the alternative school and were included in this study.

Demographic variables, pregnancy history, and prepregnancy school year characteristics are shown according to pregnancy year prenatal care setting (ie, school-based vs non–school-based) in Table 1. Adolescents receiving school-based prenatal care were similar to those receiving non–school-based prenatal care with respect to age, race, median household income, parity, most prepregnancy school year measures, and number of days they attended the alternative school. However, teens who received school-based care were more likely to be Medicaid recipients and to have missed fewer days of school in their prepregnancy year.

Table 1 examines bivariate associations among days absent, dropout rate, and promotion or graduation rate in the pregnancy and post-pregnancy years according to prenatal care setting. On average, during their pregnancy school year, adolescents in both prenatal care settings missed about 3 weeks more of school, as compared with their prepregnancy school year (15 and 16 days, respectively). However, those receiving school-based care missed significantly fewer days during their pregnancy school year than did those receiving non–school-based care (60 vs 72 days; \( P < .05 \)), and this relationship held even when controlling for prepregnancy absenteeism (data not shown). Rates of dropout were more than twice as high in the group receiving non–school-based care (15% vs 6%; \( P = .02 \)). No differences were observed in promotion or graduation rates according to prenatal care setting. Moreover, by the postpregnancy year, dropout rates among the 2 groups were similar (33% in the school-based prenatal care group and 40% in the non–school-based prenatal care group; \( P = .23 \)).

Using hierarchical logistic regression, we computed models to predict the odds of dropout and promotion or graduation during the pregnancy and postpregnancy school years, with adjustment for potential confounding variables (Table 3). With pregnancy year dropout as the dependent variable and adjusting for demographic variables, prepregnancy school year variables, and number of days attending the alternative school, we found that compared with those receiving non–school-based prenatal care, those receiving school-based prenatal care were significantly less likely to drop out during the pregnancy school year (adjusted odds ratio, 0.39; 95% con-
Adolescents returning to the alternative school for their postpregnancy school year were less likely to drop out in that year, as compared with teens who returned to their home school (26% in the alternative school and 43% in the regular school; \( P = .002 \)) and were more likely to be promoted or graduated that year (69% vs 47%; \( P = .09 \)). However, postpregnancy school year outcomes were not associated with receipt of school-based prenatal care. Moreover, associations among postpregnancy alternative school attendance, dropout, and promotion or graduation rates were not significant when we adjusted for baseline differences in prepregnancy school variables. We observed that prepregnancy school variables (absenteeism, age appropriateness for grade, and math and English grades) were among the most important predictors of dropout and promotion or graduation for this sample of adolescent mothers.

In this study, we used longitudinal data to examine the association of school-based prenatal care and school dropout rates among a group of childbearing adolescents. We observed high absenteeism and dropout rates in this group in a pattern that suggests that dropping out of school is part of a continuum of school disengagement that begins long before the pregnancy.\(^\text{38}\) A major finding of our study is that among this high-risk group of pregnant adolescents who transferred to an alternative school, receipt of school-based prenatal care was associated with lower absenteeism and dropout rates in this setting. The observed decrease in school absenteeism and dropout rates persisted even after controlling for potential confounding variables such as age, race, socioeconomic status, prepregnancy school attendance and achievement, and number of days at the alternative school.

We speculate that prenatal care appointments may account for some of this reduced absenteeism: teens receiving school-based prenatal care might have gone to their clinic appointment during the school day and then returned to class, whereas those receiving non–school-based care may have gone to their clinic appointment instead of school. Although not measured in this study, it is also possible that the SBHC paid greater attention to psychosocial and behavioral factors important to school continuation.\(^\text{40}\) Prior studies with this cohort, as well as others, demonstrated improved access and greater provision of comprehensive psychosocial services for school-based clinic users.\(^\text{22,40}\) Why school-based prenatal care

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>School-Based Prenatal Care (n = 100)</th>
<th>Non–School-Based Prenatal Care (n = 331)</th>
<th>( P ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of days absent, mean (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In pregnancy school year</td>
<td>60 (27)</td>
<td>72 (33)</td>
<td>.001</td>
</tr>
<tr>
<td>In postpregnancy school year</td>
<td>72 (41)</td>
<td>76 (39)</td>
<td>.41</td>
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<td>Dropout rate, %</td>
<td></td>
<td></td>
<td></td>
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<td>In pregnancy school year</td>
<td>6</td>
<td>15</td>
<td>.02</td>
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<tr>
<td>In postpregnancy school year</td>
<td>33</td>
<td>40</td>
<td>.23</td>
</tr>
<tr>
<td>Promotion or graduation rate, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In pregnancy school year</td>
<td>65</td>
<td>62</td>
<td>.56</td>
</tr>
<tr>
<td>In postpregnancy school year</td>
<td>63</td>
<td>52</td>
<td>.09</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Dropout Rate AOR (95% CI)</th>
<th>Promotion or Graduation Rate AOR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older maternal age</td>
<td>1.27 (0.99-1.61)</td>
<td>0.96 (0.01-1.14)</td>
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<tr>
<td>African American</td>
<td>1.44 (0.18-11.59)</td>
<td>1.39 (0.44-4.39)</td>
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<td>Medicaid recipient</td>
<td>1.43 (0.66-3.08)</td>
<td>0.51 (0.29-0.92)</td>
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<td>Age appropriate for grade</td>
<td>0.58 (0.29-1.14)</td>
<td>1.44 (0.83-2.49)</td>
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<tr>
<td>Higher grades</td>
<td>1.00 (0.98-1.03)</td>
<td>1.05 (1.03-1.07)</td>
</tr>
<tr>
<td>Higher absenteeism rate</td>
<td>1.02 (1.01-1.03)</td>
<td>1.00 (0.99-1.00)</td>
</tr>
<tr>
<td>School-based prenatal care during pregnancy year</td>
<td>0.39 (0.15-0.98)†</td>
<td>0.74 (0.42-1.23)</td>
</tr>
</tbody>
</table>

