Analyzing the Importance of Parent-daughter Relationship Quality: The Case of Teenage Sexual and Reproductive Behavior

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Introduction: Although birthrates among the American teenagers have been declining since they peaked in the late 1950s (Nathanson, 1991), teenage pregnancy continues to be an important part of American adolescents' lives. In the United States, nearly half a million children are born to teenagers every year (Curtin and Martin, 1999). This high birth rate is a concern because a considerable amount of research on the social, economic and medical consequences of adolescent pregnancy and childbearing indicates that teenage mothers are worse off in many ways and experience more hardship than women who delay childbearing (Hoffman, 1998). Not only teenage pregnancy, but also early sexual onset, which is increasing over time, is a concern. This is because the consequence of high-risk sexual behavior can be negative and lifelong, as it is associated with the rising incidence of sexually transmitted diseases (STDs) and unwanted pregnancy. Thus, sexual behavior and teen pregnancy continues to be an important topic in sociological, demographical, and public health research. Most sociological research on teen pregnancy emphasize the influence of teenagers' family structure, their parents' parenting style, parental monitoring, and communication between parents and their adolescent offspring. But the effect of the overall quality of relationship between teens and their parents for explaining adolescents' transition into sexual activity has been understudied. This paper takes a modest step in contributing to the literature by exploring the effect of parent-daughter relationship quality on teenage daughters' sexual and reproductive behavior.

Theory and Previous Studies

Most research regarding teenage pregnancy emphasizes the link between family structure and sexual behavior. This is because a wide range of sociological and demographic research suggests that a teenager who grows up in non-intact family is significantly more likely to bear a child out of wedlock (Kirby 2001; Cooksey 1988; Garfinkel and McLanahan 1986). There are mainly three mainstream theories regarding family situation and risky sexual behavior, each of which stresses different elements of family situation during the teenage years (Martinson and Wu, 1993).

The theory of *socialization during early childhood* is rooted in the literature on childhood development. This theoretical argument states that parent-child interactions during early

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childhood have long-term consequences for behaviors in later life. Some authors argue that gender identity, gender roles, and social norms about acceptable behavior take shape during early childhood. As a result, single motherhood may be seen as acceptable or even desirable to adolescents who spend childhood in a single female-headed household (Thornton and Camburn 1987; McLanahan 1988).

Unlike socialization theory, the s*ocial control of adolescence theory* places more emphasis on adolescents' current situation rather than past experience. Researchers who study adolescent deviance have argued that since adolescence is an unstable period of life when major physical and emotional changes take place, adolescents are likely to want to be engaged in inappropriate, risky behaviors in the absence of parental supervision and control. Thus, following this line of argument, adolescents in two parent families are better off compared to adolescents in single-parent families, as two parent families exert more control over adolescents' behavior and provide more supervision to prevent unconventional and inappropriate outcomes like premarital pregnancy (Thompson, McLanahan, and Curtin 1992; McLanahan and Bumpass 1988; Hogan and Kitagawa 1985).

The third hypothesis—*family instability—* argues that an unstable environment may create stress in children's and adolescents' lives. Stress can undermine adolescents' emotional security and confidence in such a way that they are more likely to engage in deviant and rebellious behavior as a response to the uncertainty about whether they can rely on their parents for support. Such deviant responses include early onset of sexual intercourse, premarital pregnancy, drug or alcohol use and the like. McLanahan (1988) suggests that frequent changes in family situation increase the likelihood of premarital motherhood, especially when female adolescents prematurely assume adult roles. Others have argued that instability and disruption of family situations may reduce adolescents' level of attachment with their parental household, which in turn may lead to risk-taking behaviors (Wallestein and Blakeslee 1989; Hetherington 1987), or may push them into non-family living arrangements (McLanahan1988; White and Booth 1985). The effect of disruption can be either short-term or long-term, and the magnitude of the effect increases

with the frequency of disruptions. Children who suffer from chronic stress as a result of frequent events of family instability are more likely to act out sexually than those who experience a single disruptive event (Rutter 1983).

Influence of Parent-adolescent Relation Quality: The three theories mentioned above relate premarital teenage pregnancy and other risky behaviors with different aspects of family situation, but fail to address the quality of parent-child relationship. Like family situation, the quality of the relationship between an adolescent girl and her family (especially with parents), is also very important. Research on parent-adolescent relationship suggests that quality relationships are linked to a wide range of outcomes, including emotional well-being, social competence, low levels of psychological distress, and a smooth transition to adulthood by reducing problem behaviors of sexual activity and substance use (Borkowsky, Ramey, and Bristol-Power, 2002; Mahony and Stattin 2002; Hair, Jager and Garrett, 2001; Amato and Booth, 1997; Resnick, Bearman, Blum, Bauman, Harris and Jones, 1997).

Teens' academic outcomes are highly influenced by parent-adolescent relationships. Teenagers with high quality parent-child relationships are at lower risk of dropping out of high school (Garnier and Stein, 1998), and are more likely to achieve higher grades and have higher academic expectations (Herman, Dornbusch, Herron, Herting 1997). Research also found that a poor relationship with parents is associated with the development of anti-social tendencies (Barber and Erickson, 2001) and emotional distress (Blum and Rinehart 1997), increased alcohol use (Jessor and Jessor, 1975), and increased drug use (Coombs et al. 1991).

