Effects of Child Health on Parents' Relationship Status

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Abstract:

The presence of a seriously unhealthy child in the household may result in a less committed parental relationship and fewer family resources. We use data from the national longitudinal Fragile Families and Child Wellbeing Study of mostly unwed parents to estimate how poor child health affects one potential human resource available to that child: father presence. We look at whether parents are living in the same household one year after the child's birth and also more generally at how their relationships changed along a continuum (married, cohabiting, romantically involved, friends or not involved) during the same one year period. Since we may not be completely successful at characterizing poor child health as a random event, we account for the potential endogeneity of child health in our models. We find that having an infant in poor health reduces the likelihood that parents will live together and increases the likelihood that they will become less committed to their relationship.

Introduction

Approximately one third of all births in the US in 2001 were to unmarried women. This does not mean that children are born without fathers present, however. Approximately two-fifths of children born out-of-wedlock have parents who are living together at the time of the birth, and another two-fifths have parents who, although not co-residing, are actively involved with one another.

Children born to unmarried parents are more likely than those born to married parents to experience spells of poverty as they grow up. They are also more likely to have health, behavior, and school problems. Having a seriously unhealthy child may be a further destabilizing force for these already "fragile" families because of the extra burden of caring for the child and the added demands on the family's resources. In this sense, unhealthy children born out-of-wedlock may be at even greater risk than their healthy peers.

A growing body of research indicates that low socioeconomic status in early childhood sets the stage for increasing disadvantages in both health and educational capital over the child's life course and can cause low socioeconomic status to persist for generations. Much less is known, however, about how child health *affects* a family's socioeconomic status. We use data from the national longitudinal Fragile Families and Child Wellbeing Study of mostly unwed parents to estimate how poor child health affects one potential human resource available to that child: father presence. The results will provide important information about the relationship between child health and family structure and will help us understand the complex processes underlying children's health

trajectories and human capital accumulation, particularly among families with low socioeconomic status.

Background

The economics literature on marriage and relationship stability has evolved since the early 1970s, when Becker (1973, 1974) first examined marriage and childbearing within an economic framework. According to Becker, one of the main reasons for establishing a marital union is the utility that parents expect to derive from their children. Monogamous unions prevail when the population sex ratio is about unity, and when men and women do not differ greatly in wealth, ability, or other attributes. Both men and women want partners with the best attributes the "market" will allow, so high income, high-ability partners tend to marry each other. Because of this "positive assortative mating," income differences across families can persist for generations.

In response to the (then) increasing divorce rates, Becker, Landes & Michael (1977) extended Becker's analysis to include marital dissolution. Because information up front about one's potential partner is costly and life involves uncertainty, individuals may become unpleasantly surprised with their spouse's actual characteristics and consider divorce. A divorce is more likely when the difference between the expected and actual quality of one's spouse is large. Similarly, an unexpected shock in the quality of one's children may lead to divorce because the utility from the union is lower than had been expected.

In a theoretical extension of Becker's work, Aiyagari, Greenwood & Guner (2000) used a Nash bargaining model to simulate a marriage market, and found that at

any point in time, the lowest wage individuals tend to be unmarried; public policies such as child support enforcement and welfare can affect both marriage and divorce; and there is a high correlation in income across generations because children in low income households will have lower levels of human capital investment and therefore lower wages as adults, and they also will have lower household income because they are less likely to marry.

Recent literature on relationship formation and childbearing has reflected two distinct trends: increases in the numbers of individuals who cohabit but do not marry and increases in the numbers of children born out of wedlock. Bumpass & Raley (1995) and Bumpass & Lu (2000) provide evidence of the dramatic increase in the number of children both born to and living with unmarried mothers. Willis (1999) posited that traditional families (with married partners having children and unmarried individuals remaining childless) prevail in societies where men earn more than women and also outnumber them. In contrast, when women have assets or earnings that are high either in absolute terms or relative to those of men, and/or they outnumber men, then some fraction of low-income men will choose to father children out of wedlock and to multiple mothers who are the main or sole sources of support for their children. Since the 1970s, women's labor force participation and wages have grown far more quickly than those of men and there has been a growing share of young low-wage males who are incarcerated; both of these changes have coincided with increases in non-marital births.

Empirical studies have found that the wellbeing of women in cohabiting relationships (and their children) falls somewhere between that of their married and single counterparts. Lillard, Brien & Waite (1995) found that those who cohabit before

marriage are less likely to remain married because individuals who are more "dissolution-prone" self-select into cohabitation. Folk (1995) and Manning & Smock (1997) found that mothers in cohabiting relationships fare better economically than do single mothers. Wu (1995), who used Canadian data to examine the effect of children on the stability of cohabiting relationships, found that children do stabilize cohabiting relationships, but not as strongly as they stabilize marriages.

The vast literature on marriage, divorce, and child wellbeing indicates that children are best off in well-functioning, stable, high income, two-parent families. Both time and money investments in children are maximized when the child lives with biological parents who are strongly committed to each other. This is not the experience, however, of many American children. Children who grow up with only one biological parent are disadvantaged in many ways compared to children who grow up with both biological parents (McLanahan & Sandefur 1994, Amato & Keith 1991, Seltzer 1994, McLanahan & Teitler 1999). They are less likely to graduate from high school and college, more likely to be idle (neither working nor in school), more likely to leave home early, more likely to become a teen or unmarried parent (for girls), more likely to divorce (given marriage), and more likely to have mental health problems in young adulthood.

According to economic theory, couples are less likely to stay together (or to marry or cohabit) if they have an unexpected negative event that lowers the value of the union. Children can be a major source of utility in a union, so the shock of a child in poor health or with a disability would be expected to lower the probability that the couple will form a union or stay together. There have been only three studies in the economics literature (Corman & Kaestner 1992, Mauldon 1992, and Joesch & Smith 1997) that have

examined this issue. All three used the Child Health Supplement of the National Health Interview Survey (1981 and 1988), and all found that married couples are more likely to divorce when their child has a significant congenital health problem.

