The Risk of Teen Mothers Having Low Birth Weight Babies: Implications of Recent Medical Research for School Health Personnel

Jeffrey Roth, Jo Hendrickson, Max Schilling, Daniel W. Stowell

ABSTRACT: This article reviews recent medical research on the relationship between young maternal age and the incidence of low birth weight infants. The line of research, "nutrition," emphasizes biological factors in early adolescence such as immaturity of the female reproductive system and inadequate prenatal weight gain. "Nature," another research focus, stresses sociocultural attributes of teen mothers such as poverty and minority status. Young maternal age alone does not explain the higher rates of low birth weight infants born to adolescent females. Both biological and sociocultural factors, plus lifestyle choices made by adolescents, combine to raise or lower the risk of delivering a low birth weight infant. School health personnel need to link their health promotion efforts to those of other community organizations serving adolescents and their families. (J Sch Health, 1998;68(7):271-275)

Medical research investigating the association between young maternal age and the incidence of low birth weight babies has implications for school health personnel. Adolescent females are two times more likely to deliver a low birth weight infant than are adult females, and these infants, weighing less than 2,500 grams or 5.5 pounds at birth, have much higher rates of mortality and morbidity. Low birth weight infants are 40 times more likely to die within the first 28 days than normal birth weight infants. Low birth weight infants also exhibit a much higher incidence of neurological impairment, gross and fine motor dysfunction, and developmental delay.

Other risk factors besides young maternal age affect the likelihood of teen mothers delivering prematurely. Knowledge of these risk factors is important for school health personnel whose daily contact with adolescents gives them a unique opportunity to serve in a premonitory capacity and, in the event of pregnancy, as a source of information for achieving optimal birth outcomes.

A consensus is emerging that any comprehensive model seeking to explain the relationship between low birth weight infants and young maternal age has to include both biological and sociocultural factors. A baby weighing between 2,500 and 3,999 grams is the expected outcome for a pregnant woman with sound physical and mental health. All conditions that compromise an expectant mother's health must be considered when seeking to explain an outcome such as low birth weight. In the United States, teen mothers of color are more likely than other teen-agers to live in low-income households and their care givers are less likely to have a sustained relationship with the health care delivery system.

This article reviews current research on the relationship between low birth weight babies and young maternal age and examines the biological and sociocultural factors that put adolescent females at risk for delivering a low birth weight baby. Recommendations for school health personnel also are presented. A Medline database search of all articles published in English between January 1991 and December 1997 using the key words "adolescence" and "low birth weight" yielded abstracts of 58 articles. Bibliographies of three recently published university press books on teen-age parents also were consulted to secure saturation across references. After eliminating articles that surveyed non-US populations or that did not compare birth outcomes for adolescent and adult subpopulations, 40 articles remained which investigated the incidence of low birth weight among adolescent mothers and/or gave explanations for the young maternal age-low birth weight gradient, that is, the lower the mother's age, the higher the risk of having a low birth weight baby.

INCIDENCE OF LOW BIRTH WEIGHT INFANTS BORN TO ADOLESCENT MOTHERS

The incidence of low birth weight births among adolescent mothers is unquestionably higher among females ages 10-14 than among females ages 15-18. Table 1 is derived from data published by the National Center for Health Statistics in its 1994 Final Natality Statistics Report. Data in Table 1 indicate a U-shaped distribution in the percentage of low birth weight infants across the child-bearing years of women in the United States. Females over age 45 share with females under age 15 a nearly equal risk of having a low birth weight infant.

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EXPLANATIONS FOR THE YOUNG MOTHERNAL AGE-LOW BIRTH WEIGHT GRADIENT

A vigorous debate is underway in the medical and public health communities as researchers seek to understand and to reduce the increased risk that young adolescent mothers face of delivering a low birth weight baby. Some researchers attribute the young maternal age-low birth weight gradient (Table 1) primarily to biological factors directly affecting how the developing female's body responds to the developing fetus. This "nurture" group focuses on three factors: time elapsed between onset of first menstruation (menarche) and conception, amount of gestational weight gain (a surrogate for nutrition during pregnancy), and level of use of legal and illegal substances. Other researchers explore the effects of sociocultural factors such as race, poverty, education level, marital status, and utilization of prenatal care on birth weight. This "nurture" group employs multivariate statistical techniques to control for possible confounding effects of background characteristics on pregnancy outcomes.