In this study, I assess the impact of the quality of the parent-daughter relationship in different family settings on teenagers' sexual and reproductive behavior. Given the importance of parent-daughter relation quality, this paper tries to answer the following question:

Does the quality of the parent-daughter relationship in early adolescence influence teenagers' sexual and reproductive behavior? Of the range of sexual and reproductive behaviors, this analysis only explores the following: the risk of becoming sexually active, risk of having unprotected sex when the teenager initiates it, and finally, the hazard of conception. Further, I investigate the effect of early socialization, parental control and instability controlling for relationship quality and other relevant covariates.

Hypotheses:

A not so good relationship between parents and their daughter

— increases the hazard and hastens the onset of first sexual intercourse,

— increases the risk of having the sex unprotected when the teenager experience it for the first time.

— increases the hazard of conception.

Table 1: Hypotheses operationalized through variables

| Variable Label	Risk of initiating first sex	Risk of having the first sex unprotected	Risk of conception
Relationship Effect (ref: Very good relation)			
Not very good relation	+	+	+
Early Socialization Effect (ref: Intact family) Step parent family			
Single parent family	+		+
Other types of family	+	+	+
Parental Control Effect (ref: Intact family)			
Step parent family			
Single parent family	+	+	+
Other types of family	+	+	+
Instability Effect			
Number of changes in family situation	+	+	+

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Study Design

Data-Source and Sample

This study uses the National Longitudinal Survey of Youth 1997 Cohort (NLSY97), which is a large, ongoing, longitudinal survey designed to be nationally representative of US residents born during the years 1980 through 1984. To identify eligible youth for the NLSY97 survey, interviewers first visited all randomly selected households. All youths aged 12 to 16 who usually resided in the household, or were temporarily away at school, in the hospital or any other type of institution during the initial interview period, were considered eligible. A computer-assisted personal interviewing (CAPI) system was used in each round of the interview. This approach is especially appropriate for surveys with elaborate skip patterns, as the respondent is automatically guided down to certain question paths and loops depending on responses and the youth's age. To obtain potentially sensitive information from both the youth and the parent in round 1, an audio computer-assisted self-interview system was used. This audio version improves the overall response quality by reducing data entry errors, permitting more complex questionnaire design, and minimizing errors because of illiteracy (NLS Handbook 2002).

At time one (1997), the survey first interviewed respondents and one of their parents. Follow-up interviews were conducted with only the adolescents every year thereafter. Six rounds of data have been released so far. The NLSY97 cohort includes 8,984 individuals. The sample for this study is restricted to only 2621 female adolescents who were twelve to fourteen years old at round one. By round six in 2002, they were seventeen to nineteen years old. The study excludes fifteen and sixteen year olds at round one because only the adolescents younger than fifteen years were asked about the quality of relationships with their parents during the first round.

Of all the responding female adolescents, 113 (4% of the total sample) became sexually active before the survey started in 1997. For the analysis of risk of initiating first sex and contraceptive behavior, these 113 teenagers are excluded from the sample. Thus the final sample size for this analysis reduces to 2508, consisting only of those who initiated their first sex after the survey started. Information on these teenagers is followed for 6 years

till 2002 for the analysis. A separate analysis is done (not presented in the paper) including all the female teenagers of age 12 to 14 years treating those who had sex before the survey started as having first sex in the first risk period. The result of the analysis is very similar to the one presented in this paper. Among the adolescents of the final sample of first sex analysis, 1633 (67% of the final sample) became sexually active at some point between round one in 1997 and round six in 2002 and 414 (25% of sexually active teenagers) did not use any form of contraceptive during their first sex. Twenty-four adolescents experienced their first pregnancy before the survey started. In the analysis, they were treated as having pregnancy in the first risk period. The sample for the analysis of risk of first conception consist of 6 years information of 2621 teenagers and 717 (41% of the sexually active teenagers) reported a first pregnancy during the survey period.

