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## Association of Early Childbearing and Low Cognitive Ability

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**CONTEXT:** Teenage pregnancy remains a pressing social issue and public health problem in the United States. Low cognitive ability is seldom studied as a risk factor for adolescent childbearing.

**METHODS:** Data from the National Longitudinal Survey of Youth were used in a matched-pairs nested case-control study comparing women who had a first birth before age 18 with those who did not. Significant differences in Armed Forces Qualifications Test scores and in reproductive and social intervening variables were determined using chi-square analyses and t-tests. Multiple logistic regression models determined the independent effects of specific factors on early childbearing.

**RESULTS:** Women who had their first birth before age 18 had significantly lower cognitive scores than others; women with a second birth before age 20 had significantly lower scores than those with one teenage birth. On average, women with the lowest cognitive scores initiated sexual activity 1.4 years earlier than those with the highest cognitive scores. Among those who had had a sexuality education course, a smaller proportion of women had scores in the first quartile for the overall sample than in the fourth quartile (20% vs. 28%); an even greater difference was seen among women who correctly answered a question about pregnancy risk (14% vs. 43%). Both poverty and low cognitive ability increased the odds of early childbearing.

**CONCLUSIONS:** Young women with low cognitive ability are at increased risk for early initiation of sexual activity and early pregnancy. Further research is needed to design interventions that consider this population's specific information and support needs.

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- » [article in pdf](#)
- » [table of contents](#)
- » [search the PSRH archive](#)
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During 1998, U.S. women aged 15-19 had an estimated one million pregnancies and nearly a half million live births.<sup>1</sup> Despite some success in reducing the incidence of adolescent pregnancy and childbearing in the United States, early childbearing remains a pressing social concern and public health problem. Teenage mothers are more likely than older mothers to experience low educational and occupational achievement;<sup>2</sup> to live in poverty;<sup>3</sup> and to have children with behavioral problems, academic difficulties and developmental delays, including mild mental retardation.<sup>4</sup> In addition, many young Americans have a second pregnancy while still in their teens,

exacerbating the problems associated with early childbearing.<sup>5</sup>

A substantial body of research describes the individual, familial and social factors associated with early childbearing. In particular, poverty, living in a single-parent household, having sexually active peers and being a member of certain racial or ethnic groups predispose adolescents to having at least one child before their 18th birthday.<sup>6</sup> These factors are also associated with the timing and pattern of adolescent sexual behavior, particularly initiation of sexual intercourse.<sup>7</sup> However, the potential influence of cognitive ability on early sexual activity and births has been studied less often. Studies of programs for pregnant teenagers have found that participants were overrepresented in special education classes and had high rates of mild mental retardation. This suggests that adolescents with cognitive deficiencies are more likely to experience pregnancy than are their peers with higher ability.<sup>8</sup>

Having a higher cognitive ability is associated with delayed initiation of sexual activity.<sup>9</sup> On the other hand, adolescents with borderline mental retardation\* have the highest probability of having sex, according to findings from the National Longitudinal Study of Adolescent Health.<sup>10</sup> Although low academic performance is associated with early sexual initiation and pregnancy, it may be the result primarily of poor-quality schooling or low motivation, rather than of low cognitive ability.<sup>11</sup>

The exclusion of cognitive ability in studies of antecedents of teenage childbearing and sexual risk-taking stands in sharp contrast to its common inclusion in investigations of other adolescent problem behaviors, such as truancy and delinquency. One study showed that the peak crime rate occurred among individuals with borderline mental retardation.<sup>12</sup> In other studies, mildly retarded adolescent men were more likely than others to binge-drink, carry a weapon, initiate sexual activity early and be involved in a pregnancy.<sup>13</sup>

To our knowledge, no population-based study has directly examined the effect of cognitive functioning on sexual activity and early childbearing. The purpose of the study presented in this article is to examine relationships between cognitive ability, early childbearing and other factors known to be associated with teenage pregnancy in a population-based sample of young women. The primary questions are whether teenage women with below-average cognitive functioning have an elevated risk of bearing a child before the age of 18 and having a second birth before the age of 20. We also assess the potential influence of cognitive ability on selected reproductive and social factors.

