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Research Article

**Family structure and wellbeing of
out-of-wedlock children:
The significance of the biological
parents' relationship**

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Family structure and wellbeing of out-of-wedlock children: The significance of the biological parents' relationship

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Abstract

This study examines the role of the relationship between the biological parents in determining child wellbeing using longitudinal data from the Fragile Families and Child Wellbeing Study (FFCWS). We extend prior research by considering children born to unmarried parents in an investigation of the effect of the relationship structure between the biological parents on infant health and behavior. The main findings are that children born to cohabiting biological parents (*i*) realize better outcomes, on average, than those born to mothers who are less involved with the child's biological father, and (*ii*) whose parents marry within a year after childbirth do not display significantly better outcomes than children of parents who continue to cohabit. Furthermore, children born to cohabiting or visiting biological parents who end their relationship within the first year of the child's life are up to 9 percent more likely to have asthma compared to children whose biological parents remain (romantically) involved. The results are robust to a rich set of controls for socioeconomic status, health endowments, home investments, and relationship characteristics.

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1. Introduction

While marriage remains the most common foundation of family life in the U.S., the traditional process of family formation, specifically marriage before having children, has been dwindling. Over the past three decades, the proportion of American children born outside of marriage increased from approximately 12% in 1970, to nearly one third of all births today (Sigle-Rushton & McLanahan, 2002a).³ It is estimated that approximately 39% of all non-marital births in the U.S. were to mothers cohabiting with the biological father between 1990 and 1994, compared to 29% in 1980-84 (Bumpass & Lu, 2000). Currently about half of all non-marital births in large urban areas are to cohabiting parents and an additional 30% are to mothers dating their child's father, but living separately (McLanahan & Garfinkel, 2002).⁴

As the proportion of children experiencing cohabitation and other forms of non-marital relationships between their biological parents rises, understanding the consequences of these non-traditional family arrangements for child wellbeing becomes increasingly important for researchers and policy makers. While the effect of one important change in family structure on children, namely divorce, has been studied extensively,⁵ the impact of the relationships between never-married parents on the children involved is less understood. In particular, the influences of the relationship dynamics between the biological parents — progressing from cohabiting to married, cohabiting at childbirth and age one, cohabiting to not romantically involved, visiting to cohabiting, etc. — on child development have rarely been studied in large survey data.

The present study examines the effects of relationship structure on young children's wellbeing. This study extends existing research by considering the potential effects of the relationship structure between the biological parents on infant health and behavior among out-of-wedlock children. Specifically, we use a large sample of children born to unmarried parents drawn from the Fragile Families and Child Wellbeing Study (FFCWS), to assess differences in child outcomes among various types of parental relationship transitions within a year following a child's birth. Three types of non-marital relationship arrangements between the biological parents at childbirth are considered: cohabitation, visiting, and no romantic involvement. In addition to the role of entry into marriage,

³Calculations on cohabitation trends from census data are consistent with this development. In 1960, among all joint households less than 1% were unmarried couples compared to more than 8% in 2000 (see Fitch et al., 2005).

⁴This type of relationship arrangement between a couple is commonly referred to as a "visiting" relationship. This paper will hereby refer to parents who are romantically involved but live in separate households as being in a "visiting" relationship.

⁵See Cherlin (1999) and Liu (2005) for recent surveys of this literature. See Morrison & Ritualo (2000) for evidence on the economic consequences of cohabitation and remarriage for children who experienced parental divorce.

we also examine the impact of transitions between each of these non-marital relationship arrangements within the first year after childbirth on child health and behavior.

Our results suggest that differences in child outcomes between children whose parents marry within the first year after childbirth and those whose parents remain unmarried are largely explained by parental relationship structure at childbirth. More specifically, we find no evidence that children born to cohabiting biological parents benefit from the subsequent marriage between their biological parents. However, we find that children of cohabiting biological parents realize better outcomes, on average, than those born to mothers who were less involved with the child's biological father. Children born to cohabiting or visiting parents who end their relationship within the first year of the child's life are up to 9% more likely to have asthma compared to children of continuously cohabiting, continuously visiting, cohabiting-at-birth or visiting-at-birth and married-subsequently biological parents.