Mauldon distinguished between congenital and non-congenital problems, and also examined the effect of the child's age. She found stronger effects for congenital conditions than for non-congenital conditions, and stronger effects for children 6 to 9 years of age than for younger children. Corman & Kaestner investigated effects of congenital child health conditions on married and single mothers, and also examined extended family outcomes. They found that having unhealthy children increases the likelihood that divorced white women live with extended family members. Both Corman & Kaestner and Mauldon found that poor child health does not affect the chances of remarriage. Thus, children born with an adverse health condition will be doubly at-risk for poor adult outcomes because of the condition itself and because they are more likely to live in a "broken home." A potentially mitigating factor is that the child may live in an extended family situation.

There are several limitations to these three studies. First, they all use the same data set and the same or similar measures of child health. Second, the data relied on parent recall that could be up to fifteen years after the birth. Third, the studies did not account for cohabitation or other non-marital relationships between the parents. Fourth, there was very limited information on the father if he did not reside in the household. Fifth, none of these studies utilized recent econometric techniques to try to account for unobserved characteristics that could affect both child health and relationships. This study improves on all of these factors.

Recent literature has revisited the relationship between child health and socioeconomic status. Case, Lubotsky & Paxson (2002) and Currie & Stabile (2002) examined why children from families with low socioeconomic status have poor health and why the health differential between poor and non-poor children gets larger as the children age. Case, Lubotsky & Paxson presented a model in which a child's health deteriorates because of a health shock, the negative effects of which can be offset, at least in part, by parental investments in his or her health. Because wealthier parents will invest more in their children's health and because older children have been subjected to more shocks, the difference in child health between poor and non-poor children increases with age. Currie & Stabile extended the analysis by investigating whether poor children are less able to recover from each health shock or whether they tend to experience a greater number of health shocks. They found that the latter explains the widening socioeconomic gap in child health with age.

Both Case, Lubotsky & Paxson and Currie & Stabile assumed that parents invest in their children, but that child health does not affect the parents' ability to invest (income). Given the research cited above showing that poor child health is related to marital disruption, this assumption may not be valid. If children born in poor health are more likely to grow up in single-parent families, they will also be more likely to grow up in poverty. We investigate causality in this (reverse) direction by estimating the effect of the child's health at birth on the relationship status of the parents at one year, using a national sample of children at high risk for living in single-parent households and for living in poverty.

Conceptual Model

We begin with a simplified underlying behavioral model in which a parent's utility is a function of leisure (L), goods consumed (G), and the quality of his or her children (C_Q):

$$(1)\quad U = U(L, G, C_Q)$$

Child quality is produced using a set of time inputs (resources) (R_T), financial resources (R_F), and the endowed health of the child at birth (E):

$$(2)\quad C_Q = C_Q(R_T, R_F, E)$$

The parent maximizes utility subject to the production function (2), as well as income and time constraints. From this constrained utility maximization, we can derive simplified reduced form demand functions for resources, where Y is income and P_T and P_F are the prices of time and financial resources, respectively:

$$(3)\quad R_j = R_j\,(Y, P_T, P_F, E), \text{ for } j = T, F$$

In this paper, we will estimate equation (3) for one type of human resource: father involvement. We measure father involvement in terms of the commitment to the relationship with the mother, and not in terms of the quality of the relationship with the mother or the quality or quantity of time the father devotes to the child. To estimate this model, we need good measures or proxies for income, prices, and for the child's health. For income and prices, we use a set of parental characteristics including age, race/ethnicity, nativity, education, parity, and parents' relationship status at baseline. Below we discuss our strategy for measuring child health.

Data

The Fragile Families and Child Wellbeing Study follows a cohort of new parents and their children in 20 US cities (in 15 states). The study was designed to take a longitudinal look at the conditions and capabilities of new (mostly unwed) parents, the nature of their relationships, factors that push them together and those that pull them apart, and the long-term consequences for parents, children, and society of new welfare regulations, stronger paternity establishment, and stricter child support enforcement. The data, when weighted, are representative of all births in US cities with populations over 200,000. Both the mothers and fathers were interviewed in the hospital at the time of the birth (fathers were interviewed by telephone or in-person outside of the hospital when the interview was not completed in the hospital), again when the child was one year old, and very recently, a third time when the child was three years old. A fourth follow-up interview with both parents is planned for when the child is five years old.[1] Baseline interviews were conducted with 4898 mothers from 1998 to 2000; 89% of the mothers who completed baseline interviews were re-interviewed at 12 months.

A strength of the FF data is its coverage of sociodemographic factors and family structure. The survey collects detailed data for both mothers and fathers on race/ethnicity, nativity, maternal age, income, education, health insurance status, and relationship status. Each wave of the survey asks parents whether they are married to each other, cohabiting, romantically involved but not cohabiting, friends, or have little or no contact—and when applicable, if they have another partner.

[1] Additional background and details about the eligible sample, sampling procedures, and research protocol of the Fragile Families and Child Wellbeing Study are available in Reichman et al. (2001).

Measures

The purpose of this paper is to estimate the effects of poor child health on parents' relationship status. Below, we describe the measures we will use in our analyses and present summary statistics from the data. We exclude cases for which we do not have full information at both waves, resulting in a sample of 4,011 cases.

Parents' relationships

As discussed earlier, the majority of parents in the Fragile Families sample were unmarried at the time of the birth. In Table 1, we show parents' relationship status at the first follow-up by their relationship status at baseline (using mother reports). At baseline, there were five relationship categories: married, cohabiting, romantically involved, friends, and little or no relationship. At follow-up, there is an additional category for separation or divorce.

In our multivariate analyses, we will look at the parents' relationship status at follow-up, given their relationship status at baseline. Table 1 shows that about half of the parents were cohabiting or married at baseline and that another quarter were romantically involved but not living together. Among those who cohabited at baseline, almost 30% no longer lived together at follow-up, while about 15% got married. Virtually all (almost 95%) of the parents who were married at the time of the birth were still married at the time of the follow-up interview.