## BACKGROUND

Given the relationship between cognitive ability and adolescent risk behaviors, it would not be surprising to discover that early sexual activity is associated with below-average cognitive ability. Low intelligence might lead to a limited ability to understand the relationship between sexual activity and pregnancy and childbirth, or the function and proper use of contraceptive methods. Having low cognitive ability would make it difficult to link one's current actions (e.g., sexual activity) to future results (e.g., pregnancy and childbirth). This is a cognitive process that requires being able to think abstractly, an ability that normally develops during midadolescence. Teenagers with cognitive limitation may experience significant delays in developing this ability, or

they may never develop it.

Low cognitive ability might also increase a young woman's need for peer acceptance and, therefore, make it difficult for her to resist male pressure for sex. Resisting sex would be especially difficult when age differences between partners compound developmental differences. For example, teenagers with borderline mental retardation experience a developmental delay of 2-4 years, and mildly retarded teenagers have a mental age that is roughly 5-8 years younger than their chronological age.

Furthermore, it is not unusual for teenage females to have male sexual partners who are two or more years older than themselves.<sup>14</sup> Therefore, a cognitively impaired teenage female could be sexually involved with someone with a mental maturity four or more years her senior. This would make saying no or even resisting coercive sex very difficult.

In addition, low cognitive ability influences school success. Limited academic success reduces motivation to complete high school and further limits educational aspirations. Mildly retarded adolescents face significant barriers to meeting the requirements for graduation from high school with a standard diploma. Faced with such obstacles, and knowing that employment opportunities are limited, an adolescent female may see little, if any, advantage to remaining in school or postponing a pregnancy.

For these reasons, adolescent females with limited cognitive ability may willingly, or as a result of coercion, initiate sexual activity early, and they may not use contraceptives effectively or at all. Among women who do not have fertility problems, the result could be pregnancy and, in the absence of miscarriage or abortion, childbearing.

Directly testing this theoretical framework would require a study that included an assessment not only of cognitive ability, but also of the variables described above, such as understanding of the relationship between sexual activity and pregnancy or ability to resist male pressure. Such a study has not been conducted, but the National Longitudinal Survey of Youth (NLSY) provides a unique and valuable opportunity to examine these issues. It is one of the few youth-based data sets that includes a measure of cognition, and it contains information on initiation of sexual activity and childbearing, as well as on relevant social and economic factors. While the NLSY data cannot address all the mechanisms by which low cognitive ability may influence early childbearing, they can be used to establish the existence of a relationship between cognitive ability and early childbearing.

## **DATA AND METHODS**

### **The Sample**

The NLSY sample is a nationally representative cohort of 12,686 men and women who were aged 14-22 in 1979; participants were followed annually for 16 years. Our analyses are based on two NLSY components: a cross-sectional sample of more than 6,100 youth designed to represent the noninstitutionalized civilian segment of young people and a supplemental oversample of almost 5,300 civilian Hispanic, black and economically disadvantaged white youth.

We focused on data collected between 1979 and 1990 from the entire female sample of the NLSY cohort (N=6,283), and used a case-control design to study the 706 women

who reported bearing a first child before their 18th birthday. We matched each of these women according to age, race and ethnicity, geographic region and urban-rural status to two women who did not have a child before age 18 (controls);<sup>‡</sup> the resulting sample included 2,094 women aged 14-22 in 1979. A second, nested case-control study design compared 333 early childbearers from the first study who had a second birth before their 20th birthday with 373 women who had only one birth during their teens.

Forty-three percent of women in the sample were black, 41% were white and 16% were Hispanic. Fourteen-year-olds and 22-year-olds each made up 5% of the sample; the remainder were evenly divided between ages 15-21. Nearly half (46%) of the women lived in the southern United States, one-quarter lived in the North Central states and the rest were evenly divided between the West and the Northeast. The great majority (80%) lived in urban areas. Early childbearers and repeat early childbearers were similar with regard to age, race and ethnicity, and geographic location.

## Variables

- **Early childbearing.** We considered women who had their first live birth before age 18 to have engaged in early childbearing. The rate of early childbearing was determined by dividing the sample by age at first birth: either before age 18 or afterward. We extracted the data related to this question from the NLSY data set for 1982-1990. Women who had their second birth before age 20 were considered to have engaged in repeat early childbearing.