2. Child wellbeing and biological parents' relationship

2.1 Existing evidence

The majority of existing studies focus on the comparison between children in families with married parents and those in alternative family settings. Children with cohabiting parents or in single-mother families are typically found to fare worse than children from married (intact) families (Harknett, 2005; Brown, 2002, 2004; Deleire & Kalil, 2002; Acs & Nelson, 2002, 2004; Manning & Lamb, 2003; Osborne et al., 2003; Manning & Brown, 2003; Dunifon & Kowaleski-Jones, 2002; Manning, 2002; Morrison & Ritualo, 2000; Thomson et al., 1994; Manning & Lichter, 1996; and Newcomb, 1979).⁶ Differences in parenting behavior and a lack of stable supply of family resources contribute in explaining the adversity associated with a non-intact family environment (e.g., Wu & Martinson, 1993; Thomson et al., 1994; and Wu, 1996). For example, Osborne and McLanahan (2004) find that children born to unmarried mothers are more likely to experience multiple maternal partnership changes compared to children born within marriage. Greater family instability, as measured by the number of maternal relationship transitions, is associated with poor parenting, and inferior child health and behavior when the child is three years old.

The evidence, however, is not uncontroversial with respect to the dimensions of child

⁶This evidence combined with the growing prevalence of unmarried parenthood prompted an expansion of U.S. family policy initiatives (e.g., the Building Strong Families project) towards encouraging and stabilizing marriage among these *fragile families*, hoping that marriage will infer benefits to these families and their children. Some researchers are vocal supporters of greater public efforts toward maintaining and increasing traditional family constellations (e.g., Glenn et al., 2002).

wellbeing affected and which relationship structures are detrimental. Utilizing sibling samples from the U.S. and Sweden, Björklund et al. (2004) find that the negative effect of living in a non-intact family on child wellbeing dissipates once unobserved family influences common to all siblings are controlled for. Delaire & Kalil (2002) find that teenagers who live with their single mothers and at least one grandparent often show comparable (and sometimes even superior) achievements to children in married two-parent families. Brown (2004) finds that adolescents (ages 12-17) with cohabiting biological parents show more emotional problems than their counterparts with married biological parents, but their levels of school engagement do not differ significantly. However, among middle school children (ages 6-11), the reverse pattern is found (see Brown, 2004, Tables 2 and 3).

Using detailed information on parental relationship structure before and after childbirth, Osborne et al. (2003) examine child behavioral outcomes three years after birth. They find that children born to married parents are less likely to exhibit behavioral problems, compared to children in persistently cohabiting families. Interestingly, among children born to cohabiting parents, Osborne et al. find no behavioral difference between children whose parents get married within three years after birth, and those whose parents remain in a cohabiting arrangement. They conclude that the observed benefits of marriage may be largely attributable to the characteristics of those parents who entered into marriage prior to childbirth.

Overall, few studies compare the effects of different non-marital family structures on child wellbeing and even fewer employ data sets that allow them to distinguish between the living arrangement of biological and social parents. Without this distinction, the developmental conditions provided by cohabiting biological parents are confounded with the potentially different environment provided by a family with a cohabiting "stepparent". A notable exception in the literature is the aforementioned study by Brown (2004). Using a particularly large sample of children and information on biological and social parents, she reports little difference in outcomes between children in cohabiting versus married stepfamilies, two-biological-parent cohabiting versus cohabiting stepfamilies, and cohabiting and single-mother families.