We also consider a broad measure of whether the parents' commitment to the relationship increased or remained the same (versus decreased) between baseline and follow-up (see Table 2). For example, consider a case in which the parents were romantically involved but not living together at baseline: If at 12 months they are "just

friends," we consider the level of commitment to have decreased. If they remain romantically involved, live together, or get married by 12 months, we consider their relationship commitment to have "stayed the same or improved." It is important to note that this measure is simplistic and that is *not* a measure of the quality of the relationship. The commitment level of the parents, as we have characterized it, decreased in about a quarter of the cases. In general, the less committed the initial relationship, the greater the chance that the commitment level decreased.

In our models, we estimate two outcomes: (1) Whether the parents lived together (married or cohabiting) at follow-up, and (2) Whether the relationship commitment stayed the same or improved between the baseline and follow-up (versus declined). For the latter, we exclude the 207 sets of parents who had no relationship at baseline.

Poor child health

We consider a child to have poor health if at least one of the following criteria is met (all are from mothers' reports): the child weighed less than 4 pounds at birth, the mother reported at follow-up that the child had a disability, or the child had not started to walk or crawl by the time of the follow-up interview (12 to 18 months). According to our classification, about 6% the children in the sample had serious health problems. We used a stringent definition of low birthweight rather than the typical 5.5-pound cutoff in order to better identify cases of serious and chronic health problems (many of the heavier children do not experience long-term health problems). Our goal is to identify children with a serious health shock from birth.

Other determinants of parents' relationship status

In Table 3, we present the characteristics of the sample that we will include in our models of parent's relationship status. In general, we use mother reports for information about the mother and father reports for information about the father. However, in cases where father's data are missing, we use mother reports about the father. Unless otherwise noted, all characteristics are measured at baseline. Both educational attainment and Medicaid (whether the birth was insured under Medicaid) are included as proxies for poverty status. With over half of the births covered by Medicaid, it is clear that a large proportion of the sample is poor or near-poor.

A measure unique to our data is whether the father has children with another partner. A father's response to having a child in poor health may depend on the quality and quantity of other children he has fathered (we do not have data on the quality of these children). One third of the fathers in the sample have at least one child with another partner—a finding consistent with recent literature on marriage and childbearing indicating that the lowest wage men tend to remain unmarried and father children with multiple partners.

We take advantage of the longitudinal nature of our data by estimating "change models" that control for the baseline value of the outcome and by looking at changes directly as the outcome (controlling for initial status). We control for baseline relationship commitment in two ways: First, we include a variable indicating whether the parents lived together or were married at the baseline. Second, we include a variable indicating whether the father visited the mother and the baby in the hospital (almost 90% of the fathers visited during the mother's hospital stay).

Finally, we include state fixed-effects in our models to account for variations in parents' relationships that may be due to unmeasured state policies and environments.

Modeling Strategy

We can express Equation (3) as follows:

(4) Parents' relationship = f (Mother and father characteristics, child health, μ)

Here we consider father presence, operationalized as parents' relationship status or level of commitment, as a potential resource available to the child. The parents' relationship is a function of characteristics of the mother, characteristics of the father, and the child's health. The parental relationship function may also contain another set of factors, denoted by μ, that are unobserved. Estimation of Equation (4) would be straightforward if the measured child health were truly random (exogenous). It is possible, however, that despite our best efforts at measuring the true health endowment, we may capture non-random components of child health that are correlated with unobserved determinants of the parents' relationships that even the state fixed effects and use of "change models" (controlling for baseline relationship status) do not eliminate. If so, our measure of child health would be endogenous and its estimated effect on parents' relationship would be biased.

Since we may not be completely successful at characterizing poor child health as a random event, we need to consider causes of possible endogeneity. For example, based on economic theory, we can think of three sources of unobserved factors that may affect both the child's health and parent's relationship: a poor maternal health endowment that is not fully measured, a low level of human capital having been invested in a parent's life

skills (not measured in their educational attainment), and a high rate of parental time preference. For example: (1) A mother with (an unobserved) poor health endowment may be more likely to bear an unhealthy child and also either more or less likely to maintain a long-term relationship because of physical or emotional problems not observed. The mother will be more likely to maintain the relationship if her poor health endowment increases her dependence on her partner. She will be less likely if her health problem decreases her ability to sustain the relationship. (2) A parent who himself or herself received poor parenting (not captured in observables) may be unskilled in both health behaviors and maintaining relationships. (3) A parent with a high rate of time preference will be less likely than other parents to invest in both the child's health and in his or her relationships. For (2) and (3), the unobserved determinants of poor child health and level of relationship commitment would be negatively correlated. Because we cannot be certain that child health is exogenous, we will model child health and its determinants as follows:

(5) Child Health = *g* (mother & father characteristics, prenatal & perinatal health care availability)

Equation (5) expresses the child's health as a function of parental characteristics, as well as the availability of health care inputs. It will also include an error term.

Model specification for parents' relationship (Equation 4)

We will let RS_i^* represent the underlying relationship status for individual *i*, conditional on the health of the child and other characteristics. In particular, assume that

RS_i^* is a function of poor child health (H_i) and mother and father characteristics, such that:

$$RS_i^* = \beta_H H_i + \beta' X_i + \varepsilon_i \quad (6)$$

where X_i is a vector of observed characteristics and ε_i is the unobserved variation. Since RS_i^* is a latent variable, it is not directly observed. The observed outcome, RS_i, for individual i is defined by the sign of the latent variable as follows:

$$RS_i = \begin{cases} 1 & if\ RS_i^* \geq 0 \\ 0 & otherwise \end{cases}$$

Model specification for child health (Equation 5)

We assume that the probability that a child has poor health, H_i^*, is a linear function of parent characteristics and prenatal and perinatal health care availability:

$$H_i^* = \beta_Z Z_i + u_i \quad (7)$$

where Z_i is a vector of observed characteristics and u_i is the error term for individual i. The data for Z_i will be taken primarily from the baseline survey.