- **Cognitive ability.** Between June and October of 1980, when the respondents were aged 15-23, more than 94% of the NLSY cohort completed the Armed Services Vocational Aptitude Battery, a test designed by the U.S. military to measure 10 areas of knowledge and skill. As in previous studies using the NLSY data,<sup>15</sup> we based cognitive ability on a composite score derived from the sum of four of the 10 subtests: arithmetic reasoning, math knowledge, word knowledge and paragraph comprehension. Norms for the composite measure—the Armed Forces Qualifications Test (AFQT) score—are based on persons who are at least 17 years old; scores for younger respondents may not be psychometrically correct. However, a ranking of cognitive ability will be correct among respondents with the same birth year, even if they are younger than 17. To assure comparability of AFQT scores, the study design included matching respondents by age.<sup>‡</sup>

We followed procedures developed by the Department of Defense to compute the composite AFQT standard scores and the resulting percentile rankings in the NLSY data. Exploratory analysis of the cognitive ability percentile rankings revealed a large right-skewed distribution associated with oversampling techniques in the NLSY study design. Hence, we used the percentile rankings only for descriptive analysis. For inferential analysis, we divided our study sample into quartiles that reflected the range of cognitive scores: The first quartile includes the one-fourth of respondents corresponding to the first to 10th percentiles of cognitive scores for the NLSY sample (lowest cognitive ability); the second and third quartiles include the one-fourth corresponding to percentiles 11-24 and 25-48 for the overall sample, respectively; and the fourth quartile includes the one-fourth corresponding to percentiles 50-99 (highest cognitive ability).

- Reproductive and social variables. We examined the following reproductive and social variables associated with early childbearing: age at first sexual intercourse, participation in a sexuality education course, ability to correctly identify when pregnancy is most likely during the menstrual cycle, educational expectations (as measured by the number of years of school respondents expected to attend),<sup>15</sup> poverty status and self-esteem. Poverty status was a dichotomous measure based on a single item—family poverty status in 1978, when most respondents still resided in the parental home. Self-esteem was based on scores from the 10-item Rosenberg Self-Esteem Scale, administered to respondents in 1979.<sup>16</sup>

## Analytic Approach

We examined the relationship between each explanatory variable and the two outcome variables to determine the strength of each and to identify variables to include in the multivariate analysis. To examine the distributions of risk factors among women with and without teenage births, we used chi-square analysis for nominal and categorical variables; continuous and ordinal measures were examined with two sample t-tests. We conducted bivariate analyses using simple logistic models for identified risk factors for early childbearing and for second birth before the age of 20; variables that were significant at  $p < .10$  were included in the multivariate analyses.<sup>17</sup>

To examine the risk of early childbearing and to determine which factors, in the presence of the others, place a woman at highest risk for having a birth before age 18, we created multiple logistic regression models using a backward elimination process; the final model included only variables that were significant at  $p < .10$ . Results are expressed as odds ratios and 95% confidence intervals.<sup>18</sup> We used the same procedures to examine the risk of having a second birth before the age of 20. After accounting for the main effects, we examined interactions between cognitive ability and each of the remaining explanatory variables. The statistical software package used for these analyses was SAS System for Windows, version 6.11.<sup>19</sup>

## RESULTS

### Bivariate Relationships

Early childbearers had significantly lower cognitive scores than controls: They ranked in the 22nd percentile for the NLSY sample overall, whereas controls ranked in the 37th percentile ([Table 1](#)). Two-thirds of early childbearers were in the two lowest quartiles of cognitive ability, but only 11% were in the highest quartile. The distribution of scores is even more disproportionate for repeat early childbearers: More than 70% of these women were in the two lowest quartiles, while only 7% of mothers with second early births were in the highest quartile.

Women who bore children early had consistently lower cognitive scores than women who delayed first birth, regardless of their age, race and ethnicity, and geographic location (not shown). Differences in percentile rankings ranged from about 10 to 20 points.

Early childbearers differed from controls on all reproductive factors ([Table 1](#)). Compared with women who did not have a birth before age 18, those with an early birth initiated sex at a younger age (15.2 vs. 17.5 years, on average), were less likely to

report having had a sexuality education course (47% vs. 65%) and were less likely to correctly identify when during the menstrual cycle women are most fertile (25% vs. 36%).