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval.

*Adjusted for age; race; Medicaid status; household income; prepregnancy school year variables–age appropriate for grade, grades, and number of days absent; and number of days attending the alternative school adjusted for total pregnancy year school attendance.

†\( P = .048 \).
was associated with reduced absenteeism and dropout rates, but not increased promotion or graduation rates, is not clear. Possible explanations include Baltimore’s policy at the time of social promotion and a realistic acknowledgment that educational remediation is beyond the scope of what school-based prenatal care alone can provide.

During the study, rates of unexcused absences of more than 20 days for students in grades 9 through 12 were 22% in Baltimore and 8% in Maryland overall. As compared with students in Baltimore and Maryland as a whole, our study’s cohort demonstrated strikingly high rates of school absenteeism. Even after adjustment for excused absences, 80% and 95% of teens were absent more than 20 days in their prepregnancy and pregnancy years, respectively. In contrast, in Manlove’s nationally representative sample, only 20% of teens were absent more than 20 days prior to pregnancy and classified as prior dropouts. Our observed high rate of prepregnancy absenteeism may reflect extreme social and economic disadvantage related to lack of family education and poverty, as well as institutional factors related to Baltimore’s flawed school system, which have been highlighted in the national press. There were significant baseline group differences and, though we controlled for prepregnancy absenteeism, it is possible that residual confounding variables exist with regard to absenteeism and that other unmeasured factors contributed to our findings. Second, teens receiving school-based prenatal care had higher rates of Medicaid coverage than did those in the non–school-based group. This difference was probably attributable to the advocacy of SBHC staff who assisted all eligible clinic users in obtaining Medicaid coverage. Medicaid coverage differences might also contribute to an underestimation of the benefits of SBHCs because receipt of Medicaid has been shown to be associated with higher dropout rates. Third, missing attendance data may have biased our findings, although we tried to address this lack with our imputation strategy.

Dropout rates were relatively lower during the pregnancy school year, but they rebounded in the year after pregnancy. Most (75%) teens who attended the alternative school returned to regular school in their postpregnancy year. Students who returned to the alternative school for their postpregnancy year were selected by school administrators because of their perceived motivation. Students returning to the alternative school were almost twice as likely not to drop out in the postpregnancy year, as compared with teens who returned to regular school. However, whether they received school-based prenatal care was not significantly associated with dropping out in the postpregnancy school year in either of these groups. It is not surprising that effects of school-based prenatal care during 1 year did not continue the next year, particularly if the SBHC was no longer accessible by the student. Whether continued use of the SBHC by students remaining in the alternative school was associated with reduced postpregnancy dropout rates is not known.

A major study limitation is its observational nature, which raises some questions. First, research has consistently shown that absenteeism is associated with dropping out. There were significant baseline group differences and, though we controlled for prepregnancy absenteeism, it is possible that residual confounding variables exist with regard to absenteeism and that other unmeasured factors contributed to our findings. Second, teens receiving school-based prenatal care had higher rates of Medicaid coverage than did those in the non–school-based group. This difference was probably attributable to the advocacy of SBHC staff who assisted all eligible clinic users in obtaining Medicaid coverage. Medicaid coverage differences might also contribute to an underestimation of the benefits of SBHCs because receipt of Medicaid has been shown to be associated with higher dropout rates. Third, missing attendance data may have biased our findings, although we tried to address this lack with our imputation strategy.

Despite these limitations, our findings suggest that high rates of dropping out of school among childbearing adolescents may be ameliorated by interventions such as SBHCs, particularly in the setting of a specialized alternative school. Moreover, because dropout rates appear to increase once these services are withdrawn, adolescent mothers may need these specialized programs to continue after their pregnancy year to successfully complete school. Our findings have policy implications particularly because reducing the number of dropouts has become a national policy concern. Not only are dropouts less likely to find and hold jobs and more likely to remain public assistance recipients, but they are also more likely to have long-term health problems. All of these problems generate large social costs. Investing in comprehensive approaches that include SBHCs may help low-income childbearing adolescents succeed.

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