Studies that examine the effect of cohabitation on children tend to analyze outcomes measured during school-age and adolescence (Acs & Nelson, 2002, 2004; Brown, 2004; Manning & Lamb, 2003; Björklund et al., 2004). Given that on average cohabiting unions tend to be short-lived (Bumpass & Lu, 2000), findings reported in these studies may over-represent conditions associated with *stable* cohabiting families. In addition, family structure at childbirth and potential transitions thereafter are typically unidentified, therefore the effect of family structure observed at one point in time may be confounded by the influences of past experiences.⁷

⁷For instance, while studies generally find that children with married parents do better than those with parents

2.2 The present study

There is a growing literature on the relationship between family structure and child well-being, but to date there has been no examination exclusively focused on the role of different relationship structures and transitions between the biological parents on young children's well-being. Using data from the Fragile Families and Child Wellbeing Study (FFCWS), we test whether the relationship between the biological parents affects child well-being. Complementing previous studies, we consider infant health and behavioral outcomes.⁸ Specifically, this study examines to what extent the parental relationship arrangements at childbirth and the involvement between the biological parents thereafter lead to better child outcomes at age one, using a large sample of children born to biological parents in various non-marital relationship arrangements (i.e. cohabiting unions, visiting unions, or no romantic involvement).⁹

Prior to the FFCWS, large datasets containing detailed information on the well-being of children born out-of-wedlock and the complete relationship history between the biological parents were unavailable.¹⁰ The FFCWS allows us to construct exact measures of the biological parents' characteristics, behavior and involvement with each other at childbirth and thereafter. Such measures help address a number of concerns with the identification and interpretation of family structure effects.¹¹ For example, given the greater prevalence of out-of-wedlock childbearing among the low-income and less educated population (McLanahan & Sandefur, 1994; Hao 1996; Sigle-Rushton & McLanahan, 2002*b*; Manning & Brown, 2003; and Ellwood & Jencks, 2004), the association between unmarried parenthood and inferior child outcomes may be the result of differences in parental characteristics, rather than greater benefits associated with the marital arrangement.¹²

Akin to most existing studies, the present study may not account for all background factors due to the cross-sectional design. However, the availability of measures of the bi-

in alternative relationship settings, some children may have been born prior to marriage (e.g. cohabiting), while others were born within marriage. The effect of current family structure is potentially confounded by the effect of family circumstances surrounding the birth of the individual. Without accounting for initial conditions surrounding childbirth, the estimated effect of living with married-parents may be biased.

⁸A related study by Osborne et al. (2003) does not consider other dimensions of child well-being but behavioral outcomes, and excludes unmarried biological parents who were not cohabiting at childbirth from their analysis.

⁹In contrast to the present study, Osborne and McLanahan (2004) do not identify the exact type of relationships the mother exits and enters (cohabiting, visiting, single); nor do they distinguish between the relationships the mother has with the biological father or other partners.

¹⁰The availability of the FFCWS has also stimulated research in the related area of marital behavior of unmarried biological parents (e.g., Osborne, 2005; Harknett & McLanahan, 2004).

¹¹For a recent survey of the literature on the potential benefits to marriage with an emphasis on methodological concerns see Ribar (2004).

¹²A similar argument can be made regarding the finding that greater instability within the parents' romantic relationship is associated with inferior child well-being (e.g., Osborne & McLanahan, 2004).

ological parents' relationship status at childbirth and parental behavior prior to childbirth in the FFCWS helps to reduce the influence of background factors potentially correlated with relationship quality and parenting behavior.¹³ While previous research investigated the effect of parental relationship on child wellbeing by comparing children in non-intact family settings to children of married two-parent families, this study examines the effect of parental relationship status and changes on child outcomes among children who are all born to unmarried parents. In contrast to previous research, the greater homogeneity at birth among our study sample of children may help to separate the effects of subsequent family structure changes, such as marriage and separation, on child development from (unobserved) factors that jointly affect biological parents' fertility and marital decisions upon childbirth and subsequent child wellbeing.¹⁴

3. Conceptual background

We examine how the biological parents' relationship status and transition, including cohabitation, (entering into) marriage, romantically involved but not living together ("visiting"), and not romantically involved, affect outcomes of young children born to unmarried parents. In formulating our hypotheses, we draw on the theoretical literature on family formation and resource allocation, known as "new household economics" (Becker, 1965, 1973, 1991; Weiss & Willis, 1997; Willis, 1999; Ribar, 2004). Specifically, these theories stress the importance of time, money, and caregivers' ability on child wellbeing ("production of child quality").