The two groups of women also differed with respect to social factors. On average, women with early births expected to attend about two fewer years of school than their late-childbearing counterparts. Furthermore, a greater proportion of women with teenage births than of controls grew up in homes below the federal poverty level. Significant differences in age at first sex and educational expectations persisted when repeat early childbearers were compared with early childbearers who did not have a second birth during adolescence ([Table 1](#)).

Cognitive ability was significantly associated with all of the reproductive variables studied ([Table 2](#)). On average, women in the lowest quartile of cognitive ability initiated sex 1.4 years earlier than those in the highest quartile. Among those who had had a sexuality education course, a smaller proportion of women were in the first quartile than in the fourth quartile (20% vs. 28%); among women who correctly answered a question about pregnancy risk, the gap was even larger (14% vs. 43%).

Cognitive ability was also significantly associated with all of the social variables studied. More than two-thirds (68%) of the women living in poverty had cognitive scores in the first and second quartiles. On average, women in the highest quartile expected to have nearly three more years of schooling than those in the lowest quartile. Women in the highest quartile of cognitive ability also had slightly, but significantly, greater self-esteem scores than those in the lowest quartile (24.0 vs. 23.4).

## Multivariate Relationships

The multivariate logistic regression model for predicting childbearing before age 18 included first, second and third quartile of cognitive ability; age at sexual initiation; having had a sexuality education course; being able to correctly answer a question about pregnancy risk; educational expectation; self-esteem score; and poverty status. Second and third quartiles of cognitive ability were included in the model as dummy variables to restrict the comparison to the reference group (fourth quartile) and the first quartile. [Table 3](#) shows significant results of these analyses.

Women with low cognitive ability (as represented by the lowest quartile) and those living in poverty had increased odds of giving birth before age 18 (odds ratios, 2.0 and 1.8, respectively). Delaying initiation of sex, having had a sexuality education course and having relatively high educational expectations reduced the odds of early childbearing (0.4-0.8). Women with low cognitive ability had nearly three times the odds of those with high cognitive ability of having two births before age 20; postponement of sex and having higher educational expectations both reduced a woman's odds of having a second teenage pregnancy (0.7-0.9).

None of the possible interactions of the significant variables from the final logistic regression models were statistically significant. Poverty was the variable that most closely approached significance ( $p=.16$ ) and was considered a possible effect modifier. To examine this possibility, we stratified the sample by poverty status. Being in the



lowest quartile of cognitive ability remained a strong predictor of early childbearing among nonpoor women (odds ratio, 3.0), but not for women in poverty ([Table 4](#)).

## DISCUSSION

Our results convincingly show that low cognitive ability increases an adolescent's odds of having an early birth. Two-thirds of women who had their first birth before age 18 had cognitive scores below the median of the entire NLSY sample. After we controlled for age, race and ethnicity, and geography, the percentile ranking of cognitive scores of adolescent women with and without early births still differed by 10-20 points; these data support the findings of other studies.<sup>20</sup> Although these results suggest a relationship between low cognitive ability and early childbearing, clearly, further research is needed to determine who is at greatest risk: women with mild, moderate or severe cognitive deficits.

We also found that women with low cognitive ability who have a first birth before age 18 have an increased risk of having a second before the age of 20. Nearly half of women with two teenage births had cognitive scores in the lowest quartile, suggesting that low cognition is an even greater risk factor for second early births than for first births. The reason for the increased risk is not clear.

Most second teenage pregnancies occur among sexually active young women who do not use contraceptives even though they do not want to become pregnant.<sup>21</sup> Experiencing an unplanned pregnancy does not improve subsequent contraceptive behavior.<sup>22</sup> Cognitive ability may influence many critical aspects of decision-making that influence young women's sexual activity and contraceptive use. What many experts view as an unplanned action or consequence may, in fact, be caused by a young woman's inability to make an informed, reasoned decision after weighing personal risk. Further research is necessary to illuminate this potential pathway to second pregnancies among teenagers.

