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THE EFFECTS OF CHILD HEALTH ON MARITAL STATUS AND FAMILY STRUCTURE

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ABSTRACT

The purpose of this paper is to provide evidence on the effect of child health on marital stability and family structure within an economic framework. We use the 1988 National Health Interview Survey's Child Health Supplement, with a sample of about 9,000 families to test whether having an unhealthy child decreases the mother's chance of being married, and whether it increases her chance of living in an extended family. Using two different measures of child health, we find that having an unhealthy child does decrease the mother's likelihood of being married. Our results are strongest for white women who were married at the time of the child's birth and for black women who were unmarried at that time. These results imply that children in poor health will, more likely, face obstacles beyond their illness, since they will also be more likely to suffer consequences of poverty and poor schooling outcomes which results when raised in a female headed household. The only mitigating factor is that, for white children, they will be more likely than healthy children to living in an extended family.

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I. Introduction

There exists an extensive literature on the stresses of having an unhealthy or disabled child on the family.[1] These stresses include psychological difficulties, such as "chronic sorrow", increased economic costs, and unexpected demands on the parents' time. Although there is considerable controversy, some previous researchers claim that this additional stress tends to lead to a greater incidence of marital dissolution.[2] The controversy centers around the issue of whether an unhealthy child brings the family closer together or tears it apart. In addition, there has been concern over whether the researcher has adequately controlled for all relevant factors, such as parents' education, income and race, which may also effect marital stability.

Recent literature has shown that children in homes with marital instability are more likely to experience poor outcomes into adolescence and adulthood (McLanahan (1985), Cherlin et al. (1991)). It is also the case that female-headed households are more likely to experience poverty. Moreover, these families perpetuate poverty into the next generation through lower educational attainment of their children and greater likelihood of daughters becoming female heads of household.[3] These researchers find evidence that the stresses of marital dissolution and the economic hardships encountered are both causative factors in the perpetuation of poverty. Thus, it is especially important to ascertain whether unhealthy or disabled children are more likely to experience parental marital instability, since these children will be doubly at risk for poor adult outcomes.

The purpose of this paper is to provide further evidence on the effect of child health on marital stability and family structure. Our analysis improves on previous studies in several ways. First, ours is the only study to use an economic framework for examining the effect of child health on marital stability and family structure. Second, we use a recent, nationally representative data set, the 1988 National Health Interview Survey's Child Health Supplement (CHS) for our empirical test. This data set provides detailed information on all household members, as well as information on numerous childhood illnesses, conditions and disabilities. Thus, we can examine several alternative measures of child health. Third, we utilize a multivariate approach, absent in all previous studies of the effects of poor child health on marital stability. Fourth, we examine a wider range of marital and family outcomes than many research. For example, many studies only use children born into two-parent households. This eliminates the majority of black children from these studies. In addition to considering single-parent households, we also consider extended family situations.

II. Effects of Child Health on Marital Status

What are the effects of child health on the mother's choice of marital status ? This is a complicated question, since the current observed choice of marital status depends on the initial state at the time of birth, as well as the factors that affect transitions into and out of marriage. Our discussion begins with an examination of the transition out of marriage, we next discuss transition into marriage, and finally we discuss the likelihood of entering into an extended family situation.

In economic terms, a child in poor health can be thought of as an unexpected outcome of the marriage, representing a deviation from the ex-ante expectation of the marriage. The child in poor health can directly reduce the utility of the marriage. Featherstone (1980) suggests that marriages experience unusual stress when caring for a special needs child.[4] First, parents experience extreme emotional responses, including "chronic sorrow" (Yura 1987). Second, the special needs child may be perceived as a symbol of shared failure, and has the potential to create marital discord. Alternatively, Yura (1987) and Darling (1987) discuss the positive effects of disabled children on the parents' relationship. The net effect of poor child health on the parents level of utility, however, appears to be negative. [5]

A child in poor health can also affect the utility of the marriage indirectly, through the budget constraint. That is, there are unexpected time and money demands which reduce the family's resources available for all other household consumption. Buboiz and Whiren (1984), for example, describe the added financial, time and psychological resources that are required when raising a handicapped child. Darling (1987) cites added direct costs for children with disabilities: respite care/baby sitting, medical care, therapy and equipment, home modifications, and legal expenses. Indirect costs may be incurred because the family's residential location may be constrained, or time and energy available for market work may be reduced.[6]

Due to both the direct, negative effects on utility of an unhealthy child, and the indirect effects through the budget constraint, the utility of the marriage is less than the ex-ante amount when there is a child in poor health, and the marriage will be more likely to dissolve. This would lead to a negative relationship between child health and the probability of being married in the cross section. On the other hand, if the sick child leads to a strengthening of the parents relationship, which outweighs the negative indirect effects of a sick child on marital utility, then we could observe a positive relationship between poor child health and the probability of being married.

A sick child might also affect the transition out of marriage through the child's impact on the parents' allocation of time. In particular, a child in poor health can place a greater demand on the mother's time than a healthy child, and can be considered a more home time intensive good (Gronau 1977). Assuming that the mother has primary responsibility for child care, and does not relinquish the child, the presence of a sick child creates an incentive for a women to specialize in home production.[7] The mother would decrease her investments in market oriented skills, and her market wage would decrease. If there is negative assortative mating on the wage, as described by Becker (1981), the gains from marriage would increase and lead to a decrease in the probability of transiting out of marriage. On the other hand, if there is positive assortative mating on the wage, as described by Lam (1988), the gains from marriage would decrease, and there would be an increase in the probability of transiting out of marriage. Thus, the effect of a sick child on the transition probability out of marriage depends upon whether there is negative or positive sorting on wages, which in this analysis is an empirical question.

Next, we examine the effect of child health on the factors that influence the mother's transition into marriage. For mothers who are unmarried (eg. divorced), Becker's (1981) model of assortative mating is again a useful framework of analysis. As was noted above, a special needs child will create an incentive for a woman to specialize in home production, and thus, reduce her market oriented investments and her wage. Depending on the type of sorting in the marriage market, with regard to wages, this could lead to an increase or decrease in the potential gains from marriage, and the probability of being married. The decision to get married,however, also depends on the ability of a person to find a suitable mate. Keeley (1977), models this marital search process, and some of the results from that paper can be useful in analyzing the current problem. An unmarried women with a sick child has a "rare trait", as defined in Becker et al. (1977), and given this unique attribute, will find fewer acceptable marriage offers from which to choose, since the expected utility from marriage is relatively low. Therefore, she will be more likely to remain unmarried.[8] On the other hand, the search costs associated with finding an acceptable mate, for a person with a "rare trait", also rise, and will lead to a shorter search duration and a greater likelihood of marriage. Again, the direction of the effect of child health appears to be ambiguous. This apparent ambiguity can be resolved, however, by noting, as does Becker et al.(1977), that a person with a "rare trait" has a higher probability of divorce. Since we assume that the mother is observed at her equilibrium choice, we would expect to observe her to be unmarried (eg. never married or divorced).