Financial resources in the parental home are key determinants of child development (e.g., Blau, 1999). They allow the parents to purchase goods and services that benefit child development including shelter, food, and childcare. Economic resources are complemented by parenting resources—the services provided by the parents using time and childrearing ability (e.g., McLanahan & Sandefur, 1994). Interaction with the child fosters child development by providing support, stimulation, and control (e.g., Baumrind, 1966; Maccoby & Martin, 1983). The amount of interaction with adults has been found

¹³The aforementioned study by Björklund et al. (2004) allows for arbitrary correlation between family-specific unobserved factors and observed determinants of child wellbeing using sibling panel data. Given that non-marital family structures tend to be less stable and short-lived, using a sample of unmarried families with at least two children may result in the over-representation of stable non-intact (unmarried) families. The results of which may not be representative of children in unmarried families in general. Furthermore, given that changes in family structure occur relatively infrequently across siblings, the absence of statistical evidence of such effects may be due to the lack of family structure variation in sibling panel data.

¹⁴Couples that have children before vs. after marriage may be selectively different. In turn, family environment and parenting practices between these two types of families may potentially differ. To account for this potential endogeneity, this study focuses on the population of children all born to unmarried parents to examine the effect of parental relationship structure changes *after childbirth* on child wellbeing.

to be particularly beneficial (Zajonc, 2001). Time and income are substitutable to a certain extent as money can buy childcare services and working in the labor market increases available financial resources. For healthy child development, however, both types of resources are needed (e.g., Coleman, 1988). By forming a union, parents can increase the availability of resources and realize gains to specialization, resulting in more efficient production of material and parenting resources (Becker, 1991; Michael, 1973). Thus, considerations of earnings ability and complementarities in skills are expected to play a role in partner selection and union formation (Becker, 1973, 1991). Finally, if parents' time inputs are complements rather than substitutes in child quality production the two-parent household may yield additional benefits.

3.1 Resource availability

The availability of economic resources differs markedly across family arrangements with children residing in mother-only or cohabiting-parents households being much more likely to live in poverty (Brown, 2002). Cross-sectional studies find that income explains up to one-half of the differences between children in single parent and two-parent families (McLanahan, 1985). While the extent to which family structure is a cause or consequence of economic hardship is still being debated (Brown, 2004; Thomson et al., 1994), it is well-documented that out-of-wedlock childbearing occurs more frequently among the low-income and less-educated population (McLanahan & Sandefur, 1994; Hao 1996; Sigle-Rushton & McLanahan, 2002*b*; Manning & Brown, 2003; and Ellwood & Jencks, 2004).

Children born into two-parent households will experience an environment where economic resources are more abundant on average compared to single parent households, and are hence expected to achieve better outcomes than children born to single parent families. The two-parent household can pool individuals' resources and reduce outlays by realizing consumption synergies in ways that may not be available to the single parent (e.g., sharing the apartment). Households of married or cohabiting parents may also capitalize on opportunities to divide responsibilities across partners according to their individual capacities. Specialization of partners' time is economically efficient as it exploits comparative advantages of each person in the production of goods that both enjoy (such as "child quality"). The two-parent environment is also more likely to provide certain joint inputs such as time spend as a threesome that may be particularly beneficial for child development.¹⁵ In addition, living together may induce a stabilizing effect on the parents, which can lead to greater productivity at home and in the labor market (see Ribar, 2004 for a survey).

¹⁵We are grateful to an anonymous referee for this point.