In addition to examining the effects of low cognitive ability on first and second teenage births, we looked at the relationship between cognitive ability and other, well-documented antecedents of early childbearing. Low cognitive ability was associated with several reproductive risk factors (early age at sexual initiation, lack of sexuality education and lack of knowledge about when during the menstrual cycle a woman is most fertile) and social factors (educational aspiration, poverty and low self-esteem). These findings suggest that women with lower intellect are at increased risk of negative sexual outcomes. Consistent with these results, one study has indicated that as many as 68% of women with cognitive limitations will be sexually abused before the age of 18.<sup>23</sup> Other experts suggest that such women are more vulnerable to sexual exploitation because of their need for attention and acceptance.<sup>24</sup>

It is not clear from the data whether women with low cognition actually had less exposure to sexuality education or they were less likely to remember or effectively use the information they received. However, other research supports an association between low cognition and lack of sexuality education. Findings from a study of the information needs of people with cognitive limitations found that more than half wanted more information about contraception, dating and intimacy; one-third expressed a desire to know more about AIDS and pregnancy.<sup>25</sup> Although health

education programs are rarely designed to take into account adolescents with cognitive limitations,<sup>26</sup> ensuring comprehensive sexuality education for such teenagers could help decrease sexual abuse among this population.<sup>27</sup>

Furthermore, our data show that as cognitive ability increased, so did young women's aspirations. Previous studies have shown a relationship between school experiences and adolescent pregnancy.<sup>28</sup> Having low educational aspirations and experiencing a pregnancy as an adolescent are among the most commonly observed markers of deviant behavior associated with low intelligence and disadvantaged social status.<sup>29</sup> Clearly, cognitive ability influences school success, and success in school raises educational aspirations. If young women with low cognitive ability have minimal success in school, they may feel bad about themselves and about their futures. In this light, early childbearing may appear to them to be an appropriate and positive life choice.

## Study Limitations

This investigation had several limitations that warrant mention. Longitudinal data sets such as the NLSY have numerous inherent problems: For instance, a large amount of data is missing for some variables; our study excluded any variables that missed data for more than 10% of respondents. In addition, the respondents were adolescents in the late 1970s and early 1980s; different findings might be observed in a sample of today's adolescents. Another limitation is the difficulty of measuring cognitive ability and of interpreting or classifying an individual's level of cognition. It is not possible with any single measure to determine if an individual has a diagnosed cognitive limitation, such as mental retardation. Such determinations require assessment by a qualified professional and the use of adaptive behavior measures. Sample size limitations did not allow for analysis of race-specific or age-specific populations, further limiting the generalizability of the findings.

Interpretation of the effect of cognitive ability on poverty in the study population was problematic because of the degree of correlation between the two. It was not our intent to tease out the underlying causal relationship between low cognition and poverty; however, these characteristics were significantly associated with one another, as well as with early childbearing. More than two-thirds of women in the NLSY sample who lived in impoverished environments were also in the two lowest quartiles of cognitive ability. This finding supports studies showing that environments lacking in resources are positively associated with mild cognitive limitations and mental retardation.<sup>30</sup>

When the analysis was restricted to women not in poverty, the effect of low cognitive function increased. It is difficult to interpret the nonsignificance of the association between cognitive ability and teenage childbearing among poor women. One possible explanation is the degree of collinearity between age at sexual initiation and other variables. Another possibility is that other adverse factors that exist in low-income populations may overwhelm the influence of cognitive ability.

Among women living above the poverty line, there may have been some residual confounding as a result of income differences that could not be determined with the dichotomous measure of poverty used in this study. This was an unfortunate limitation of the data, which reduced our ability to measure variation in poverty status. In future



studies, poverty might need to be measured differently, to address the natural variations that occur in this population. Nonetheless, the tripling of the risk between the first and fourth quartiles of cognitive ability hint at a dose-response relationship, and suggest again that unknown factors within impoverished environments may mask the effects of low cognitive ability. This ambiguity may partially explain why the contribution of cognitive ability has been widely ignored in studies of adolescent pregnancy.