There are differences between unmarried women regarding their likelihood of marriage (remarriage). Previously married women have made investments in "marriage specific" capital which has two forms; transferable and spouse specific (Chiswick and Lehrer 1990). Children are considered spouse specific capital, while specialization in home production would be considered transferable capital. The more spouse specific capital a woman has, the less likely she will be to remarry, and a sick child might represent a greater quantity of spouse specific capital then a healthy child. Therefore we would expect a divorced women with a sick child to be less likely to be remarried. The mother of a sick child, however, will be more specialized in home production, and have more transferable capital than otherwise similar women. Again, depending on the role of wages in determining the gains from marriage, this could increase or decrease the probability of remarriage.

The above discussion has lead to the expectation that a woman with a sick child will be observed in an unmarried state, if there is positive assortative mating on wages and a negative direct effect on utility of a sick child. If there is negative assortative mating, and positive a positive direct effect on utility of a sick child, we would expect to observe the woman as being married in a cross sectional analysis.

We now discuss the impact of child health on the probability of living in an extended family. For all adults, there are advantages to living in an extended family situation such as greater potential for economies of scale in household production. For single parents, an extended family situation provides an alternative to marriage, by allowing for specialization in either household production or market work in a non-marriage setting. The disadvantage of the extended family is the disutility of having other adults or children in the household. Given the greater advantages of an extended family situation to single parents, it is not surprising that children living with only one parent are three to four times more likely to live with other relatives than children in two parent households.[9] However, even in two parent households, about 5% of children have other relatives in the home.[10]

An unhealthy child will affect the decision to enter into an extended family living situation for two reasons. First, there may be a greater need for income to meet the needs of the child, thus the realization of scale economies becomes more important. And, secondly, the child may require a change in the degree and type of specialization in the household, depending on the nature of the household production function. For example, the mother may need to spend much of her non-market time caring for the ill child, and another adult household member would contribute by performing most of the other household production, thus inducing a greater degree of specialization and a greater incentive to enter into an extended family. It is also possible, however, that the mother may be able to engage in less market work, and have more time for both the care of the sick child and other household production. In this case, the gains to an extended family may decrease, especially in a married context. Thus, it is an empirical question to determine the effect of having a child in poor health on whether the family is nuclear or extended.

From the above discussions, we have identified several ways in which an unhealthy child may affect the probability of being married, getting divorced, getting remarried, and being in an extended family. In our empirical analysis, described below, we focus on three specific sets of outcomes. First, we examine the probability of observing a mother as currently married versus not married. Second, we examine the probability of observing a mother as currently in one of the four possible types of households: married in a nuclear family, married with an extended family, single head of household, and single and in an extended family. Finally, we also explore the dynamics of the marital process by using a dependent variable that measures three possible paths for a mother who was married at the time of birth : staying married to biological father, getting divorced and remarried, and getting divorced and not being remarried at the time of the interview.[11]

III. Analytic Framework

We are interested in devising a probabilistic choice model for the marital status and household composition of a family with a child in poor health. Because we only have information regarding the current household in which the child resides, we use a model which assumes that the household is currently at an equilibrium regarding such choices.[12] Thus, we follow the approach by Danziger et al. (1982) and by Hutchens et al. (1986), who use cross sectional data to represent living arrangements for households which are in equilibrium. Danziger et al. (1982) argue that the choices that are observed in a cross sectional study will be representative of the long run equilibrium for this particular market.

Also, because we only have information on biological parents in the household, and because children living with one parent are far more likely to live with their mothers, we focus on the mother's choices and equilibrium.[13] The use of this type of an equilibrium model has previously been justified by Becker et al.(1977), who assume that an individual can change his/her living arrangement status through appropriate payments, if the bargaining costs associated with such transactions are small. Becker et al.(1977) used this assumption of "costless compensation" in modelling the probability of divorce, but it applies equally to the more general situation of living arrangements currently being examined.[14]

We consider four living arrangement options for the mother: married in a nuclear family, single in a nuclear family, married in an extended family, and single in an extended family.[15] Following the approach of Hoffman and Duncan (1988), the mother chooses a living arrangement to maximize her utility. Utility is denoted by V_{ij}, where i indexes the person and j indexes the living arrangement. The utility of the mother is of the following form:

(1) $V_{ij} = f(Z_{ij})$,

where the Z_{ij} are arguments of the (indirect) utility function, such as consumption and leisure, and f, is the specific functional form. The mother makes her choice based on the comparison of the utility levels obtainable across the alternative types of living arrangements. The mother chooses living arrangement j if :

(2) $\text{Prob}(V_{ij} > V_{ik})$ for all $k \neq j$.

In the current case, data for the Z_{ij} are unavailable, so a set of predicting equations of the following form will be used as replacements (Hutchens et al. 1989) :

(3) $Z_{ij} = g(X_{ij})$,

where the X_{ij} are characteristics of individual i and/or alternative j, and g is some functional form. The next step is to substitute equation 3 into 1. If an error term is added to equation 1, and assumed to be an independent and identically distributed random variable with an extreme value (type I) distribution, the model can be estimated by using the "multinomial logit" method (McFadden 1984). The basic form of the model is :

(1a) $V_{ij} = h(X_{ij}) + e_{ij}$

(2a) $\text{Prob}(V_{ij} > V_{ik})$ for all $k \neq j$.

In the current model, the X_{ij} are characteristics of the chooser, and are the same across all alternatives. In this paper, the function h will be specified as a linear combination of the X_{ij}. Note that by substituting the X_{ij} 's for the Z_{ij} 's, we are creating a "reduced form" model. This is necessary due to the constraints of the available data. The alternative would be to use the "conditional logit" framework in which the arguments of the utility function enter directly into the model.[16] The disadvantage of the reduced form is that we cannot separate the direct effects of poor child health on utility (and choice) from the indirect effects. For example, child health has an indirect effect on utility through its effect on the amount of leisure time available. Thus, if poor child health affects living arrangements, we cannot ascertain whether this is due to the direct impact of child health on utility or its indirect impact via leisure. The reduced form provides important and useful information, however, since it allows an assessment of the total impact of child health on marital status and household composition.