Given that out-of-wedlock children are more likely to enter into an environment where economic resources are scarce, the availability of time and parenting resources may be particularly important. The frequency of interaction between the child and an adult is likely to be lower in single parent homes.¹⁶ Single parents may not be able to perform the multiple roles and tasks involved in childrearing, which can result in heightened stress levels and insufficient monitoring, demands, and warmth in their childrearing practices (e.g., Cherlin, 1992; Thomson et al., 1994; Wu, 1996 and Wu & Martinson 1993). Conflicts between the parents over visitation may also encumber parenting effectiveness (Brown, 2004).

3.2 Paternity and investment behavior

Based on the previous discussion, we expect that two-parent households have greater economic and parental resources that could benefit the child. Greater availability of resources, however, may not equate with greater allocation towards the child. In non-marital relationship arrangements, the father's incentive to invest in a child may be reduced since the father faces greater uncertainty regarding the extent to which he will be able to enjoy the benefits of these investments in the future.¹⁷ In addition, monitoring the effective use of his transfers may be more difficult in a non-marital union (Willis, 1999). Marriage, on the other hand, provides legal protection, requires property sharing between the partners (Hamilton, 1999), and may result in more defined parental roles (e.g., Brown, 2004).

In light of these institutional differences between married and cohabiting unions, Kieran et al. (1999), argue that "the absence of the legal bond of marriage among cohabiting couples may represent less economic or emotional security, which may lie behind the higher dissolution rates invariably found among cohabiting parents compared with married parents". Consistent with lower investments in children by cohabiting partners, Bauman (1999) finds that income of a cohabiting partner does less to amend the economic hardship than that of a spouse. Winkler (1997) shows that married couples are more likely to pool their incomes compared to cohabiting couples. Parenting resources may also suffer in cohabiting unions. Brown (2002) finds that cohabiting mothers are more likely to be psychologically distressed than married mothers and suggests that this difference may reflect stress due to greater uncertainty regarding the future of the union.¹⁸

¹⁶Hofferth (2001) estimates that among children under age 13, those living with single mothers spent 12 to 14 fewer hours with their parents per week compared to children living with married parents.

¹⁷While the number of households with custodial fathers is rising (e.g., Meyer & Garasky, 1993), they remain the exception.

¹⁸The costs of preventing a partner from defecting may be higher within a non-marital union, as unmarried couples lack the legal protection which limits their bargaining power within the union. The risk of dissolution from a marriage may be lower given the greater separation costs (as opposed to the costs of dissolving a non-marital union). This implies that resources may be freed up (including parental time) that would oth-

Whether or not the partner is the biological father as opposed to a social or a stepfather may also play a role. Biological fathers (parents) may make greater investments (or transfers) in their children than non-biological fathers for several reasons. First, biological fathers may be more emotionally attached to the child. Second, they may be forced by law to pay child support regardless of the relationship with the mother at childbirth.^{19,20} Third, biological fathers may have an interest in the continuation of their family lineage. Traditionally interests in children such as the continuation of the family name, access to the child, and having a legitimate heir to ensure intergenerational transfers of wealth could only be secured through marriage. To the extent that parents today may consider marriage as a way to realize such interests, marriage can result in greater investments in children.

3.3 Stability and change in relationship structure

The discussion on resource availability and investment implies that relationship transitions towards more involvement between the (biological) parents—such as a transition from non-involved to dating and from dating to cohabiting or married—may result in greater availability of economic and parenting resources and increased paternal investment in the child. If marriage yields the benefits discussed above, children whose parents get married may also experience better outcomes as children with continuously cohabiting parents. Conversely, a transition towards less involvement is expected to be detrimental for child wellbeing.

The type of relationship arrangement an individual enters and the way it progresses may also reflect the quality of the match. Relationships are formed (and maintained) if their perceived net value to those involved exceeds that of the alternatives (Weiss & Willis, 1997). Couples that face good relationship prospects are more likely to enter and continue the relationship than those who do not. Hence, an evolving relationship may signal that the partners form a good match that, in turn, may boost parenting resources allocated to children.