Biological Factors

Research focusing on the maturation of the female reproductive system employs the concept of "young gynecologic age" to refer to conception within two years after menarche. The biological perspective suggests that the blood supply to the cervix and uterus does not develop completely, or at the same rate, in all females during pubescence. A restricted blood supply may predispose some young females to infections which in turn may precipitate preterm labor and preterm birth, the proximal cause of low birth weight babies. In addition to an incomplete blood supply, low levels of gonadal hormones - most postmenarchal adolescents need at least three years to establish their adult ovulatory cycle — may compromise secure attachment of the fetus to the uterine wall, causing vaginal bleeding followed by premature contractions. The irregularity of the ovulatory cycle prevents some adolescent girls from realizing they are pregnant until well into the second trimester. Parents of some such teen-agers, unaware their daughters are sexually active, react to the symptoms of morning sickness as if they were caused by influenza. Therefore, the failure of some adolescents to seek early prenatal care originates in a lack of knowledge, not willful avoidance.

A second physiological explanation for young teens having low birth weight babies is competition between fetus and young mother for nutrients. Studies cited by Scholl et al found that 50% of females aged 17 and older continue to grow, exhibiting gains in height and body mass. Young pregnant teens show most of their gestational weight gain during the first half of their pregnancy. Stevens-Simon et al contend that this early weight gain goes primarily into preparing the young woman's body to accommodate the developing fetus whose energy requirements become pronounced during the second half of gestation. Physically immature teen-agers tend to deliver infants with birth weights 150 to 200 grams less than infants born to physically mature teen-agers. Women of all ages who do not gain an optimal amount of weight during pregnancy are much more likely to deliver small-for-gestational-age or low birth weight babies.

Finally, what female adolescents do to and with their bodies is a causative factor in the higher incidence of low birth weight babies. Some pregnant teens resist medical advice about optimal weight gain to minimize their enlarged appearance. This problem may be particularly acute among White adolescent females whose cultural icons convey slimmness as the ideal body type. Since adolescence as a developmental life stage is characterized by experimentation and boundary-testing, teen mothers may have sampled or regularly used psychoactive substances prior to pregnancy. Fearing peer disapproval or ostracism, pregnant teen-agers may continue to consume substances known to have deleterious effects on fetal development.

Sociocultural Factors

Researchers and clinicians, aware of the interaction between biological and environmental variables, are beginning to insist that before drawing conclusions about young adolescent mothers and their babies, it is important to look at confounding factors such as race and poverty. This research suggests further examination of race as an independent predictive factor for low birth weight. Table 2 groups the data on low birth weight babies from Table 1 by age and race of mother. Although data in Table 1 indicated that 7.5% of all women who gave birth in the United States delivered a low birth weight infant in 1994, it obscured the fact that the low birth weight percentage rate for Black women was more than double that for White women. Moreover, the best rate achieved by any Black age group (12.0 for women 20-24) was virtually equal to the worst rate achieved by any White age group (12.1 for women 45-49).