IV. Empirical Analysis

Data and Variables

The data for this study came from the National Health Interview Survey of 1988, including the Child Health Supplement to that survey. The sample consists of approximately 17000 children. The data contain detailed information on child health, characteristics of the biological parents, and of members of the current household. We restrict the child sample in several ways. All sample children had to be at least 2 years old, and in the case of children in poor health, their illness had to be noticed or diagnosed more than two years before the interview date. These restrictions were imposed to allow for sufficient time for the mother to adjust her living arrangement, and are related to the above discussion of this paper's use of an equilibrium model. We included children through age 15, and excluded those with a deceased parent. We also limited the analysis to non-hispanic white and black women, since the sample of hispanic women was too small for statistical purposes. These restrictions resulted in a sample of approximately 10,500 observations of which only 9,098 could be used due to incomplete information. Although we concentrate on children living with their biological mothers, we consider the potential bias this selectivity introduces.

The focus of the analysis is on the mother's current choice of living arrangement. Given the available data, a variety of dependent variables were constructed. The first measure is whether or not the mother was legally married and not separated at the time of the interview.[17] The data were not detailed enough to identify those women living with a partner who were not legally married. The second dependent variable constructed was a combination of marital status and household composition at the time of the interview. This consisted of the three possible categories, described above, which classifies mothers on the basis of their marital status and household size. Finally, to make use of the information on the mother's marital history, a three category dependent variable was developed for mothers who were married at birth. This variable identifies a women as, 1) continuously married to the biological father, 2) previously divorced from the biological father and currently remarried, and 3) previously divorced from biological father and currently divorced. This measure is not totally adequate in terms of the equilibrium framework (see footnote 11), but does provide some valuable insight into the effects of child health on marital status and household composition.

All analyses were done separately by race after likelihood ratio tests indicated that there were systematic differences in the relationships under study between racial groups. As noted previously, hispanic women were dropped from the analysis due to the small sample size of this group. The differences across racial groups are consistent with the results of Chiswick and Lehrer (1990), who found substantial differences in remarriage probabilities between white and black women.

Within each racial group (ie. blacks and whites), the sample was also divided according to whether the mother was married at the time of the child's birth.[18] We do this for two reasons. First, as suggested by Becker et al. (1977) and Chiswick and Lehrer (1990), women who were previously married might have different preferences or tastes for marriage than women not previously married. In the current sample, additional information is available that might be a clear indicator of such preferences, namely whether the women was married at time of birth of the sample child. A second reason to divide the sample is control for the potential reverse causality between marital status and health caused by poor birth outcomes. Unmarried mothers have been shown to use less prenatal health inputs, and have lower birthweight babies than married mothers.[19] And, as discussed by Chaikind and Corman (1990), these children are more likely to have health and developmental problems. In addition, we estimate all models for a sample of mothers who are less than 35 years old. We estimate the model for the younger cohort in order to take into account possible heterogeneity of the sample due to taste or other differences by cohort.

Table 1 contains the sample frequency distributions of the dependent variables by race and marital status for the dependent variables used in the analysis. The numbers for the younger age cohort have been omitted, but are quite similar to those listed. As Table 1 demonstrates, there are large differences between white and black women. A large majority (90%) of white women were married at the time of the birth of the sample child, while for black women, a majority (56%) were unmarried. For both groups, however, the majority of women who were married at the birth were also married at the time of the interview, although the proportion is higher for whites. For both races, the likelihood of living in an extended family is greater if the woman was unmarried at the time of the birth, although the proportion in extended families is greater for blacks than for whites.

The National Health Interview Survey contains a variety of measures of child health. In selecting child health measures, we have considered the possibility of the reverse causality between marital status (or household composition) and child health. In fact, research by Mauldon (1990) provides evidence that marital discord can cause poor health in children. In order to circumvent this problem, we select measures of child health which are believed to be caused by congenital and/or hereditary factors. Thus, we limit the possibility that home factors caused the child to become ill. Note that this discussion centers on health problems after the birth of the child. Previously, we attempted to control for prenatal problems, by dividing the sample into children whose mothers were and were not married at birth.

In this study, two measures are used to describe child health. The first measure, DEVDEL, is a dichotomous variable indicating whether the sample child had ever experienced a delay in development. This variable is intended to measure whether the child ever had a delay in growth and/or development. It includes children with long lasting, severe developmental delays as well as children with temporary or limited deficits (Zill and Schoenborn, 1990). As reported by Zill and Schoenborn (1990), 45 percent of all developmental delays were noticed or diagnosed by the sample child's first birthday, and the rates of prevalence did not increase with child age.

The second measure of child health (NUMCON) focused on physical ailments. This variable measures the number of health conditions the child has. The causality issue is particularly problematic regarding the physical health indicators. The objective is to obtain a measure of child health that is not dependent on marital status and/or household composition. Mauldon (1990), provides some guidelines with respect to this problem, but the data in that paper are from the 1981 NHIS and are not totally consistent with the 1988 survey. In light of this problem, the measure currently developed uses the physical conditions that Mauldon (1990) considered to be the "non-target" group as a starting point and builds from there. The non-target group of conditions is that group of physical ailments that could not plausibly be a result of marital status or household composition differences among families. The details of the way the measure was constructed are in Appendix Table 1.[20] The empirical work was carried out using the individual measures, both measures together, and a dichotomous variable to indicate either condition.