Chart1: Description of the Initial Sample: Sexual Behavior of US Female Teenagers
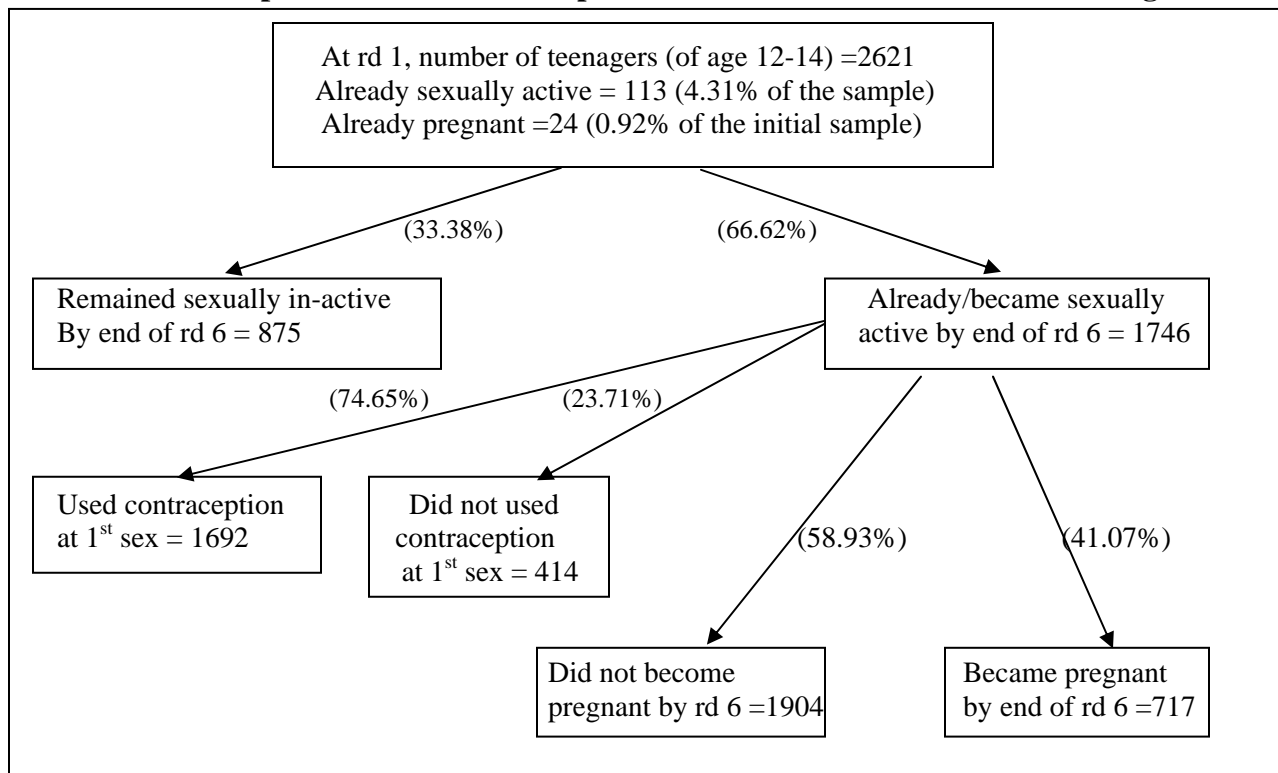
Measures

This study focuses on two dependent variables. For the analysis of first sex and contraceptive use, the dependent variable is a categorical one which takes the value of 1

if the female teenager become sexually active and use contraceptive when she initiates her first sex; the variable takes the value of 2 when the teenager become sexually active without using contraceptive at first sex. The reference category for this variable is remaining sexually inactive. Once the respondent has had her first sexual intercourse, the case is dropped from the risk group. For the analysis of first pregnancy, the outcome is coded as a dummy variable. The reference category for this dummy is never having been pregnant and takes the value of 1 if the teenager experiences her first pregnancy in that year. The case is dropped from the risk group after the person becomes pregnant.

Respondents were asked a variety of questions regarding their relationship quality with either biological or social parents, or parental figures at round one. The parent-youth relationship scale developed by Haire et. al. (2003) is used to create the relationship index which uses eight questions that are answered by the daughters. The questions asked about teens' identification with parents, and parental supportiveness. The responses for each question were measured on a 5-point Likert scale. For a girl in a single parent home, the quality of her relationship with the parent present in the household is used to measure the relationship index. For two-parent family, the index is created by averaging the values of the relationship with both parents. For other types of families, relationship with present parent figures is used to construct the index. A dummy variable is created from the relationship scale, with very good relationship as the reference category. The dummy takes the value of 1 if the relationship is not very good. The construction of the index is discussed in detail in appendix A.

The retrospective data provides information about family situation at ages 2, 6 and 12. The event history data provides information about family situation at each round of the survey. These retrospective and event history data are used to create an indicator of the instability of the family situation. Family situation at age 12 is used to capture the *socialization during early childhood* effect and current family situation at each round is used as a proxy for *social control of adolescence* effect. Two sets of dummy variables are created to capture adolescents' family situation at age 12 and in the current period. In both cases intact family with both biological parents is used as the reference category.

The other categories are step parent family consisting of one biological parent and one step parent, single parent family with only one biological parent living in the household, and other types of family that includes living with grand parents or relatives or in a foster care etc.

As control variables, I have included race, parents' education, religious affiliation, place of residence, and financial condition of the family. Throughout the sociological and demographic literature it has been established that African Americans have higher overall levels of fertility than do Whites (Morgan 1996), and that they become sexually active at early ages (Hogan, Sun, and Cornwell, 2000; Santelli, Lindberg, Abma, and McNeely, 2000). Thus, race is included as a control variable in the analysis and is categorized as African American, Hispanic, and non-African American non-Hispanic or White. Two dummies (African American, Hispanic) are used with White treated as the reference category.

Religion is also used as a control variable, as some (though not all) studies have found that religious affiliation may play an important role in adolescents' decision to become sexually active or to use contraception (O'Connor, 1998). Religion is broadly categorized in this analysis. Four dummies are created for Roman Catholics, Protestants, followers of other denominations of Christianity, and the followers of 'other religion' such as Jews, Muslims etc. 'No religion' is used as the reference category. Respondents who are not affiliated with any religion or do not identify themselves with any religion are represented by this category. The surveys do not ask the adolescents about their church attendance, which prohibits to control for the effect of religiosity.