Since H_i^* is a latent variable, it is not directly observed. The observed health, H_i, for individual i is defined by the sign of the latent variable as follows:

$$H_i = \begin{cases} 1 & if\ H_i^* \geq 0 \\ 0 & otherwise \end{cases}$$

We assume that both of the error terms, u_i and ε_i, are normally distributed. In addition, we normalize the variance of the disturbance terms to one and we allow for these error terms to be correlated. Therefore, the covariance matrix is given by:

$$\Sigma = \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}$$

We use a bivariate probit model specification in which we estimate both poor child health and the parents' relationship. If the correlation between these error terms (ρ) is not significantly different from zero, it implies that poor child health is exogenous and that a standard probit is the more appropriate model. For this two equation system to be identified, we must impose either exclusion restrictions or set restrictions on the correlation coefficient of the error terms in the two equations (see Altonji et al. 2000).

We use three identifiers in estimating poor child health: the number of obstetricians/gynecologists per 10,000 women in the mother's city of residence, the presence (or lack thereof) of a Level III neonatal intensive care unit in the hospital where the baby was delivered, and the number of abortion providers performing more than 400 abortions in the mother's county of residence.[2] The first two are proxy measures for access to care, and abortion availability may be related to the wantedness of the child (see, for example, Grossman & Joyce 1990, which showed that children who are more wanted tend to receive greater levels of prenatal care). There is considerable variation in the availability of these inputs. For example, ob/gyns ranged from 7 to over 41, and abortion providers ranged from 2 to 35.

For these identifiers to be valid, they must satisfy the two conditions. Condition #1: They must be significant predictors of poor child health. Condition #2: They must be uncorrelated with relationship status of the parents.

Results

In Tables 4(a) and 5(a), we present the results from the models in which we estimate the effect of poor child health on whether the parents live together at follow-up

and whether the relationship commitment maintained/increased, respectively. In the probit models, child health is assumed to be exogenous to relationship status and in the bivariate probit models, we allow for the possible endogeneity of child health. In Tables 4(b) and 5(b) we present probit and bivariate probit estimates of child health. All models correct for within-city correlation of the error terms using the Huber-White method. Because the coefficients in these models are not easy to interpret, we also present marginal effects.

Whether the parents lived together at follow-up

According to the probit specification, poor child health significantly reduces the probability that the parents live in the same household at the follow-up. The marginal effect indicates that a having a child in poor health reduces the probability that they are cohabiting or married at follow-up by approximately 9 percentage points. The bivariate probit model also indicates a significant negative effect of poor child health on parents' cohabitation at follow-up, with the estimated marginal effect more than triple that from the single-equation model.

We test the hypothesis of zero correlation between the error terms in equations (6) and (7). As shown in Table 4(a), ρ is positive and significant at the 3% level. The positive sign of ρ is consistent with the hypothesis that a woman with a poor health endowment herself will be more likely to both have a child with a poor health endowment and be dependent on the father. It is possible, however, that over time the mother's poor health endowment could affect the relationship differently.

To assess the strength of the correlation between our identifiers and poor child health (Condition #1), we test the joint significance of these three identifiers in the

[2] Data on the abortion providers were provided by the Alan Guttmacher Institute.

bivariate probit model. As reported in Appendix Table 1, we perform Wald tests on the joint significance of the three identifiers: ob/gyns, abortion providers, and Level III NICUs. We find that they are jointly significant at the 1% level in both the probit and bivariate specifications.

To ensure that our set of three identifiers is excludable from the outcome equation (uncorrelated with the relationship status of the parents) (Condition #2), we follow Rashad and Kaestner (2003) and use a just-identified bivariate probit with the other two identifiers in the relationship equation. We perform Wald tests to determine whether the two identifiers are jointly significant in predicting whether the parents are cohabiting or married at follow-up. If they are jointly significant, then they are not valid identifiers.[3] The results, presented in Appendix Table 2, indicate that no matter which pair of identifiers we use to perform the test, we satisfy Condition #2 in that the identifiers are not jointly significant predictors of the relationship.

In the relationship status equation, the signs of the coefficients for predictors other than child health are as expected. The likelihood that the parents are cohabiting or married at follow-up is positively associated with education of the mother, the father's age, the baby's parents having resided together at baseline, and the father having visited in the hospital. In contrast, when the baby's father has one or more children with another partner, the parents are less likely to live together.

Whether the relationship remained the same or improved

The results in Table 5(a) indicate that having a child with a serious health problem significantly decreases the chance that the parents' relationship commitment will remain

[3] According to Bollen, Guilkey & Mroz (1995) it does not matter which pair of identifiers are included. To be cautious, we performed the test using each possible pair. As expected, the results did not vary by pair.

the same or increase. The marginal effect of poor child health on relationship change is 7 percentage points in the single-equation probit, which is very similar to the corresponding result in Table 4(a) and provides further evidence that having a child in poor health reduces the stability of the child's living arrangements. Again, the marginal effect of poor child health in the bivariate probit model is more than triple that from the single-equation probit.

As shown in Table 5(a), ρ is not statistically significant—even at the 10% level, indicating that the single-equation probit is appropriate provided that Conditions #1 and #2 are met. Indeed, the test results (presented in Appendix Tables 1 and 2) indicate that our identifiers are valid.

Simulations of relationship change

Based on the probit results from Table 5(a), Figures 1 and 2 illustrate the marginal effects based on a number of simulations. In each, we assume the mother is from the state of Michigan and that the baby's father visited in the hospital. We separate the profiles by race and by whether the father has a child with another partner (Figure 2) or not (Figure 1). These simulations show the effects of poor child health on the probability of the relationship remaining the same or improving, for four distinct sample profiles: (1) The mother and father are teenagers, poor, uneducated, did not live together at baseline, and have not known each other for one year. (2) The mother and father are in their early 20s, have a high school education, did not live together at baseline, and have known each other for 4 years. (3) The mother and father are in their late 20s, have some college, were living together at baseline, and have known each other for six years. (4) The parents are in their 30s, highly educated, lived together at baseline, and have known each other for

seven years. In the first three profiles, the mother has no other children. In profile (4) the mother has one other child, with either the father of the focal child or a different father.