<table>
<thead>
<tr>
<th>Age of Mother</th>
<th>Number of Births &lt;2,500 g</th>
<th>Total Live Births</th>
<th>Percent &lt;2,500 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15</td>
<td>1,766</td>
<td>12,901</td>
<td>13.7</td>
</tr>
<tr>
<td>15</td>
<td>3,527</td>
<td>30,742</td>
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</tr>
<tr>
<td>16</td>
<td>6,502</td>
<td>63,125</td>
<td>10.3</td>
</tr>
<tr>
<td>17</td>
<td>9,685</td>
<td>101,302</td>
<td>9.6</td>
</tr>
<tr>
<td>18</td>
<td>12,526</td>
<td>137,547</td>
<td>9.1</td>
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<tr>
<td>19</td>
<td>14,851</td>
<td>172,772</td>
<td>8.6</td>
</tr>
<tr>
<td>20-24</td>
<td>72,565</td>
<td>1,001,418</td>
<td>7.3</td>
</tr>
<tr>
<td>25-29</td>
<td>69,850</td>
<td>1,088,845</td>
<td>6.4</td>
</tr>
<tr>
<td>30-34</td>
<td>60,645</td>
<td>906,498</td>
<td>6.7</td>
</tr>
<tr>
<td>35-39</td>
<td>29,447</td>
<td>371,608</td>
<td>7.9</td>
</tr>
<tr>
<td>40-44</td>
<td>5,922</td>
<td>63,502</td>
<td>9.3</td>
</tr>
<tr>
<td>45-49</td>
<td>321</td>
<td>2,507</td>
<td>12.8</td>
</tr>
<tr>
<td>All Ages</td>
<td>287,607</td>
<td>3,952,767</td>
<td>7.3</td>
</tr>
</tbody>
</table>

Data from Ventura et al.

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It should be noted, however, that the ratio of low birth weight infants among Blacks to those among Whites is actually lower in the 20-34 years range (ranging from one and a half to nearly two times greater) than in older age groups (ranging from two to nearly three times greater). The increasing incidence of low birth weight babies born to Black women has led public health educator Arnold Gerominus to formulate a "weathering hypothesis." The hypothesis proposes that the health of adult Black women who live in poverty deteriorates dramatically after adolescence. Gerominus contends that poverty has an increasingly deleterious effect on Black women's health status as they age. To support her hypothesis, she investigated the Black/White discrepancy in low birth weight births in one state. Table 3 contains the rate and rate ratios of low birth weight by maternal age in a sample of Black and White singleton first births to Michigan residents aged 15-34 in 1989 (n=54,898 births).

Gerominus's descriptive data indicated the Black/White discrepancy in low birth weight births first seen in adolescence widens with increasing maternal age. She found that a 25-year-old Black woman in Michigan had a 32% greater chance of having a low birth weight baby than did a 15-year-old Black teen-ager. One controversial way of interpreting this phenomenon would be to conclude that early childbearing among Black teenagers is protective. Among White women the situation was reversed: when White teens postponed childbirth from age 15 to age 25, the odds of having a low birth weight baby decreased. These contrasting trends between Black and White teen-agers have been replicated by researchers using vital statistics data from other states.

In addition to race, family income has long been known to have a positive relationship to birth outcomes. Adolescents who become pregnant are poorer than any other age group of childbearing women in the United States. Recent estimates place 40% of US adolescent females near or below poverty income levels, and "this low-income population accounts for six out of seven teen-age births." Most of these mothers are not married and receive little or no financial support from their child's father. They are much more likely to have parents with low educational attainment and to be members of a racial or ethnic minority group.

Most teen pregnancies are unplanned, and evidence exists that pregnancy among the very youngest age group (<15) may be the result of coercion and abuse. Wiermann and associates determined that unwanted pregnancies are frequently accompanied by feelings of shame, fear, and isolation. Consequently, this young constituency who could benefit the most from early obstetrical care may be the group least likely to seek it. That young teen-agers face a number of disincentives that block them from seeking prenatal care and counseling is cited frequently as a major link in the causal chain to low birth weight babies: young gynecologic age → reproductive immaturity → late prenatal care → poor nutrition → inadequate weight gain.

**COMBINING BIOLOGICAL AND SOCIOCULTURAL FACTORS**

Even when researchers construct meticulously designed studies, controversy regarding methodology and conclusions arises. For example, Fraser et al. conducted a study to determine whether younger age confers an increased risk of adverse pregnancy outcomes, independent of sociocultural factors such as adequacy of prenatal care, educational level, and marital status. After statistically adjusting for variations in sociocultural factors, the authors found an increased risk for young teen-age mothers (13-17) to deliver low birth weight infants.