One of the major drawbacks of the Child Health Survey is that it relies solely on self-reported measures of child health. We have addressed this issue in a number of ways. First, our measures of child health are specific and represent quite "memorable" problems. Second, we separate the sample into cohorts with characteristics related to differential rates of reporting. Mauldon (1990) suggests that single mothers may report a higher fraction of the illnesses than married mothers. We have separated women according to marital status at birth. Andersen et al. (1987) find significant reporting differentials between blacks and whites. Again, we estimate our equations separately by race. Mauldon (1990) discusses other characteristics related to reporting such as age, education, family size and income. Following her strategy, we include variables on the right side of the equation which may also be associated with rates of reporting.[21]

Frequency distributions for the health variables also appear in Table 1. We provide separate distributions for race and marital status at the time of the birth. The numbers for the younger cohort are similar to those presented, and have been omitted. In general, reported prevalence of poor health is greater among the sample of children whose mother was unmarried at the time of the birth. Among the sample of white mothers who were not married at birth, 6.6% report a child with at least one physical ailment, and 4.9% report having a child with a developmental delay. Interestingly, there is very little overlap in these two measures. Only 6 of the 77 "unhealthy" children are classified that way according to both measures. For the sample of white mothers who were married at the time of birth, 4.5% report having a child with a physical problem, and 4% report a child with a developmental delay. Again, there is little overlap across health categories. In our sample there appears to be a large difference, by race, in the reported incidence of developmentally delayed children. Black women report lower prevalence of health problems, but the difference is only significant for developmental delays. The reported prevalence of developmental delays in black children is about 2.5% and is similar for women of both types of marital status at the time of birth.[22]

The explanatory variables consist primarily of the personal attributes of the mother, as measured at the time of the interview. These include the mother's age, education, age at time of first birth, number of own children under 6 years of age, and number of own children aged 6 to 17.[23] The square of mother's education, age, and age at time of the first birth were also included, as was an interaction between mother's age and education. The other explanatory variables in the model include several geographical location dummy variables and the sample child's age and its square. For the sample of mothers who were married at the time of the birth of the child, several additional variables were constructed that relate to the biological parents' marriage. These include mother's age at the time of the marriage, the number of years married prior to the birth of the sample child and the number of older own children. Most of these variables are found in previous studies of marital status and household composition (Becker, et al. 1977, Hutchens et al. 1986, 1989, Chiswick and Lehrer 1990).

Appendix Table 2 provides mean values for each of the variables described, above. We provide means for the entire sample, as well as means for the married at birth and not married at birth sub-samples, for white and black women, respectively.

Results

A primary concern of this paper is in analyzing the effect of child health on the current marital status of mothers. The importance of this question is related to the fact that many single, female headed households are susceptible to current spells of poverty, and that the children of such families are also more likely to experience poverty as adults (McLanahan 1985, McLanahan and Bumpass 1988). Thus, the first set of results we will review are from a binary logit model of the probability of being married at the time of the interview. The coefficients for the child health indicators are listed in Table 2. These equations are estimated only for children living with their biological mother. A complete set of results are contained in Appendix Table 3. The 16 results in each table represent the four different sub-samples run with four different sets of measures of child health.

Overall, the effect of poor child health on a women's probability of being married at the time of interview is almost always negative (28 out of 40 times), and often significant. These results are robust with respect to the specification.[24] The findings suggest that the total effect of poor child health on a mother's marriage probability is negative, although identification of the specific theoretical reason is not possible. Note that the other explanatory variables generally had their expected signs (Appendix Table 3). We find, however, some interesting differences between races.

We find that health measure coefficients are more significant for black women who were not married at birth than for black women who were married at birth, whereas the opposite is true for white women; those who were married at birth have more significant health measure coefficients than those unmarried at birth. This difference is apparent for the under 35 cohort as well as for the full age cohort. In other words, for black women, the greatest impact of poor child health occurs to women who were not married at birth. These women are significantly less likely, than women with healthy children, to marry either the child's father or another man. The magnitude of the effect is substantial. For example, for an unmarried black woman with a child with a physical health condition, the probability of currently being married is sixteen percentage points lower than a similar woman with a healthy child.[25] For white women, the greatest impact is felt by women who were married at the time of the birth. They are significantly more likely, than those with healthy children, to become divorced and to not remarry. The magnitude of this effect is about five percentage points.[26] Another difference between the races is that, for blacks, the developmental delay (DEVDEL) measure of child health is never significant, whereas the developmental delay variable for whites is generally as significant as the NUMCON variable. That is, black women seem to respond more strongly to physical, as opposed to developmental problems, compared to white women, who seemed to be affected by both measures equally.

Clearly, there are differences in the sample that are related to race. as indicated by the likelihood ratio tests, discussed earlier. These differences could be related to differences in preferences between the races or differences in the functioning of the marriage market. The fact that over 90% of white women are married at the time of birth, whereas the majority of black women are not, suggests substantial marriage market differences. Our result implies that unhealthy children affect the marital utility level differently for black and white women. In general, however, the different results of Table 2 support the conclusion, that poor child health is negatively correlated with the probability of being married.[27]

As mentioned, above, we estimate the logit models only for children living with their mothers. It has been suggested that the decision to have a child live with the mother may be related to the child's health. Thus, by including only those living with the mother, the results may be biased. In order to address this problem, we estimate a bivariate probit model with sample selection based on whether or not the mother currently lives with the child (Van de Ven and Van Praag 1981). The model consists of two equations, one for the probability of being married, and the other for the probability that the mother lives with the child. We assume that the random variables underlying the specification of the two equations are distributed as bivariate normal. The sample selection is due to the fact that we only observe the probability of marriage for the mother, when the mother lives with the child. The right hand side of the selection model contains the geographic variables, the mother's current age (squared), the mothers age at the birth of her first child (squared), the child's age (squared), a series of dummy variables for the (biological) birth order of the child, and a dummy variable indicating a male child.[28]

Approximately 11% of the original sample of children do not live with their mother, but due to missing data we lost about half of those (11%) observations. Also, we could only estimate the bivariate probit model for the sample of white women who were married at birth.[29] The results of this analysis, however, indicate that there is in fact no bias in the parameter estimates due to the sample selection. The estimates of the coefficients from a binary probit model (which did not consider selectivity bias) were virtually identical to those of the bivariate probit (which did consider sample selection), although the estimated correlation coefficient across equations was significant.

Both Cherlin et al. (1991) and Mauldon (1990) suggest that certain parental factors may be related to both the child's well-being and to marital stability. Mauldon mentions two possible factors: parental youth or lack of eduction. We control for these variables. However, there may also be some unmeasured factors for which we do not control. One possible unmeasured factor may be the health endowment of the mother.[30] That is, mothers with poor health endowments may be more likely to experience both marital dissolution and unhealthy children. We explored this possibility by including mother's health status in our models.[31] Including mother's health status in the model, however, leaves the estimates of the effect of child health on marital status virtually unchanged, even though the coefficient on mother's health is statistically significant. and negative. The self-reported mother's health status is an imperfect measure of the mother's unobserved health endowment (see footnote 31), and we can not categorically rule out the possibility that some other unmeasured factor is the driving force behind our results.