Figures 1 and 2 highlight several key findings. First, race makes little difference in either relationship change or the effect of poor child health on relationship change. Second, children born into families with higher socioeconomic status are far less likely than children in poor families to experience a decline in parental commitment, no matter what their health status. Third, if the father has a child by another partner, the commitment level is more likely to decrease, regardless of child health. Fourth, having a child in poor health results in a decrease in relationship commitment, regardless of socioeconomic status. Fifth, the negative effect of poor child health on relationship commitment is larger in magnitude when the parents have low socioeconomic status.

Conclusion

Past research has found that poor child health is related to marital dissolution, placing unhealthy children at "double jeopardy" for future health and economic outcomes, and that non-marital relationships are more volatile than marital relationships in that they are more likely to end and to have shorter durations. In this study, we have tied together these literatures by examining the effects of poor child health on parental relationships using a new national sample of mostly unmarried parents. We found that within a very short period of time (12 – 18 months after the birth), having a child with poor health decreases the level of commitment in the parents' relationship, suggesting that not only will their children be at increased risk, but that the period of decreased

paternal attachment they experience will be even longer than previous studies have indicated.

Our results have important implications for our understanding of the processes underlying the intergenerational transmissions of health and poverty. Recent studies have highlighted the role of socioeconomic status in determining health and economic trajectories of children as they age. In particular, poor children receive lower levels of health investments that can buffer the effects of adverse health shocks. This recent line of research has assumed that the causality runs in one direction, from income to health, and that child health does not affect the parents' income. Our results indicate that poor child health may affect parental income through parental relationships, suggesting that child health and income may interactively and jointly determine children's health and economic trajectories.

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Table 1: Distribution of Cases by Parent's Relationship at Baseline & Follow-Up (mother reports)

Relationship Status at 12-months-Row percentages and counts

Relationship Status at birth:	Married	Cohabiting	Romantic	Friends	No Relationship	Separated/ Divorced	**Total**
Married	94% *978*	1% *11*	<1% *3*	<1% *1*	<1% *1*	4% *42*	***1036***
Cohabiting	15% *223*	56% *848*	9% *129*	11% *163*	8% *27*	1% *16*	***1056***
Romantic	6% *59*	25% *257*	23% *239*	25% *256*	20% *210*	1% *14*	***1035***
Friends	<1% *1*	6% *14*	6% *13*	45% *103*	40% *91*	2% *5*	***227***
Rarely/Never Talk	<1% *2*	5% *11*	6% *12*	26% *53*	60% *125*	2% *4*	***207***
Total	**31%** ***1263***	**28%** ***1141***	**10%** ***396***	**14%** ***576***	**14%** ***554***	**2%** ***81***	***4011***

Table 2: Changes in Relationships between Baseline and Follow-up

Relationship Status at birth:	**Direction of Change in Commitment Level**		
	Up	Same	Down
Married	N/A	94%	6%
Cohabiting	15%	56%	29%
Romantic	31%	23%	46%
Friends	12%	45%	42%
Rarely/Never Talk	38%	62%	N/A

***** The five relationship categories are listed in the first column from most to least committed. A movement up would be, for example, from Romantic to Cohabiting.

Table 3: Sample Characteristics (Standard Deviations in Parentheses)

	Proportions (unless indicated otherwise)	
	n=4011	**n=3804**
Relationship With Father Same or Improved		.72
Parents Lived Together at the Follow-up	.60	
Child In Poor Health	.06	.06
Mother's Characteristics:		
Age (years)	25 (6)	25 (6)
Less than High School*	.32	.32
High School Grad	.30	.30
Some College	.25	.25
College Grad	.12	.12
Medicaid	.61	.60
Attends Religious Services Several Times/Month	.39	.39
Hispanic	.27	.27
Non-White/ Non-Hispanic	.51	.51
White Non-Hispanic*	.23	.23
Time Has Known Father (months)	59 (57)	60 (57)
Lived with Baby's Father at Baseline	.63	.67
Male Child	.53	.53
Other Children (number)	1.1 (1.3)	1.1 (1.3)
Father's Characteristics:		
Age (years)	28 (7.2)	28 (7.2)
Less than High School*	.32	.32
High School Grad	.34	.34
Some College	.23	.23
College Grad	.11	.11
Hispanic	.27	.27
Non-White/ Non-Hispanic	.53	.53
White Non-Hispanic*	.20	.20
Visited Hospital at Birth	.84	.87
Has 1 Child w/ Another Partner	.16	.16
Has >1 Child w/ Other Partner	.18	.17
Identifiers		
# of Ob/Gyns per 10,000 women	21 (12)	21 (12)
# Abortion Providers in County	8 (8)	8 (8)
Level III NICU in Birth Hospital	.78	.78

Table 3: Sample Characteristics (continued)

States:	n=4011	n=3804
California	.12	.12
Texas	.16	.16
Maryland	.07	.07
Michigan	.07	.07
New Jersey	.07	.07
Pennsylvania	.09	.09
Virginia	.09	.09
Indiana	.07	.07
Wyoming	.07	.07
New York	.07	.07
Massachusetts	.02	.02
Tennessee	.02	.02
Illinois	.03	.03
Florida	.02	.02
Ohio*	.02	.02

* Excluded categories in analyse

Table 4(a): Probit and Bivariate Probit Estimates of the Effect of Poor Child Health on Parents' Living Together at Follow-up (n=4011)