The literature on poverty and child outcomes suggests that there is a high correlation between poverty and risky sexual behavior. Women at lower income and educational levels tend to have children at earlier ages, and are more likely to bear children out of wedlock (Maynard, 1997). It is thought that poverty acts as a constraint by reducing opportunities and increasing instability in different spheres of life. This instability, uncertainty, and lack of opportunity creates frustration and increases the level of risk taking attitudes and behaviors regarding teenage pregnancy by negatively influencing the

timing of first sex, frequency of sexual behavior, number of sexual partners, and contraceptive use. The dataset provides information about adolescents' family income-poverty ratio at each survey year. The income to poverty ratio at the time of first sexual intercourse or the time of becoming pregnant is added as a control variable with income above income-poverty ratio as the reference category.

I have used an average of both parents' (biological and/or social) education as an indicator of parents' educational background. For single parent family, the educational level of present parent was taken into account. Education more than high school is the reference category. The dummy variable takes the value of 1 if education is less than college education. Area of residence is also controlled in the analysis with not living in the central city as the reference category. Table 2 provides a detailed description of the variables including the types and mean values of those variables used in the analyses.
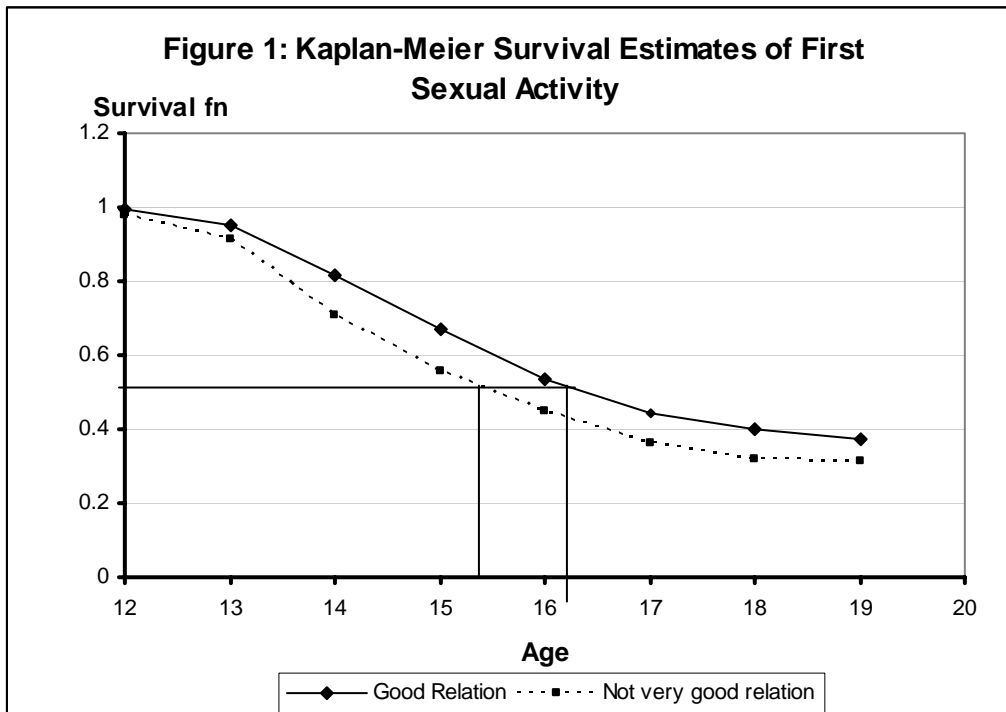
Table 2. Definitions and means of variables used in discrete time multinomial logit model of having first sex and use of contraception (model 1) and discrete time hazard model of first conception (model 2), US Female Teenagers.
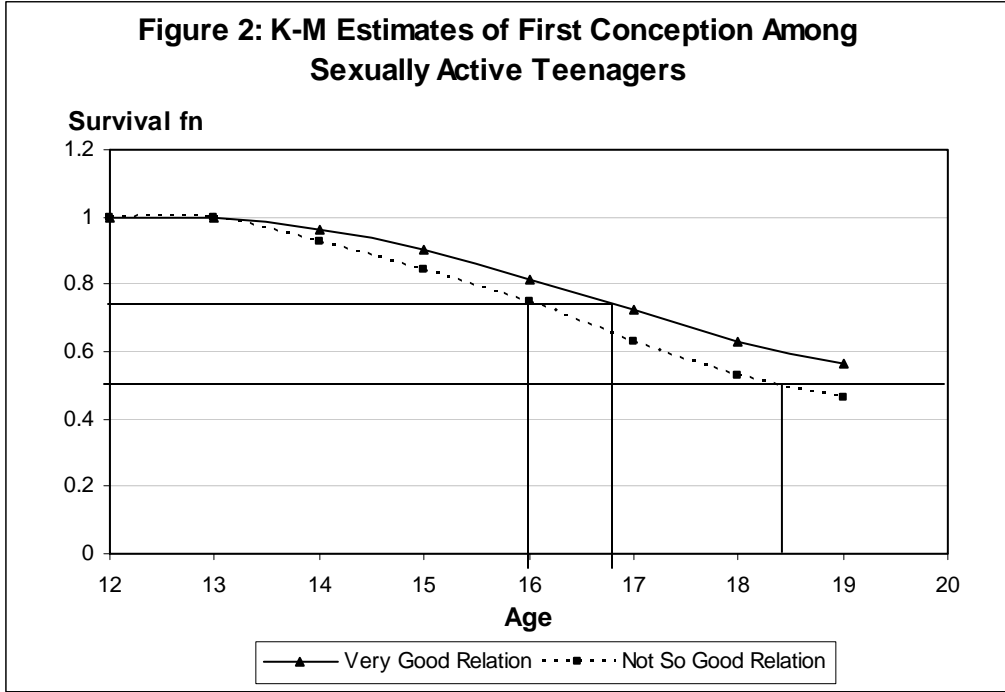
Variable Label	Description	Type	Mean
Outcome			
becoming sexually active and not using contraception at first sex in the current year vs. remaining sexually inactive (model 1)			
becoming sexually active and using contraception at first sex in the current year vs. remaining sexually inactive (model 1)			
being pregnant for the first time (model 2)			
Relationship Effect			
Very good relation (reference category)	The index score is 24 or above in 0-32 index range	Fixed	0.633
Not very good relation	The index score is below 24 in 0-32 index range	Fixed	0.367
Early Socialization Effect (Family Situation at age 12)			
Intact (reference category)	Living with both biological parents at age 12	Fixed	0.419
Step parent	Living with one biological parent and one step parent at age 12	Fixed	0.039
Single parent	Living with a single parent (mom / dad) at age 12	Fixed	0.386
Other types	Living with grand parents or relatives or in a foster house or living alone etc.	Fixed	0.057
Unknown	Family situation at age 12 is not known	Fixed	0.098