It was hypothesized above, that child health might also be expected to affect the choice of living with other adults, or what we call an extended family. The basis of this expectation, is that a child in poor health will use more of the households resources (eg. time and financial), and the mother will choose a living arrangement that can provide additional resources or total wealth. The addition of other adults in the household allows for greater specialization within the household, and thereby providing more of the necessary resources.

To investigate this issue, we examine the determinants of a mother's choice of three possible living arrangements; married, single head of household, and single living in an extended family. Table 3 lists the coefficients of the child health indicators for women of all ages, Table 4 lists the coefficients for women under 35 years of age, and a complete set of results for one specification is contained in Appendix Table 4. The reference group in each table is married women living in a nuclear or extended family, so a positive coefficient is interpreted as raising the probability of living in a particular setting, relative to that of being married.[32]

Our discussion of Tables 3 and 4 centers on issues of extended family. Among the sample of black mothers, the results indicate that the mother is no more likely to live in an extended family when there is a sick child present as compared to when the child is healthy. This is true in all cases except when examining the effects of a developmentally delayed child on the choices of black women under 35 years of age who were married at birth. For the sample of white mothers, both the full sample and mothers under 35, who were married at birth, the presence of a sick child makes them significantly more likely to be single, and in an extended family. This conclusion is reached by noting that the child health coefficients on all the child health indicators in the "single extended" columns are positive, and in a majority of the cases statistically significant. In addition they are larger than the coefficients associated with the health indicators in the single head columns. [33] Among the sample of white women not married at the time of birth, the results indicate that a developmentally delayed child raises the probability of being single and living in an extended family, for both the full cohort and the younger mothers.

Since the NHIS data contain information on the mother's marital status at the time of birth of the sample child, we were able to build a limited longitudinal record of a mother's marital choices since the time of birth of the sample child.[34] The results regarding this analysis are contained in Table 5. Only women who were married at the birth of the sample child are included in this analysis. The dependent variable identifies whether a mother has been continuously married to the biological father since the time of birth, divorced and remarried at the time of the interview, or divorced and still divorced at the time of interview. The reference group are those women who stayed continuously married to the biological father.

The results of this analysis are consistent with those in the previous tables. There is a much greater likelihood of observing a white women as not married when there is a sick child present, and there is no impact on the choices of black women. For the white women, although the coefficients on "currently remarried" are generally positive and sometimes significant, they are always exceeded, in magnitude, by those on "currently divorced". This means that white women with unhealthy children will be less likely to remain married to the child's father than women with healthy children. It also means that, for the women who do not remain married to the child's father, mothers of unhealthy children will be more likely to remain divorced than to remarry compare to mothers of healthy children.[35] In terms of the theory outlined above, the ways in which a child in poor health might increase the probability of remarriage, through greater specialization in household production and/or higher marital search costs, does not fully offset the possible negative effects of a child in poor health. The results are similar for the sample of women under 35 years of age.

V. Conclusion

The results of this study provide robust evidence that having an unhealthy child decreases the likelihood that a woman will be married. This is true, regardless of the measure used for poor child health. The results are strongest for white women who were married at the time of the child's birth and for black women who were unmarried at that time. These results are also apparent when we examine only younger mothers. In a preliminary examination of the path taken to the unmarried status, we find that women who were married at the time the unhealthy child was born will be more likely to be divorced but less likely to be remarried than mothers of healthy children. This set of results is an important addition to a mixed literature, where some researchers have found higher rates of divorce and others have not.[36] These results imply that unhealthy children are more likely to be raised by only their mothers, and thus suffer the consequences, such as poverty and poorer schooling outcomes, that result. Thus, these children will be more likely to face obstacles even beyond their illness and/or disability. The only potentially mitigating factor is that, for white children, unhealthy children who don't live with their fathers will be more likely than healthy children to be living in an extended family.

NOTES

1. Recent papers by Yura (1987) and Darling (1987) review much of the recent literature.

2. For example, see Featherstone (1980).

3. See, for example, Krein (1986), Krein and Beller (1988), McLanahan (1985), McLanahan (1988), and McLanahan and Bumpass (1988).

4. Throughout our discussion of the literature, it is important to note that each study defines "special needs", "disability" or "ill" in a different manner, and that these studies are not strictly comparable.

5. We assume throughout the paper that a sick child leads to a decrease in the level of marital utility on average, but only an empirical analysis can give a definitive answer. We acknowledge this later in the discussion of the results.

6. Darling (1987) notes that some, but not all, of these expenses are off-set by government programs, private insurance, and charitable organizations.

7. Fitzgerald (1987) reports that, according to the 1981 Child Health Supplement of the NHIS, of all children living in households, about 2.4 million, or 4.2% had some activity limitation. Sick or disabled children may be relinquished through institutionalization. The (1980) Census figure indicates about 95,000 children in facilities (institutions) for mentally handicapped, physically handicapped, deaf, blind, and in mental hospitals. Thus, about 3.7% of children with some handicap are in institutions. Children may also be placed in foster care or relinquished through adoption, although it is difficult to assess which children are sick or disabled. Sweet and Bumpass (1987) report that, in 1980, about 0.4% of all American children under 18 were living with nonrelatives in foster care, small group settings, or in an exchange program. Finally, according to the U.S. Bureau of the Census (1990), approximately 50.000 children, or 1.4% of births were adopted by non-relatives in the United States that year. Thus, even if a full one quarter of all children adopted or in nonrelative care in 1980 had activity limitations, this would represent less than 11% of all children with activity limitations.

8. The frequency distribution of marriage offers for a person with a rare trait is less dense (Becker et. al (1977)). Thus, they will have fewer acceptable offers.

9. Sweet and Bumpass (1987) report that about 21% of children living with fathers, 17% of children living with mothers, and only 5% of children living with both parents had other relatives in the household.

10. Of course, these figures include relatives needing care, as well as relatives helping in household production.

11. The assumption underlying this analysis is that a path of choices represents an equilibrium outcome, and that these paths are complete. There are no additional choices that could be made. This is clearly a restrictive assumption, and the results of such an analysis need to be interpreted with caution. The data do not allow for a more detailed analysis.

12. A longitudinal data set which contained full health information on the child as well as full information on characteristics of both biological parents over time would be an excellent resource for exploring the dynamics of marriage and household composition in the context of child health. Here, we can only infer the dynamics from the current situation.