	Probit		Bivariate Probit	
	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Child is in Poor Health	-.26** (.10)	-.09	-.85*** (.32)	-.33
Mother's Characteristics				
Age	.02 (.04)	.01	.02 (.04)	.01
Age squared	-.00 (.00)	-.00	-.00 (.00)	-.00
High-School Grad	.15*** (.05)	.06	.15*** (.06)	.06
Some College	.21*** (.06)	.08	.20*** (.06)	.07
College Grad	.52*** (.13)	.18	.51*** (.13)	.18
Medicaid	-.15** (.08)	-.06	-.14* (.08)	-.05
Attends Religious Services Several Times/Month	.10* (.06)	.04	.11* (.06)	.04
Hispanic	.15* (.08)	.06	.14 (.09)	.05
Non-White/ Non-Hispanic	-.26*** (.10)	-.10	-.27*** (.09)	-.10
Months Known Father	.00* (.00)	.00	.00* (.00)	.00
Lived with Baby's Father at Baseline	1.20*** (.06)	.45	1.18*** (.07)	.44
Male Child	.04 (.04)	.02	.05 (.04)	.02
Number of Other Children	.01 (.02)	.00	.01 (.02)	.00

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Table 4(a): Probit and Bivariate Probit Estimates of the Effect of Poor Child Health on Parents' Living Together at Follow-up (n=4011) continued

	Probit		Bivariate Probit	
	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Father's Characteristics				
Age	.04** (.02)	.02	.05*** (.02)	.02
Age squared	-.00 (.00)	-.00	-.00 (.00)	-.00
High-School Grad	-.04 (.05)	-.01	-.04 (.05)	-.02
Some College	-.00 (.06)	-.00	-.02 (.06)	-.01
College Grad	.19 (.13)	.07	.16 (.13)	.06
Hispanic	-.08 (.13)	-.03	-.07 (.13)	-.03
Non-White/ Non-Hispanic	-.08 (.13)	-.03	-.08 (.13)	-.03
Visited In Hospital at Birth	.67*** (.08)	.26	.66*** (.08)	.26
Has 1 Child w/ Another Partner	-.19*** (.04)	-.07	-.19*** (.04)	-.07
Has >1 Child w/ Other Partner	-.42*** (.08)	-.16	-.41*** (.08)	-.16
Log Likelihood	**-1837.03**		**-2702.40**	

*Significant at 10% level; **Significant at 5% level; ***Significant at 1% level
Note: Number in parentheses is (City) clustered robust standard error. All models include State fixed effects (not presented).

Table 4(b): Probit and Bivariate Probit Estimates of Poor Child Health (n=4011)

	Probit	Bivariate Probit
	Coefficient	Coefficient
Mother's Characteristics		
Age	.02 (.04)	.02 (.04)
Age squared	-.00 (.00)	-.00 (.00)
High-School Grad	-.05 (.08)	-.05 (.08)
Some College	-.07 (.07)	-.07 (.06)
College Grad	-.08 (.10)	-.08 (.10)
Medicaid	.09 (.07)	.10 (.08)
Attends Religious Services Several Times/Month	.08 (.06)	.09 (.06)
Hispanic	-.23*** (.10)	-.24** (.11)
Non-White/ Non-Hispanic	-.04 (.07)	-.05 (.07)
Months Known Father	-.00 (.00)	-.00 (.00)
Lived with Baby's Father at Baseline	-.10 (.08)	-.10 (.08)
Male Child	.15*** (.05)	.16*** (.05)
Number of Other Children	-.05** (.02)	-.06** (.02)

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Table 4(b): Probit and Bivariate Probit Estimates of Poor Child Health (n=4011) continued

	Probit	Bivariate Probit
	Coefficient	Coefficient
Father's Characteristics		
Age	.04 (.03)	.04 (.03)
Age squared	-.00 (.00)	-.00 (.00)
High-School Grad	-.06 (.07)	-.06 (.07)
Some College	-.36*** (.09)	-.36*** (.08)
College Grad	-.47*** (.16)	-.47*** (.16)
Hispanic	.13 (.13)	.14 (.13)
Non-White/ Non-Hispanic	.04 (.11)	.04 (.11)
# of Ob/Gyns per 10,000 women	-.03*** (.01)	-.03*** (.01)
# of Abortion Providers in County	-.12*** (.03)	-.12*** (.03)
Level III NICU in Birth Hospital	.07 (.09)	.06 (.09)
Log Likelihood	**-866.14**	**-2702.40**
Rho		**.30** **(.13)**

*Significant at 10% level; **Significant at 5% level; ***Significant at 1% level
Note: Number in parentheses is (City) clustered robust standard error. All models include State fixed effects (not presented).

Table 5(a): Probit and Bivariate Probit Estimates of Poor Child Health on Whether Parents' Relationship Stayed the Same or Improved (n= 3804)

	Probit		Bivariate Probit	
	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Child is in Poor Health	-.21** (.10)	-.07	-.79* (.42)	-.29**
Mother's Characteristics				
Age	.02 (.03)	.01	.02 (.03)	.01
Age squared	-.00 (.00)	-.00	-.00 (.00)	-.00
High-School Grad	.06 (.05)	.02	.06 (.05)	.02
Some College	.18*** (.05)	.05	.17*** (.05)	.05
College Grad	.51*** (.12)	.14	.50*** (.11)	.14
Medicaid	-.10 (.07)	-.03	-.10 (.07)	.03
Attends Religious Services Several Times/Month	.15*** (.05)	.05	.15*** (.05)	.05
Hispanic	.01 (.10)	.00	-.01 (.10)	-.00
Non-White/ Non-Hispanic	-.20** (.08)	-.06	-.20*** (.08)	-.06
Months Known Father	.00 (.00)	.00	.00 (.00)	.00
Lived with Baby's Father at Baseline	.38*** (.06)	.12	.36*** (.06)	.12
Male Child	.05 (.05)	.02	.06 (.05)	.02
Number of Other Children	-.02 (.01)	-.01	-.02 (.01)	-.01

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Table 5(a): Probit and Bivariate Probit Estimates of Poor Child Health on Whether Parents' Relationship Stayed the Same or Improved (n= 3804) continued