Parental Control Effect (Current Family Situation)			
Intact (reference category)	Currently living with both biological parents	TV	0.416
Step parent	Currently living with one biological parent and one step parent	TV	0.115
Single parent	Currently living with a single parent (mom or dad)	TV	0.290
Other types	Currently living with grand parents or relatives or in a foster house or living alone etc.	TV	0.125
Unknown	Current family situation is not known	TV	0.054
Instability Effect (Change in Family Situation)			
Number of changes in family situation	Number of changes the respondent has experienced in her life	TV	0.634
Socio-economic and Demographic Controls			
Race			
White (reference category)	Non-Hispanic and Non-African American	Fixed	0.521
African American		Fixed	0.264
Hispanic	Non African American Hispanic	Fixed	0.211
Religious Background			
No religion (reference category)	Not affiliated with or identify herself with any religion	Fixed	0.380
Other religion	Religion other than different denominations of Christianity	Fixed	0.108
Roman Catholic	Respondent identify herself as Roman Catholic	Fixed	0.281
Protestant	Respondent identify herself as Protestant	Fixed	0.366
Other denomination	Respondent identify herself as different denomination of Christianity other than Catholic/Protestant	Fixed	0.204
Early Adolescence Place of Residence			
Not in central city (reference category)	Living outside of central city at age 12	Fixed	0.673
In central city	Living in central city at age 12	Fixed	0.327
Financial Condition of the family			
Not poor (reference category)	Family does not live in poverty	TV	0.197
Nearly poor	Family's income is at near poverty level	TV	0.076
Poor	Family's income is at below poverty level	TV	0.097
Parents Education			
More than 12 grade (reference category)	Parents have average education of more than 12 grade	Fixed	0.499
Not more than 12 grade	Parents have average education of max. 12 grade	Fixed	0.501
Age	Age (in years) at first round	TV	15.301
Exposure time (model 2)	Years of exposure to the risk of conception	Fixed	1.915
Contraceptive behavior (model 2)			
Used contraceptive (reference category)	Used contraceptive at first sex	Fixed	0.813
No contraception	Did not use contraceptive at first sex	Fixed	0.189

Note: TV= Time varying

The Kaplan-Meier survival curves, for the sample teenagers, reflect the importance of good relationship between parents and daughters without controlling for individual or family level characteristics. Figure 1 shows that the median age of initiating first sex among the sample teenagers is 16.35 years for those who had very good relation with their parents during early adolescence and 15.45 years for those who did not have very good relation. Again, among only the sexually active teenagers of the sample; one-fourth of the teenagers with not so good relation with their parents became pregnant by age sixteen. This age is 16.8 years for those who have very good relation with their parents (Figure 2). For sexually active teenagers, who do not have very good relation with their parents, 18.4 years is the median age of first conception.

Figure 1: Kaplan-Meier Survival Estimates of First Sexual Activity

Figure 2: K-M Estimates of First Conception Among Sexually Active Teenagers

Survival fn

[Figure: Line graph with vertical axis "Survival fn" ranging from 0 to 1.2, and horizontal axis "Age" ranging from 12 to 20. Two curves are shown: "Very Good Relation" (solid line with triangle markers) and "Not So Good Relation" (dotted line with square markers). Both start at 1.0 at age 12-13 and decline, with the Very Good Relation curve remaining higher. Horizontal reference lines at approximately 0.74 and 0.5, with vertical reference lines at ages 16, ~16.8, and ~18.4.]

Legend: —▲— Very Good Relation · · ■ · · Not So Good Relation

Statistical Model

To investigate the effect of parent-daughter relationship quality on the risk of initiating first sexual intercourse and contraceptive behavior at first sex, a discrete time multinomial logit model is used with controls of demographic, socio-economic, and family characteristics. With time measured in years the discrete time model is more appropriate than the use of a continuous time model. I distinguish three outcomes: remaining sexually inactive, having protected first sex, and having unprotected first sex. The odds of having protected or unprotected first sex compared to remaining sexually inactive is given by,

$$\log[\pi_{mi}/\pi_{3i}] = \beta_{m,0} + \sum{}_{j} \beta_{mj} X_{ij}, \qquad (m = 1, 2)$$

where π_{1i} is the probability of initiating first sex and using protection when the teenager experience her first sex in interval i; π_{2i} is the probability of initiating first sex without using any protection in interval i; and π_{3i} is the probability of remaining sexually inactive in interval i. In the model X_{ij} are the control variables and $\beta_{m,j}$ are the unknown parameters to be estimated. For this analysis, the interval of risk began in first round of the survey which took place in 1997. At that time the respondents were 12-14 years old.