13. For children living in households without both of their biological parents (41% of all children), the vast majority (72.2%) live with their mothers. In fact, in the current sample, children are more likely to live with neither parent (19.6% of those not living with both biological parents) than with their biological father only (8.1%). Although we exclude children not living with their biological mother, we consider potential biases from such as exclusion in our results section.

14. In our model, we use several different samples of women: married at the time of birth, not married at time of birth. The rationale underlying the use of an equilibrium model is related to the particular sample being examined. For example, the "costless compensation" assumption seems better suited to a sample of married women. See Hutchens et. al. (1986) for a more complete discussion of the issues.

15. By "extended family" we mean adults other than a spouse or older siblings in the household.

16. The current data set does not have information on consumption, leisure or wages. The information on income is not very detailed. An alternative would be to estimate predicting equations using a different data source that contained data on income, consumption and leisure, with a set of exogenous variables observed in both data sets, but this is beyond the scope of this paper.

17. Throughout the rest of the paper, when we refer to marital status, we consider only women who are not separated as married.

18. This was done only for the first two dependent variables, since the third dependent variable is only valid for women who were married at the time of birth.

19. For example, see Grossman and Joyce (1990) for a discussion of the relationship between marital status and prenatal care and birth outcomes.

20. We explicitly exclude children whose conditions were the result of an accident, an injury or a poisoning. The sensitivity of the results with respect to the inclusion of several specific physical conditions was tested by trying various combinations of the conditions. The results were virtually the same for all the different measures.

21. We do not include income, however, since this variable is not exogenous to current marital status. Family income is determined by marital status and the number of earners in family. We interpret most of the right hand side variables as a result of a reduced form specification in which age, education and child health variables are the exogenous determinants of several endogenous measures.

22. Our measures are reported, generally, by the mother of the child rather than from a health assessment. Note that developmental delay is 80% more prevalent in white than in black children born to mothers who were married, and 70% more for white than black children born to unmarried mothers. Examining the fraction of children who had one or more physical condition, whites exceeded blacks by less than 20% for both marital groups. Given that the incidence of both low birthweight and infant

mortality rates for black babies is twice that of white babies, and that childhood mortality rates for black children exceed rates for white children by 35% to 60%, it is not fully plausible that black children are, otherwise, more healthy than white children. The reporting problem is mitigated by separating the cohorts by race. It should be noted that, because of suspected racial differences in reporting, it would be misleading to compare magnitudes of coefficients across samples.

23. Note that this includes only the mother's biological or adopted children, since these are the children who would reside with the mother under most family structures.

24. Several model specifications were tried which altered the number and form of the explanatory variables, including the child health measures, and the results were always similar to those reported.

25. To approximate these OLS-type effects, we multiply the logit coefficient by the P(1-P), where P is probability of being married for the sub-sample. We use the sub-sample mean of P. which is .206 (Table 1). This is only one of several methods of calculating the OLS-type coefficient.

26. As discussed earlier, because of differences in rates of reporting which may not be controlled by the right-hand variables, these magnitudes may not be comparable.

27. A fuller and more definitive explanation of the racial differences is not possible given the reduced form nature of the current analysis, and is a question that will need further research.

28. All the exogenous variables in the marriage model could not be included in the selection equation, since these variables were unobserved for the mothers who were not currently living with the child. We also estimated a model which included the child health measures as part of the selection model, although we note that these variables are endogenous themselves, and the results from these analyses did not differ from those reported in the text.

29. The other samples resulted in singular Hessian matrices, and the statistical software (LIMDEP) that was used failed numerous times in an attempt to find the maximum likelihood estimates. For these samples we estimated the probability of marriage using the linear probability model, and corrected for sample selection using the Heckman two stage method. The results from this admittedly imperfect analysis leads to the conclusion that sample selection is not a problem in these samples. These results are similar to those from the maximum likelihood procedure used to estimate the selection model for white women who were married at birth.

30. For example, this is discussed by Corman, Joyce and Grossman (1987) in relation to neonatal mortality.

31. We acknowledge that current health status of the mother is an imperfect measure of the mother's health endowment, and may cause problems for several reasons. First, poor health may be endogenous since it may be caused by marital instability. Second, the self-reporting variation in a qualitative health measure may vary more than in the more specific measures we utilize for the children. Third, health status (fair or poor as opposed to good or excellent) may be a poor proxy for the true unobserved health endowment.

32. We experimented with four categories; married nuclear family, married extended family , single nuclear family, and single extended family. The results from this analysis indicated that there were no

significant differences between married nuclear or married extended families with regard to a variables impact.

33. The logit coefficients represent the log of the ratio of the probability of each outcome with respect to being married in a nuclear family. To find the logit coefficient on the probability of being in a single extended family with respect to being single head of household, one only needs to subtract the coefficients. That is, if $\ln (p_1 / p_0) = a_1 + b_1 X$ and $\ln (p_2 / p_0) = a_2 + b_2 X$ then $\ln (p_2 / p_1) = (a_2 - a_1) + (b_2 - b_1) X$.

34. An analysis of these choice "paths", while not in keeping with a strict equilibrium approach, could provide additional insight into the effects of child health on marital status .

35. See footnote 32.

36. Most of these studies have been performed by psychologists, and have used small samples and limited multivariate techniques.

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TABLE 1
DISTRIBUTION OF SAMPLE BY MARITAL STATUS,
HOUSEHOLD COMPOSITION, AND CHILD HEALTH INDICATORS

	White Women		Black Women	
Variable	Married At Birth	Not Married At Birth	Married At Birth	Not Married At Birth
	Frequency (Percent)			
Current Marital Status				
Married	5616 (87.9)	397 (55.1)	459 (66.9)	180 (20.6)
Not Married	775 (12.1)	323 (44.9)	227 (33.1)	692 (79.4)
Current Living Arrangement				
Married Nuclear	5437 (85.1)	375 (52.1)	429 (62.5)	166 (19.0)
Married Extended	179 (2.8)	22 (3.1)	30 (4.4)	14 (1.6)
Single Head	651 (10.2)	238 (33.1)	183 (26.7)	541 (62.0)
Single Extended	124 (1.9)	85 (11.8)	44 (6.4)	151 (17.3)
Marital Choices				
Continuously Married	5192 (81.2)		434 (63.3)	
Divorced - Remarried	424 (6.6)		25 (3.6)	
Divorced	775 (12.1)		227 (33.1)	
Number of Physical Conditions				
0	6099 (95.4)	672 (93.3)	659 (96.1)	822 (94.3)
1	258 (4.0)	41 (5.7)	25 (3.6)	47 (5.4)
2+	34 (0.5)	7 (0.9)	2 (0.2)	3 (0.3)
Developmental Delay				
0	6134 (96.0)	685 (95.1)	671 (97.8)	847 (97.1)
1	257 (4.0)	35 (4.9)	15 (2.2)	25 (2.9)
Number of Physical Conditions and/or Developmental Delay				
0	5892 (92.2)	643 (89.3)	649 (94.6)	802 (92.0)
1	499 (7.8)	77 (10.7)	37 (5.4)	70 (8.0)
Observations	6391	720	686	872