A greater involvement between the biological parents could also reflect factors that are unrelated to child wellbeing or perhaps even detrimental. For example, if a couple that is not well-matched or ready to advance their commitment experiences an unplanned pregnancy, a marriage (“shotgun wedding” or other advancement in the relationship status)

erwise be used to prevent the partner from defecting from the non-marital union. This is another reason to expect better child outcomes within a marital environment, compared to non-marital arrangements between the parents.

¹⁹The Family Support Act of 1988 requires states to establish legal paternity for all births, to develop and apply child support formulas based on a father’s resources, and to establish stronger collection procedures.

²⁰If the child is born out of wedlock and the father disputes paternity, the court determines paternity via DNA testing. However, child support laws thus far assume that the husband (at the time) is the father and enforce child support transfers if the birth occurs within marriage.

that occurs because of pressure to conform to a traditional family arrangement may not yield greater stability and parental resources. We explore these potential sources of correlation as part of the robustness analysis of the effects of relationship transitions by employing controls for relationship characteristics (including whether the father suggested abortion) and individual characteristics (including religious affiliation and attendance of religious activities).

4. Data and empirical models

4.1 Sample

The study sample consists of 2,331 children born to unmarried parents drawn from the Fragile Families and Child Wellbeing Study (FFCWS). The FFCWS started collecting data on approximately 4,800 births in 75 hospitals in 16 large cities (with population of 200,000 or more) across the U.S. between 1998 and 2000. The number of births to unmarried parents is 3,600 while the rest are to married couples. The weighted sample is representative of births in large U.S. cities in 1999.²¹ Biological parents were interviewed at the time of childbirth, when the child reaches age one and then at age three. Topics such as parent-parent and parent-child relationships, socioeconomic activities, parents' and child's health, and child development are covered.²² These data are unique in that they provide information on a large set of unmarried biological parents in various living arrangements and relationship structures. A rich set of family socioeconomic and demographic characteristics, parenting behavior, relationship quality, and child developmental outcome variables is available.

We restrict our attention to children born outside of marriage with at least one parent (usually the mother) interviewed at baseline (birth of child) and after one year. Among the resulting sample of children, 49% are born to unmarried mothers who were cohabiting with the child's biological father at baseline; 33% are born to biological parents in visiting relationships; while the remaining are to mothers not romantically involved with the child's biological father (and living separately).²³

Table 1 presents the summary statistics of the dependent and independent variables employed in our analysis. The table reports the sample means by relationship arrangements of the biological parents at childbirth and age one. We divide the sample into five categories: Column (1) reports variable means for the sample of children whose biological

²¹Given that we study the subsample of out-of-wedlock children, we do not employ the sample weights in our analysis below.

²²For a detailed description of the survey and sampling procedures see Reichman et al. (2001).

²³The last group includes children whose biological mother was, at childbirth: (i) not romantically involved with anyone; or (ii) romantically involved with a partner who is not the biological father of the child.