Teenagers' exposure to risk ended if they had intercourse by sixth round and is censored at each round of the survey till 2002 when they became 17-19 years old.

The net effect of parent-daughter relationship quality on the risk of first conception among the sexually active adolescents is measured using a discrete time hazard model. In this case, the same demographic, socio-economic and family background variables were used as control variables.

The log hazard form for first conception is,

$$\log[h(t)] = \beta_0 + \beta_1 x_1 + ... + \beta_k x_k,$$

where $h(t)$ is the hazard of the event and x_1....x_k are covariates. The interval of risk of conception begins at the age of first sexual experience and is censored at the time of observation at each year from 1997 to 2002, when the respondent is no older than 17-19 years.

Results

Hazard of first intercourse and use of contraceptive

The survival curve (figure 1) shows that the risk of initiating first sexual intercourse at each age is lower for those teenagers who had very good relation with their parents at their early adolescence. Or in other words, teenagers with very good relation are more likely to survive from initiation of first sex at each age compared to those who did not have very good relation. Results from regression analysis (Table 3) provide further evidence that the relation holds even after controlling for early socialization, parental control, family instability and socio-economic and demographic influences. Teenagers with not so good relation with parents are at a significantly higher risk of initiating first sexual intercourse. They are also about one-fourth times more likely to have unprotected sex when they experience it. Therefore, relationship quality does not only adversely affect the risk of becoming sexually active; it also significantly affects the contraceptive behavior of a teenager.

There is some evidence showing the importance of early socialization. Teenagers who spent their early adolescence in single parent household are one-third times more likely to have their first sex in a given year compared to those who grew up in a family with both biological parents. But growing up in a single parent household does not increase the risk of unprotected first sex when they experience it.

Results of the analysis show very strong and significant effect of parental control on the risk of becoming sexually active. Teenagers from single parent and other types of families, who face much less parental control, are at much higher risk of initiating first sex either protected or unprotected than those from intact families. Again, teenagers from step-parent families, for whom parental control is on average stronger than that of single parent or other types of family teenagers but weaker than that of intact family teenagers are also at a higher risk of initiating first sex using contraceptive compared to those from intact families. But when a teenager experiences her first sex, the risk of not using contraception does not depend on her current family situation.

Table 3: Odds ratio from discrete time multinomial regression models of having first sexual intercourse and contraceptive use at first sex

Variables	Outcome:		
	Having first sex and using contraception *v.* remaining sexually inactive	Having first sex with non-contraceptive use v. remaining sexually inactive	Non-use *v.* contraceptive use at first sex
	Odds Ratio (se)	Odds Ratio (se)	Odds Ratio (se)
Relationship Effect			
Not very good relation	1.287 (0.083)***	1.650 (0.183)***	1.283 (0.157)**
Early Socialization Effect (Family situation at age 12) Ref: Family with both bio-parents			
Step-parent family	1.203 (0.226)	0.664 (0.234)	0.583 (0.228)
Single-parent family	1.279 (0.142)**	1.169 (0.218)	0.928 (0.197)
Other types of family	0.958 (0.165)	0.920 (0.260)	0.98 (0.312)
Family type is unknown	0.966 (0.130)	1.79 (0.355)***	1.858 (0.437)***
Parental Control Effect (Current Family Situation) Ref: Family with both bio-parents			

Step-parent family	1.410	1.089	0.765
	(0.185)**	(0.249)	(0.194)
Single-parent family	1.418	1.486	1.041
	(0.151)***	(0.264)**	(0.208)
Other types of family	2.146	2.546	1.178
	(0.310)***	(0.572)***	(0.295)
Family type is unknown	0.139	0.387	2.777
	(0.042)***	(0.134)***	(1.265)**
Instability Effect (Change in family situation)			
No. of changes in family situation	1.030	1.249	1.208
	(0.052)	(0.102)***	(0.110)**
Demographic and Socio-economic Controls			
Age at first round	1.212	1.263	1.044
	(0.051)***	(0.094)***	(0.086)
Current age	1.14	1.122	0.987
	(0.023)***	(0.040)***	(0.038)
Race (ref: Non-black non-Hispanic)			
African American	1.04	0.802	0.772
	(0.084)	(0.122)	(0.128)
Non-black Hispanic	0.805	1.194	1.481
	(0.076)**	(0.178)	(0.251)**
Parents' Education (ref: More than 12 grade)			
Parent's average education <=12 grade	1.09	1.171	1.074
	(0.071)	(0.135)	(0.137)
Religion (ref: No religion)			
Roman Catholic	0.814	0.715	1.282
	(0.093)*	(0.136)*	(0.483)
Protestant	0.904	0.619	0.997
	(0.094)	(0.113)***	(0.371)
Other denominations	0.777	0.892	1.669
	(0.089)**	(0.167)	(0.629)
Other religion	0.599	0.377	1.449
	(0.118)**	(0.148)**	(0.571)
Family financial condition (Not poor)			
Poor	0.793	1.289	1.624
	(0.098)*	(0.232)	(0.335)**
Nearly poor	0.820	1.039	1.264
	(0.108)	(0.226)	(0.308)
Resident of central city	1.098	1.082	0.982
	(0.074)	(0.129)	(0.129)
Log-likelihood Chi-square	515.62***		515.62***
DF	44		44
Observations	10331	10331	10331

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Family instability increases the risk of initiating first sex without using contraception of any method, but it does not significantly increases the risk of experiencing protected sex. The relative risk model shows that one additional change in family situation increases the risk of not using contraception while having first sex by 20 percent.