	Probit		Bivariate Probit	
	Coefficient	Marginal Effects	Coefficient	Marginal Effects
Father's Characteristics				
Age	.05*** (.02)	.01	.05** (.02)	.02
Age squared	-.00 (.00)	-.00	-.00 (.00)	-.00
High-School Grad	-.04 (.05)	-.01	-.04 (.05)	-.01
Some College	-.01 (.08)	-.00	.04 (.07)	-.01
College Grad	.16 (.15)	.05	.14 (.15)	.04
Hispanic	-.10 (.14)	-.03	-.09 (.15)	-.03
Non-White/ Non-Hispanic	-.12 (.14)	-.04	-.11 (.14)	-.04
Visited In Hospital at Birth	.48*** (.07)	.17	.47*** (.07)	.16
Has 1 Child w/ Another Partner	-.26*** (.06)	-.09	-.26*** (.06)	-.09
Has >1 Child w/ Other Partner	-.41*** (.06)	-.14	-.41*** (.06)	-.14
Log Likelihood	**-1954.69**		**-2785.54**	

*Significant at 10% level; **Significant at 5% level; ***Significant at 1% level
Note: Number in parentheses is (City) clustered robust standard error. All models include State fixed effects (not presented).

Table 5(b): Probit and Bivariate Probit Estimates of Poor Child Health (n= 3804)

	Probit	Bivariate Probit
	Coefficient	Coefficient
Mother's Characteristics		
Age	.03 (.05)	.02 (.05)
Age squared	-.00 (.00)	-.00 (.00)
High-School Grad	-.06 (.08)	-.05 (.08)
Some College	-.08 (.07)	-.07 (.07)
College Grad	-.08 (.10)	-.08 (.11)
Medicaid	.08 (.08)	.09 (.08)
Attends Religious Services Several Times/Month	.09 (.06)	.09 (.06)
Hispanic	-.26** (.11)	-.27*** (.11)
Non-White/ Non-Hispanic	-.06 (.07)	-.07 (.07)
Months Known Father	-.00 (.00)	-.00 (.00)
Lived with Baby's Father at Baseline	-.14 (.09)	-.14 (.09)
Male Child	.15*** (.06)	.16*** (.06)
Number of Other Children	-.06** (.03)	.06** (.03)

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Table 5(b): Probit and Bivariate Probit Estimates of Poor Child Health (n= 3804) continued

	Probit	Bivariate Probit
	Coefficient	Coefficient
Father's Characteristics		
Age	.03 (.03)	.04 (.03)
Age squared	-.00 (.00)	-.00 (.00)
High-School Grad	-.06 (.07)	-.06 (.07)
Some College	-.38*** (.08)	-.37*** (.08)
College Grad	-.47*** (.16)	-.48*** (.17)
Hispanic	.11 (.15)	.12 (.14)
Non-White/ Non-Hispanic	.05 (.11)	.06 (.11)
# of Ob/Gyns per 10,000 women	-.03*** (.01)	-.03*** (.01)
# of Abortion Providers in County	-.13*** (.04)	-.14*** (.04)
Level III NICU in Birth Hospital	.05 (.10)	.05 (.09)
Log Likelihood	**-831.40**	**-2785.54**
Rho		**.28** **(.17)**

*Significant at 10% level; **Significant at 5% level; ***Significant at 1% level
Note: Number in parentheses is (City) clustered robust standard error. All models include State fixed effects (not presented).

Figure 1: Probability of Relationship Status Improving or Remaining the Same, Father has No Other Children With Other Partners