Statistically controlling for sociocultural factors, however, does not eliminate the need to understand the context of the lives of different at-risk populations. Fraser's subjects were primarily White, middle-class women. Thus, Fraser's sample was not representative of the general population and therefore, the results are not generalizable.

<table>
<thead>
<tr>
<th>Age of Mother</th>
<th>Percent &lt;2,500 g White Race</th>
<th>Percent &lt;2,500 g Black Race</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15</td>
<td>11.1</td>
<td>16.3</td>
</tr>
<tr>
<td>15</td>
<td>9.4</td>
<td>14.6</td>
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<tr>
<td>16</td>
<td>8.8</td>
<td>13.3</td>
</tr>
<tr>
<td>17</td>
<td>8.0</td>
<td>13.3</td>
</tr>
<tr>
<td>18</td>
<td>7.7</td>
<td>13.0</td>
</tr>
<tr>
<td>19</td>
<td>7.3</td>
<td>12.5</td>
</tr>
<tr>
<td>20-24</td>
<td>6.0</td>
<td>12.0</td>
</tr>
<tr>
<td>25-29</td>
<td>5.4</td>
<td>12.8</td>
</tr>
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<td>30-34</td>
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<tr>
<td>35-39</td>
<td>6.6</td>
<td>16.4</td>
</tr>
<tr>
<td>40-44</td>
<td>8.1</td>
<td>18.1</td>
</tr>
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<td>45-49</td>
<td>12.1</td>
<td>18.9</td>
</tr>
<tr>
<td>All Ages</td>
<td>6.1</td>
<td>13.2</td>
</tr>
</tbody>
</table>

Data from Ventura et al.

<table>
<thead>
<tr>
<th>Maternal Age</th>
<th>Black</th>
<th>White</th>
<th>Black/White Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>11.6</td>
<td>6.3</td>
<td>1.8:1</td>
</tr>
<tr>
<td>20-24</td>
<td>12.4</td>
<td>5.0</td>
<td>2.5:1</td>
</tr>
<tr>
<td>25-29</td>
<td>14.0</td>
<td>4.9</td>
<td>2.9:1</td>
</tr>
<tr>
<td>30-34</td>
<td>17.8</td>
<td>6.2</td>
<td>2.9:1</td>
</tr>
<tr>
<td>Total</td>
<td>12.5</td>
<td>5.4</td>
<td>2.3:1</td>
</tr>
</tbody>
</table>

Data from Gerominus.
urban centers with high percentages of minority teen mothers, researchers have found that inner city pregnant teens smoke, drink, and use drugs less than their White suburban and rural counterparts.\(^\text{32}\) Lubarsky et al examined a different adverse outcome — preterm birth (delivery before 37 weeks) — in a group of adolescent women under 15 years old and concluded: “Pregnancy at the lower limit of reproductive age in an urban American population is not associated with an abnormal labor course, as is commonly believed.”\(^\text{33}\)

Cooper et al\(^\text{34}\) found that very young adolescents (ages 10-12) have an elevated risk of having a low birth weight infant, compared to 15-year-olds. The authors contend, however, that:

*It is . . . difficult to determine whether poor birth outcomes among adolescent mothers are a direct result of young maternal age, biological immaturity, or rather a function of secondary maternal risk factors including sociodemographic and health characteristics.*\(^\text{35}\)

Geronimus\(^\text{32}\) studied how the relationship between maternal age and low birth weight was affected by socioeconomic status (SES). She found that in the low SES category the chance of 20-year-old Black mothers having a low birth weight baby was one-third greater than that of 15-year-old Black mothers. At 30 years of age, the odds were nearly two and half times greater than at age 15. At age 34, the odds were nearly three times the odds at age 15. In contrast, Black mothers in the high SES category experienced no increased risk of delivering a low birth weight baby as they aged. Geronimus’s explanation for this “weathering” (deteriorating health status) among poor Black mothers combines biological and sociocultural variables. She surmised that as a result of “prolonged active coping with stressful circumstances,” poor Black women develop hypertension, a precipitating factor in preterm labor and delivery. She added that the women living in low SES neighborhoods are exposed to higher levels of environmental contaminants which degrade their health status.