The effects of the control variables, shown in the table, generally follow the expected regular path. Result shows, Hispanics are significantly less likely to have protected sex than whites, but when they experience first sexual intercourse they are almost half times more likely to initiate it without any protection. Similar result is found for teenagers from poor family background. Religion also have effects as found by other studies (O'Connor, 1998). Teenagers with any religious affiliation are significantly less likely to experience first sex, protected or unprotected, at any given time compared to those who do not have any religion. Only for Protestants, the relation is not significant even though it follows the same direction. The likelihood of initiating first sex at a given year is the lowest among teenagers from other religions. They are 40 percent and 62 percent less likely to have protected or unprotected first sex than teenagers with no religion. Like O'Connor, I also found that religious affiliation does not have any significant role in teenagers' contraceptive decision making.

Hazard of First Pregnancy

The survival curve of first pregnancy (figure 2) shows that parent-daughter relation quality does affect the risk of first conception and very good relation reduces the risk. But this relation does not hold when I controlled for other family and individual level variables. This suggests absence of any direct effect of relation quality on the hazard of conception once the teenager became sexually active. The result of the regression analysis is presented in table 4.

I have not found any evidence in support of early socialization or family instability argument. But the result with respect to early socialization has to be read cautiously as family situation at age 12 is used as a crude proxy to capture the effect of early socialization. There is some evidence regarding parental control effect. The hazard of

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Table 4: Odds ratios from discrete time logistic regression model of first conception. Sexually active teenagers of age under 19, US

Variables	Having first conception	
	Odds Ratio	se
Relationship Effect		
Not very good relation	1.115	(0.094)
Early Socialization Effect (Family situation at age 12)		
Ref: Family with both bio-parents		
Step-parent at age 12	1.098	(0.252)
Single-parent at age 12	1.086	(0.146)
Other types at age 12	1.269	(0.243)
unknown at age 12	1.115	(0.188)
Parental Control Effect (Current Family Situation)		
Ref: Family with both bio-parents		
Step-parent	0.925	(0.167)
Single-parent	1.252	(0.176)
Other types	1.918***	(0.283)
Instability Effect (Change in family situation)		
No. of changes in family situation	1.075	(0.051)
Demographic and Socio-economic Controls		
Age at first round	1.083	(0.057)
Duration of exposure to the risk	1.125***	(0.031)
Race (ref: Non-black non-Hispanic)		
African American	1.600***	(0.172)
Non-black Hispanic	1.457***	(0.181)
Parents' Education (ref: More than 12 grade)		
Parent's education <=12 grade	1.333***	(0.117)
Religion (ref: No religion)		
Roman Catholic	0.932	(0.136)
Protestant	0.957	(0.127)
Other denominations	0.963	(0.141)
Other religion	0.865	(0.261)
Resident of central city	1.003	(0.091)
Family financial condition (Not poor)		
Poor	1.666***	(0.193)
Nearly poor	1.503***	(0.202)
Contraceptive behavior		
No contraception	1.595***	(0.152)
Observations	5420	
lr-chi2	253.29***	
DF	22.00	

Standard errors in parentheses,
** significant at 5%; *** significant at 1%

pregnancy is very significant, and at the same time, very high for teenagers from other types of families. They are almost twice as likely as teenagers from intact families to

conceive. Since relationship quality is included in the model the current situation of the family captures the main effect of parental monitoring net of psychological effect of 'not mattering,' or emotional insecurity and loneliness that can evolve from current family situation.

African Americans and Hispanics are at a higher risk of conception compared to White teenagers. The risk is 62 percent and 35 percent higher for African Americans and Hispanics respectively. Financial situation of the family has a strong effect on the risk. Poor and nearly poor teenagers are 66 percent and 50 percent more likely, respectively, to conceive compared to not poor teenagers. I have checked the interactions between financial condition of the family and racial background of the teenagers, but found no significant effect. Therefore, I dropped those from the final model. Parents' education also significantly influences the level of risk of pregnancy. Teenagers with less than college educated parents are one-third times more likely to conceive compared to teenagers with highly educated parents. As expected, longer exposure to the risk and also, unprotected sex increases the hazard of pregnancy. The result suggests that pregnancy unlike first sexual intercourse or contraceptive use is not a choice variable. The risk of pregnancy is strongly affected by socio-economic factors.