TABLE 2
EFFECTS OF CHILD HEALTH ON MARITAL STATUS
LOGIT ESTIMATES OF THE PROBABILITY OF CURRENTLY BEING MARRIED

Model	Child Health Variable	All White Women: Not Married At Birth	All White Women: Married At Birth	White Women Less Than 35: Not Married At Birth	White Women Less Than 35: Married At Birth
1	Number of physical conditions (NUMCON)	.274 (.248)	-.442** (.126)	.227 (.305)	-.480** (.157)
2	Developmental delay (DEVDEL)	-.847* (.397)	-.419* (.176)	-1.046* (.483)	-.215 (.227)
3	Number of physical conditions and/or developmental delay (DDCON)	-.218 (.261)	-.436** (.129)	-.431 (.312)	-.425** (.163)
4	Number of physical conditions (NUMCON)	.363 (.254)	-.404** (.128)	.340 (.317)	-.467** (.159)
	Developmental delay (DEVDEL)	-.931* (.406)	-.336+ (.179)	-1.110* (.487)	-.123 (.230)
	Observations	720	6391	570	3630

Model	Child Health Variable	All Black Women: Not Married At Birth	All Black Women: Married At Birth	Black Women Less Than 35: Not Married At Birth	Black Women Less Than 35: Married At Birth
1	Number of physical conditions (NUMCON)	-1.003+ (.544)	.174 (.388)	-.946+ (.550)	.508 (.643)
2	Developmental delay (DEVDEL)	.351 (.506)	-.417 (.581)	.234 (.559)	-1.538 (.979)
3	Number of physical conditions and/or developmental delay (DDCON)	-.623 (.402)	-.031 (.378)	-.697 (.432)	-.091 (.533)
4	Number of physical conditions (NUMCON)	-1.042+ (.546)	.250 (.394)	-.980+ (.555)	.617 (.671)
	Developmental delay (DEVDEL)	.477 (.515)	-.521 (.610)	.359 (.563)	-1.599+ (.975)
	Observations	872	686	719	349

\+ Significant at .10 level
* Significant at .05 level
** Significant at .01 level

Note: Numbers are coefficients from logit analysis with standard errors in parentheses.

TABLE 3
EFFECTS OF CHILD HEALTH ON MARITAL STATUS AND HOUSEHOLD COMPOSITION
MULTINOMIAL LOGIT ESTIMATES

		White Women			
		Not Married At Birth		Married At Birth	
Model	Child Health Variable	Single Head	Single Extended	Single Head	Single Extended
1	Number of physical conditions (NUMCON)	-.191 (.257)	-.667 (.553)	.342* (.143)	.801** (.211)
2	Developmental delay (DEVDEL)	.628 (.434)	1.361** (.505)	.341+ (.194)	.737* (.348)
3	Number of physical conditions and/or developmental delay (DDCON)	.092 (.287)	.552 (.383)	.371** (.141)	.737** (.268)
4	Number of physical conditions (NUMCON)	-.256 (.261)	-.837 (.539)	.311* (.145)	.746** (.213)
	Developmental delay (DEVDEL)	.688 (.444)	1.524** (.515)	.281 (.197)	.583 (.355)
	Number in Cell	238	85	651	124
	Observations	720		6391	

		Black Women			
		Not Married At Birth		Married At Birth	
Model	Child Health Variable	Single Head	Single Extended	Single Head	Single Extended
1	Number of physical conditions (NUMCON)	1.171* (.550)	.124 (.724)	-.225 (.428)	.048 (.728)
2	Developmental delay (DEVDEL)	-.460 (.532)	-.081 (.615)	.128 (.670)	1.273 (.794)
3	Number of physical conditions and/or developmental delay (DDCON)	.703+ (.409)	.309 (.504)	-.089 (.417)	.496 (.630)
4	Number of physical conditions (NUMCON)	1.226* (.553)	.127 (.728)	-.260 (.436)	-.132 (.718)
	Developmental delay (DEVDEL)	-.365 (.545)	-.093 (.621)	.241 (.699)	1.337 (.820)
	Number in Cell	541	151	183	44
	Observations	872		686	

+ Significant at .10 level
* Significant at .05 level
** Significant at .01 level

Note: Numbers are coefficients from multinomial logit analysis with standard errors in parentheses. The single head category includes single women who live only with their children. The single extended category includes single women living with other families/adults or other relatives. Married is the excluded category.

TABLE 4
EFFECTS OF CHILD HEALTH ON MARITAL STATUS AND HOUSEHOLD COMPOSITION
MULTINOMIAL LOGIT ESTIMATES

		White Women Under-35			
		Not Married At Birth		Married At Birth	
Model	Child Health Variable	Single Head	Single Extended	Single Head	Single Extended
1	Number of physical conditions (NUMCON)	-.141 (.329)	-.391 (.522)	.405* (.177)	.747** (.260)
2	Developmental delay (DEVDEL)	.858 (.527)	1.507* (.595)	.112 (.255)	.549 (.422)
3	Number of physical conditions and/or developmental delay (DDCON)	.314 (.347)	.806+ (.432)	.362* (.179)	.684* (.321)
4	Number of physical conditions (NUMCON)	-.225 (.338)	-.597 (.520)	.402* (.179)	.712** (.263)
	Developmental delay (DEVDEL)	.898+ (.533)	1.630** (.602)	.033 (.259)	.423 (.428)
	Number in Cell	188	72	407	87
	Observations	570		3633	

		Black Women Under 35			
		Not Married At Birth		Married At Birth	
Model	Child Health Variable	Single Head	Single Extended	Single Head	Single Extended
1	Number of physical conditions (NUMCON)	1.146* (.559)	.048 (.728)	-.533 (.712)	-.566 (1.179)
2	Developmental delay (DEVDEL)	-.325 (.594)	-.031 (.652)	1.299 (1.061)	2.604* (1.280)
3	Number of physical conditions and/or developmental delay (DDCON)	.794+ (.441)	.371 (.527)	-.120 (.609)	.671 (.801)
4	Number of physical conditions (NUMCON)	1.191* (.565)	.046 (.736)	-.634 (.741)	-.668 (1.190)
	Developmental delay (DEVDEL)	-.479 (.598)	-.041 (.656)	1.376 (1.055)	2.658* (1.284)
	Number in Cell	429	138	103	28
	Observations	719		349	

+ Significant at .10 level
* Significant at .05 level
** Significant at .01 level

Note: Numbers are coefficients from multinomial logit analysis with standard errors in parentheses. The single head category includes single women who live only with their children. The single extended category includes single women living with other families/adults or other relatives. Married is the excluded category.