**PRINCIPAL CONCLUSIONS**

Review of recent medical literature indicates that all young female adolescents are not uniformly at risk for delivering low birth weight infants. The occurrence of low birth weight in younger (10-14) adolescent females can be explained in part biologically by the presence of an immature female reproductive system. Younger pregnant adolescents are more likely to compete with their fetuses for nutrients because they are still growing themselves. Concerned with their body image and testing social boundaries, some teens fail to eat properly, and some consume harmful substances that contribute to the delivery of low birth weight babies. Yet, sociocultural factors such as race and poverty strongly affect the incidence of low birth weight babies in young adolescents, with poor, minority adolescents being at greatest risk.\(^\text{36}\;\text{37}\)

When pregnancies occur in the younger adolescent group, a much greater likelihood exists that they were unplanned and perhaps coerced.\(^\text{36}\;\text{37}\) Sexual abuse often results in adolescents feeling shame, fear, and a sense of isolation, which inhibits their seeking early prenatal care. Furthermore, most young pregnant teenagers are from low-income families and rarely have easy access to adequate prenatal health care. Finally, late utilization or complete foregoing of prenatal care, brought on by a need for secrecy or denial, plus inadequate weight gain and poor nutrition most likely combine with young gynecological age to produce the higher incidence of low birth weight infants born to teenagers 10-14 years old.

**IMPLICATIONS FOR SCHOOL HEALTH PERSONNEL**

Medical researchers regularly have alerted educators to be sensitive to the biological and sociocultural factors that place students at risk for becoming pregnant or for having complications during pregnancies.\(^\text{38}\;\text{39}\) School health personnel can help reduce the risk of teen mothers having low birth weight babies by joining teachers, students, parents, and community agencies in forming a strategic plan to accomplish three interrelated goals: 1) implementing schoolwide environments that promote healthy lifestyle choices; 2) postponing first pregnancies; and 3) reducing unwanted pregnancies. Achieving any or all three goals would contribute substantially to lowering the incidence of low birth weight births among adolescents.

**Promoting Healthy Lifestyle Choices**

School health professionals can collaborate with classroom teachers in designing curricula that stress the harmful effects of alcohol, tobacco, and drug use on fetal growth and development. They should support community efforts to restrict minors’ access to these substances. In addition to championing the protective effects of physical fitness in health education classes, school health professionals also can discuss the research on the immature female reproductive system and the danger it poses for infants of young teen-age mothers. They also can cooperate with community maternal child health programs such as Healthy Start and WIC which emphasize the beneficial effects of early prenatal care, especially prepartum nutrition and weight gain.

**Postponing First Pregnancies**

School health personnel can help design curricula for and serve as guest speakers in life management skills and human sexuality education classes where they can review arguments in favor of abstinence and family planning. Talking to students about fetal growth and development and its effect on pregnant women also offers an occasion to contextualize early childbearing in light of the long-term emotional and financial consequences.

**Reducing the Number of Unwanted Pregnancies**

School personnel need to remain vigilant in noting any changes in students’ appearance or deportment that might indicate a pregnancy. They also enjoy a position of familiarity and trust with many students that may allow them to detect evidence of sexual abuse. Once a student acknowledges she is pregnant, appropriate physical and mental health promotion activities should begin. Mental health counseling and parenting classes decrease the likelihood that pregnant teens will drop out of school.

Teen mothers who underwent an unwanted pregnancy and who struggled through complications of labor and
delivery that may have ensued as a result of their young age may be invited back to the school they once attended to speak about their experiences. Their testimony could be influential in promoting abstinence or contraceptive use in their student audience. Discussing family planning options in health education classes may help reduce the likelihood of repeat pregnancies.

Finally, school health personnel must continue to link students to community social, economic, and religious agencies that provide assistance. By serving as a liaison to a spectrum of community health promotion services, school health personnel can make a significant contribution to diminishing the incidence of low birth weight births among young adolescents.

References