Discussion

The results of the analyses indicate the importance of the quality of parent-adolescent relationships by 'gate-keeping,' or delaying the onset of first sexual intercourse, and acting as a 'filter' that reduces the risk associated with first sex by increasing the use of contraception. The sense of security and self-knowledge that is created by quality relationship with parents reduces the likelihood of sexual 'acting out' during early adolescence. Although counterintuitive, we see that after a female teenager becomes sexually active, the quality of the relationship fails to reduce her risk of pregnancy. To measure the risk of pregnancy, only the sexually active teenagers were considered who are less likely to have very good relationship with parents compared to their sexually inactive counterparts. Again, we have seen that sexually active teenagers who do not have very good relationships with their parents are more likely not to use contraception at

first sex. Both of these factors highly increase the risk of pregnancy. So, although we do not see any direct effect of having very good relationship with parents, we can see that it indirectly reduces the risk of pregnancy by delaying first sex and increasing contraceptive use.

Regression result of risk of first pregnancy (appendix B) from the analysis including all the teenagers (sexually active or inactive) provides evidence in support of this argument. The result reflects the importance of relationship quality; but it becomes insignificant when only the teenagers at risk are considered. As I have argued before, this is because sexually active teenagers are a selective group who are less likely to have very good relation with their parents compared to their sexually inactive counterpart. Therefore, once someone becomes sexually active, risk of pregnancy does not depend on relationship quality anymore.

Conclusions

Teenage childbearing remains a significant social problem in the United States despite the fact that demographic and normative shifts in the last half-century have significantly influenced teen fertility. Abundant theorizing and research have attempted to understand and influence this trend. Medical practitioners have attempted to utilize media, group opinion leaders, small groups or other interactive activities to intervene and reduce risky sexual behavior of adolescents. Throughout the literature, many theories have tried to explain adolescent sexual and reproductive behavior. Yet no single theory can explain all the findings, demonstrating how complex adolescents' sexual behavior is. Thus, programs that are designed to foster strong parental relationships, improved contraceptive education and access, and most importantly, increase adolescents' confidence and self-esteem may be useful. Programs should place special emphasis on targeting poor and underprivileged adolescents who need contraceptive education and access to contraception most.

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Appendix A

Construction of relationship index:

The parent –youth relationship scale developed by Haire et al., (2003) is used to construct the relationship index. The eight items that used to create the relationship scale are:

a. I think highly of him/ her (father/mother)
b. S/he is a person I want to be like.
c. I really enjoy spending time with her.
d. How often does s/he praise you for doing well?
e. How often does s/he criticize for your ideas?
f. How often does s/he help you for doing things that are important to you?
g. How often does s/he blame you for his/her problems?
h. How often does s/he make plans with you and cancel for no good reason?

The first three items 'a' to 'c' address the adolescents' identification with parent(s). Response categories for those three items consisted of a 5-point Likert scale, ranging from "strongly agree" to "strongly disagree". The questions 'd' to 'h' address adolescents' perceived parental supportiveness. Response categories for those five questions that are also consisted of 5-point Likert scales range from "never" to "always." Each of the items is coded from 0 to 4 points. Following Haire at. el. (2003). I calculated the scores of relation index only for those respondents who answered at least three-fourth of the items. Raw scores that suffered from missing responses will be weighted as follows — rawscore*(No. of total items) / (No. of total items – No. of missing items). This procedure assigns the respondents' average response for the relationship index. The small percentage (0.71%, 19 cases), who answered fewer than 75% of the items on a given scale is coded as missing on that scale.

With 0 to 4 points for each item, score could range from 0 to 32. The cut off point is decided to be 24, since it would require on average a 3 on the 4 point responses. Then a dummy variable is created which takes the value 1 if the index score is below 24, which suggests that the relation is not very good.

Appendix B

Table 5: Odds ratios from discrete time logistic regression model of first conception. Including all the female teenagers (sexually active + inactive) of age under 19, US

Variables	Having first conception	
	Odds Ratio	se
Relationship Effect		
Not very good relation	1.150	(0.096)*
Early Socialization Effect (Family situation at age 12)		
Ref: Family with both bio-parents		
Step-parent at age 12	0.948	(0.216)
Single-parent at age 12	0.977	(0.130)
Other types at age 12	1.009	(0.190)
unknown at age 12	1.041	(0.172)
Parental Control Effect (Current Family Situation)		
Ref: Family with both bio-parents		
Step-parent	1.087	(0.206)
Single-parent	1.478	(0.206)***
Other types	2.360	(0.351)***
Instability Effect (Change in family situation)		
No. of changes in family situation	1.144	(0.055)***
Demographic and Socio-economic Controls		
Age at first round	1.300	(0.067)***
Duration of exposure to the risk	1.456	(0.038)***
Race (ref: Non-black non-Hispanic)		
African American	1.651	(0.176)***
Non-black Hispanic	1.415	(0.173)***
Parents' Education (ref: More than 12 grade)		
Parent's education <=12 grade	1.338	(0.116)***
Religion (ref: No religion)		
Roman Catholic	0.906	(0.132)
Protestant	0.961	(0.127)
Fundamentalist	0.977	(0.142)
Other religion	0.808	(0.239)
Resident of central city	1.046	(0.093)
Family financial condition (Not poor)		
Poor	1.528	(0.093)***
Nearly poor	1.355	(0.181)**
Contraceptive behavior		
No contraception	1.780	(0.168)***
Observations	10755	
lr-chi2	709.75***	
DF	22.00	

Standard errors in parentheses
** significant at 5%; *** significant at 1%