TABLE 5
EFFECTS OF CHILD HEALTH ON MARITAL CHOICES
WOMEN MARRIED AT THE TIME OF BIRTH OF SAMPLE CHILD
MULTINOMIAL LOGIT ESTIMATES

		All White Women		White Women Less Than 35	
Model	Child Health Variable	Currently Remarried	Currently Divorced	Currently Remarried	Currently Divorced
1	Number of physical conditions (NUMCON)	.311+ (.181)	.488** (.129)	.348 (.221)	.541** (.162)
2	Developmental delay (DEVDEL)	.147 (.271)	.430* (.179)	.020 (.338)	.217 (.231)
3	Number of physical conditions and/or developmental delay (DDCON)	.368* (.177)	.486** (.132)	.393+ (.218)	.492** (.167)
4	Number of physical conditions (NUMCON)	.301+ (.183)	.450** (.130)	.354 (.224)	.529** (.163)
	Developmental delay (DEVDEL)	.084 (.274)	.339+ (.182)	-.055 (.343)	.114 (.234)
	Number in Cell	424	775	298	494
	Observations	6391		3630	

		All Black Women		Black Women Less Than 35	
Model	Child Health Variable	Currently Remarried	Currently Divorced	Currently Remarried	Currently Divorced
1	Number of physical conditions (NUMCON)	-.669 (1.028)	-.206 (.398)	-.258 (1.123)	-.577 (.659)
2.	Developmental Delay (DEVDEL)	.957 (1.243)	.544 (.608)	-10.691 (458.0)	1.413 (1.010)
3	Number of physical conditions and/or delay (DDCON)	.031 (.843)	.041 (.388)	-.093 (1.212)	.034 (.552)
4.	Number of physical conditions (NUMCON)	-.766 (1.045)	-.296 (.402)	.029 (1.109)	-.699 (.689)
	Developmental delay (DEVDEL)	1.133 (1.262)	.670 (.643)	-10.933 (429.0)	1.472 (1.003)
	Number in Cell	25	227	15	131
	Observations	686		349	

\+ Significant at .10 level
* Significant at .05 level
** Significant at .01 level

Note: Numbers are coefficients from multinomial logit analysis with standard errors in parentheses. Continuously married is excluded category.

APPENDIX TABLE 2
DESCRIPTIVE STATISTICS OF VARIABLES USED IN ANALYSIS
BY MARITAL STATUS AT TIME OF BIRTH OF SAMPLE CHILD

	White Women		Black Women	
Variable	Married At Birth Mean	Not Married At Birth Mean	Married At Birth Mean	Not Married At Birth Mean
NORTHEAST	0.198	0.176	0.142	0.173
MIDWEST	0.323	0.283	0.201	0.266
SOUTH	0.299	0.289	0.576	0.492
BIGCITY	0.345	0.343	0.522	0.534
URBAN	0.195	0.260	0.548	0.675
SUBURBAN	0.520	0.446	0.280	0.173
MOMAGE	34.702	30.349	35.754	30.295
AGEMAR	21.251		21.609	
YRSMAR	4.793		4.858	
MOMAGE1B	23.200	21.189	21.708	19.320
MOMEDUC	13.089	12.013	12.679	11.767
CHILDAGE	8.641	7.462	9.269	8.136
NUMSIB6	0.306	0.317	0.296	0.386
NUMSIB617	0.652	0.374	0.799	0.587
OLDSIB	0.474	0.219	0.618	0.416
NUMCON	0.052	0.081	0.045	0.061
DEVDEL	0.040	0.049	0.022	0.029
DDCON	0.078	0.107	0.054	0.080
OBS.	6391	720	686	872

APPENDIX TABLE 3
EFFECTS OF CHILD HEALTH ON MARITAL STATUS
LOGIT ESTIMATES OF THE PROBABILITY OF CURRENTLY BEING MARRIED
CORRESPONDING TO MODEL 1 OF TABLE 2

	All White Women Married at Birth		All Black Women Married at Birth	
Variable	Coeff.	Std. Err.	Coeff.	Std. Err.
CONSTANT	-3.752	1.610	-5.580	4.835
NORTHEAST	0.259	0.127	-0.393	0.389
MIDWEST	0.411	0.115	-0.570	0.365
SOUTH	0.322	0.115	-0.126	0.349
BIGCITY	-0.102	0.096	-0.152	0.214
URBAN	-0.390	0.118	0.212	0.286
SUBURBAN	0.119	0.108	0.700	0.307
MOMAGE	-0.805	1.000	0.160	2.019
MOMAGESQ	0.000	0.001	0.001	0.002
MOMAGE1B	0.255	0.102	-0.247	0.199
MAGE1BSQ	-0.004	0.002	0.005	0.004
MOMEDUC	0.249	0.153	0.975	0.435
MEDUCSQ	0.003	0.006	-0.035	0.012
MEDUCAGE	-0.009	0.004	-0.001	0.006
NUMSIB6	0.777	0.095	0.661	0.183
NUMSIB617	0.490	0.092	0.286	0.174
OLDSIB	-0.340	0.116	-0.348	0.222
CHILDAGE	0.632	1.005	-0.384	2.022
CHILDAGESQ	0.013	0.003	0.006	0.006
AGEMAR	0.777	1.004	0.012	2.016
AGEMARSSQ	0.003	0.002	-0.003	0.004
YRSMAR	1.049	0.999	-0.037	2.017
YRSMARSQ	-0.001	0.003	-0.003	0.004
OBS.	6391		686	

Note: Estimates from other models are available from the authors.