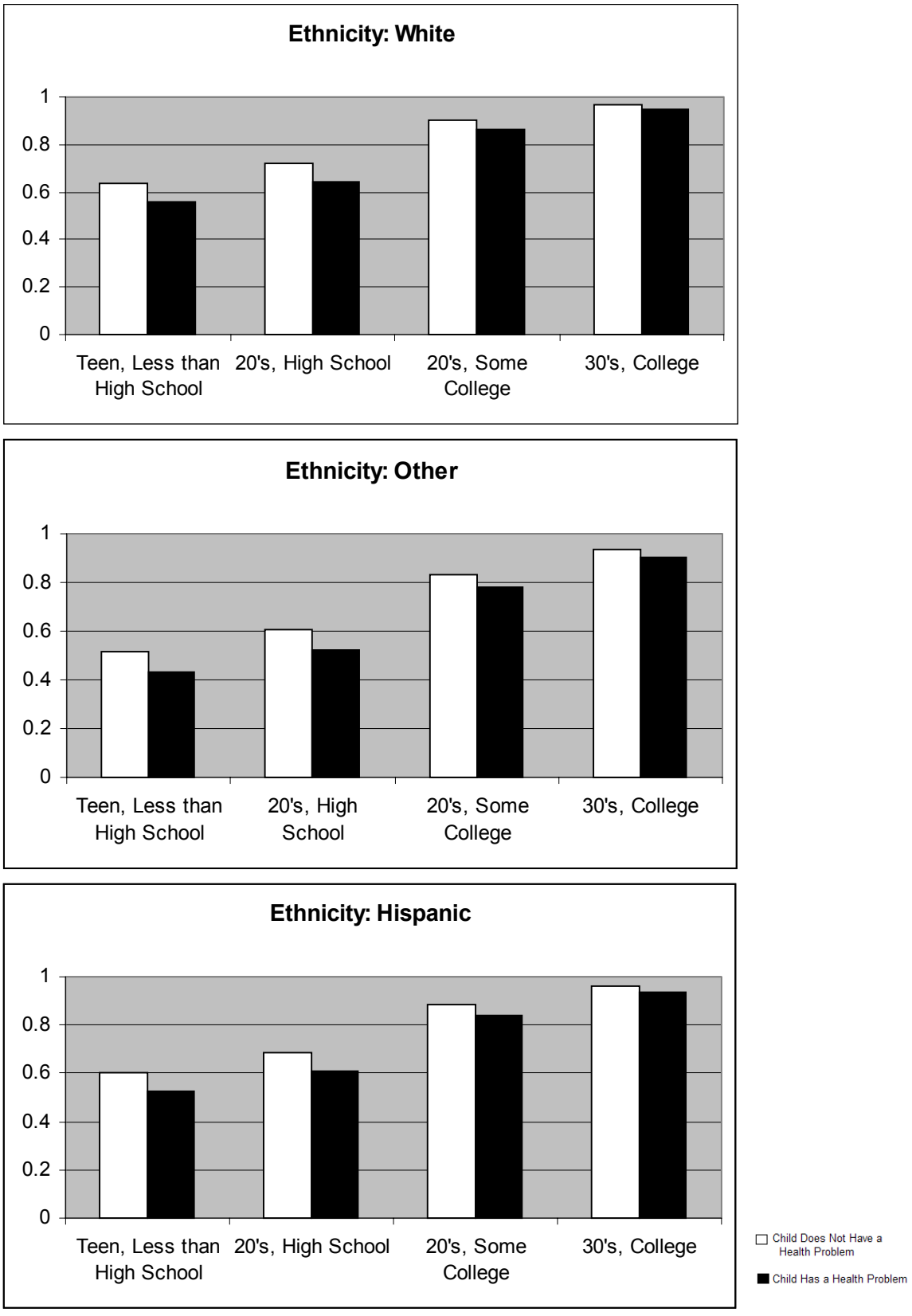
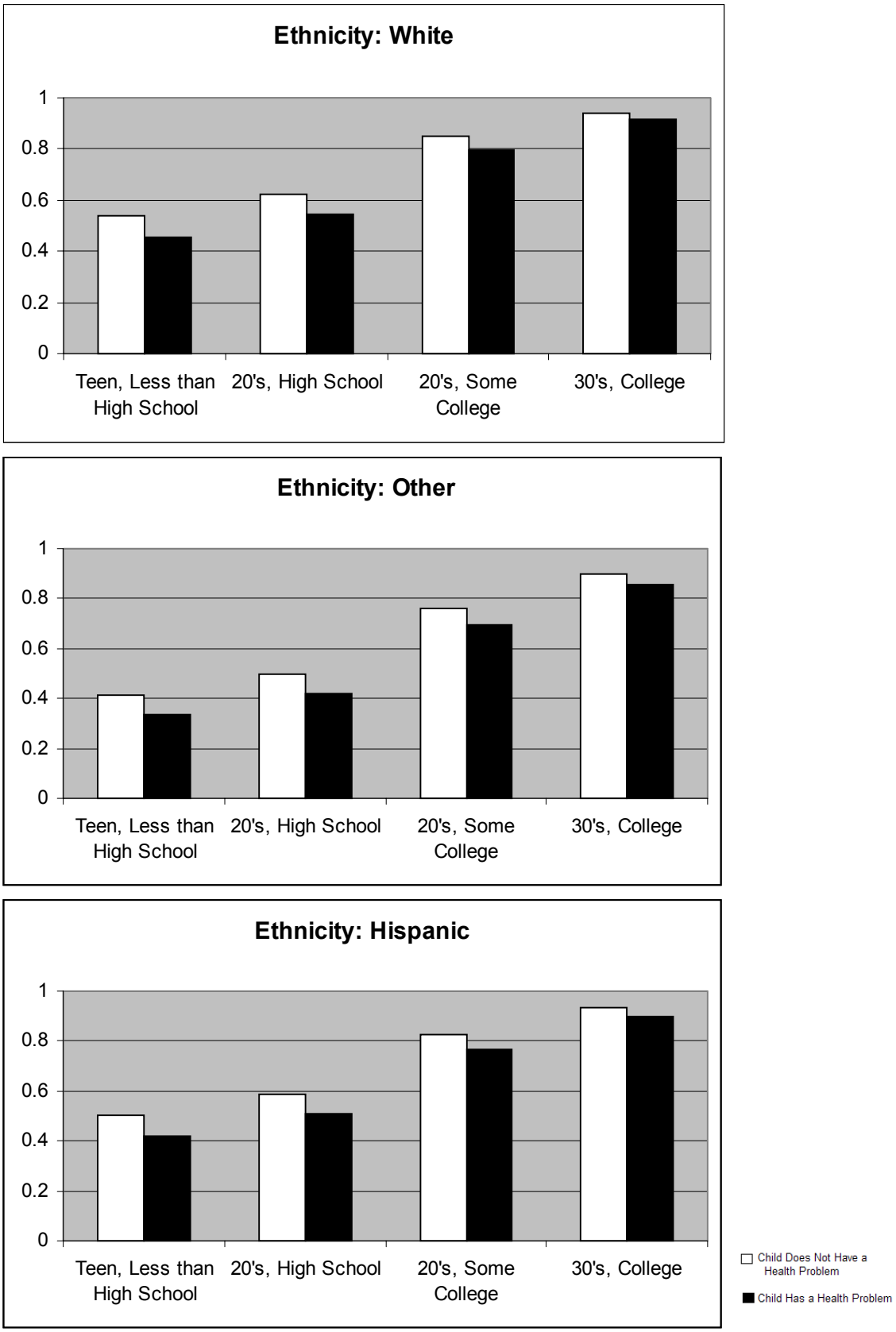


Figure 2: Probability of Relationship Status Improving or Remaining the Same, Father has One Child With Another Partner



Appendix Table 1

Tests for Condition #1: Identifiers are Significant Predictors of Poor Child Health
Chi-Square Statistics for Joint Significance (df=3)

	Results for Tables 4 (a), 4(b)		Results for Tables 5(a), 5(b)	
	Probit Model	Bivariate Probit Model	Probit Model	Bivariate Probit Model
Identifiers: Ob/gyns, abortion providers, NICUs	22.21***	21.54***	21.30***	23.28***

Appendix Table 2

Tests for Condition #2: Identifiers are Excludable from Relationship Equation
Chi-Square Statistics for Joint Significance (df=2)

	Parents Lived Together at Follow-up	Relationship Improved or Stayed the Same
Ob/gyns and Abortion	3.44	.15
	p=.1795	p=.9264
Ob/gyns and NICU	1.47	.10
	p=.4803	p=.9495
NICU and Abortion	3.33	.12
	p=.1890	p=.9427