Yet another explanation may be that society has higher expectations of nonpoor women than of their poor counterparts. When these women cannot meet such expectations because of low cognitive function, they react negatively and, perhaps, seek recognition for something they can do (e.g., have a child at a young age). In any case, cognition and poverty are undoubtedly interrelated. State-level studies reveal that 30-54% of adult recipients of Temporary Assistance for Needy Families, including some with documented IQs in the slow learner and mild mental retardation range, have special learning needs.<sup>31</sup>

### **Significance of Findings for Practitioners**

Our results have implications for practitioners who work with vulnerable adolescent populations. Individuals with mild cognitive limitations are expected to manage typical social roles with few or no specialized supports, and for the most part they succeed. However, if their learning needs go unrecognized, these individuals are at risk for outcomes that directly and negatively affect them and their children. Without appropriate support, they are unlikely to function appropriately in complex situations, such as when planning for and making major decisions, providing consent, accepting responsibility for their actions, protecting themselves from harm and finding themselves in roles that require complex learning skills and judgment. Adolescents with intellectual limitations have the same right as others to make choices about sexual activity, but they may not have the same capacity to comprehend the implications of sexual behavior or the skills to fend off unwanted or coercive sex.

Teenage pregnancy prevention and educational programs are often based on social learning theories, which postulate that behavior is based on the merging of internal perceptions with actual external events. Such programs are effective in helping adolescents to avoid problems and to promote their health.<sup>32</sup> Generally, teenagers respond best to instructional approaches that present peers as positive role models, or that use familiar vehicles such as rap songs or dance clubs to introduce information.<sup>33</sup> One study suggests, however, that this is not true for adolescents with mild cognitive limitations enrolled in special education classes: When peers were the instructors, these adolescents did not show gains in their posttest scores, and in some instances, the posttest scores were lower than the pretest scores.<sup>34</sup> Specialized, individualized and concrete instruction is extremely important for students with cognitive limitations. These teenagers often exhibit problems with attention, perception, memory, problem-solving and logical thinking. They also are slower to learn than other youngsters and experience difficulty in applying previously learned information to new situations and problems.<sup>35</sup>

Many researchers have concluded that younger teenagers are at a disadvantage in assessing their personal risk of pregnancy because of their cognitive immaturity and

limited ability to think abstractly.<sup>36</sup> Low cognitive ability may produce a similar, but more lasting disadvantage. Difficulties in seeing or recognizing consequences may result in the acquisition of a sexually transmitted disease, including HIV, or in unplanned pregnancy. In addition, teenagers with low cognitive ability may engage in high-risk behaviors out of a desire to be like everyone else.<sup>37</sup>

The findings of this study are in accord with expert assertions that decreased developmental maturity in adolescence influences the amount of forethought teenagers give to contraceptive use and educational accomplishments.<sup>38</sup> Low cognitive ability influences many of the critical aspects of decision-making and risk calculation that ultimately affect the choices that young women make about sex and contraception. Additional research is needed to examine the role of cognitive ability in adolescents' decision-making process regarding initiation of sexual activity and contraceptive use.

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\*Teenagers with IQs of 70-85 are considered borderline mentally retarded, and those with IQs of 50-70 are defined as being mildly retarded.

†Poverty was not used as a case-control match variable, because it was an important predictor of both the independent and the dependent variables.

‡The psychometric properties of both the complete test and the AFQT are well documented, and the research suggests that differences in these scores predict performance in military and in civilian life (source: Bock RD and Mislavy RJ, *Data Quality Analysis of the Armed Services Vocational Aptitude Battery*, Chicago: National Opinion Research Center, 1981; and Bock RD and Moore EGJ, *Advantage and Disadvantage: A Profile of American Youth*, Hillsdale, NJ: Lawrence Erlbaum Associates, 1986). The AFQT is highly correlated with a range of other cognitive tests, including the Wechsler, revised Wechsler and Stanford Binet. The magnitude of correlation between the AFQT and classic IQ tests is as high as or higher than the observed correlation of these traditional IQ tests with each other (source: Herrnstein RJ and Murray C, 1994, reference 15).

§The NLSY collected little information on respondents' perceptions of and expectations for the future. The questions related to respondents' expectations for their educational future were asked in 1979. Given that educational expectations were measured at a different time than when birth of a first child was reported, we assume that this variable was differentially distributed in the sample. Independent of cognitive or childbearing status, responses may have differed, but not in a significant way.