Table 1: Descriptive Statistics by Family Structure Transitions

Parents' Union Status at Childbirth	Cohabiting	Cohabiting	Visiting	Not Involved	Unmarried
Parents' Union Status at 1-Year	Cohabiting	Married	Married	Married	Unmarried
Child Outcome Variables					
Asthma or Asthma Attack by Age One (Binary)	.082	.103	.022*	.100	.160*
Health Status (1 = Excellent; 5 = Poor)	1.48	1.42	1.48	1.50	1.52
Behavioral Index(1 = Least Prob; 5 = Very Prob)	2.83	2.72	2.81	2.53	2.89
Child Characteristics					
Low Birth Weight (< 88 oz.)	.099	.094	.022*	.000*	.107
Child is Female	.475	.507	.500	.600	.451
Parental Background Characteristics					
Mother's Race: White Non-Hispanic	.227	.254	.196	.000*	.143*
Mother's Race: Black	.385*	.230*	.413	.200	.579
Mother's Race: Hispanic	.360	.469*	.370	.800*	.253*
Mother's Race: Other	.007	.009	.000*	.000*	.009
Parents are of Different Race	.142	.188	.109	.200	.188*
Mother is Foreign Born	.175	.225	.217	.300	.090*
Mother's Age at Childbirth	24.3	24.5	24.6	25.5	23.2*
Father's Age at Childbirth	27.0	27.4	26.6	28.4	25.9*
Parents' Religion and Religious Activities					
Mother's Religion (None)	.106	.127	.000*	.100	.144*
Mother's Religion (Catholic)	.382	.408	.326	.700 ⁺	.242*
Mother's Religion (Baptist)	.240	.146*	.196	.100	.308*
Mother Attends Relig. Activities (1=Never;4= \geq 1/Wk)	1.79	2.11*	2.37*	2.30	1.92*
Father's Religion (None)	.119	.080 ⁺	.109	.000*	.097
Father's Religion (Catholic)	.350	.413 ⁺	.261	.100*	.136*
Father's Religion (Baptist)	.214	.169	.109*	.100	.189
Father Attends Relig. Activities (1=Never;4= \geq 1/Wk)	1.50	1.84*	1.76	1.50	1.13*
Mother's Educational Background					
Less than High School	.387	.338	.391	.500	.400
High School Diploma (or GED)	.347	.319	.326	.400	.332
Some College	.238	.263	.261	.100	.234
College and Beyond	.026	.070*	.022	.000*	.032
(Continued)					

Table 1 (Continued): Descriptive Statistics by Family Structure Transitions

Parents' Union Status at Childbirth	Cohabiting	Cohabiting	Visiting	Not Involved	Unmarried
Parents' Union Status at 1-Year	Cohabiting	Married	Married	Married	Unmarried
Father's Educational Background					
Less than High School	.407	.343 ⁺	.370	.200	.345*
High School Diploma (or GED)	.336	.305	.348	.100*	.371
Some College	.220	.272	.239	.200	.179*
College and Beyond	.033	.070*	.043	.100	.031
Father's Education Level Relative to Mother's					
Same as Mother	.486	.469	.478	.300	.432*
More than Mother	.250	.254	.261	.200	.248
Less than Mother	.258	.268	.261	.100	.249
Mother's Labor Income					
\$0	.370	.394	.435	.500	.411 ⁺
\$1 to \$9, 999	.363	.357	.239 ⁺	.100*	.385
\$10, 000 to \$25, 000	.211	.164	.239	.400	.171*
More than \$25, 000	.056	.085	.087	.000*	.034*
Father's Labor Income					
\$0	.148	.131	.174	.500 ⁺	.439*
\$1 to \$9, 999	.237	.160*	.217	.100	.229
\$10, 000 to \$25, 000	.407	.418	.478	.200	.233*
More than \$25, 000	.208	.291*	.130	.200	.100*
Home Investments					
Number of Children in					
Household (Age < 18)	2.20	2.20	2.17	2.20	2.34*
Number of Adults in					
Household (Age ≥ 18)	2.35	2.54*	2.57	2.50	2.12*
Mother has New Partner (1 Year)	.0	.0	.0	.0	.238*
Grandmother in					
Household (Childbirth)	.215	.202	.522*	.100	.426*
Grandmother in Household (1 Year)	.143	.160	.283*	.100	.319*
Mother's Weekly Hours					
Worked (1 Year)	37.5	35.5	34.5	38.6	36.6
Mother Does Not Work (1 Year)	.469	.474	.500	.500	.447
Father's Weekly Hours					
Worked (1 Year)	45.0	45.7	44.7	45.9	43.8
Father Does Not Work (1 Year)	.131	.117	.130	.200	.357*
Mother Owns Her Own House					
or Apartment (1 Year)	.119	.207*	.130	.200	.047*
Father Owns His Own House					
or Apartment (1 Year)	.128	.207*	.130	.300	.045*

(Continued)

Table 1 (Continued): Descriptive Statistics by Family Structure Transitions

Parents' Union Status at Childbirth	Cohabiting	Cohabiting	Visiting	Not Involved	Unmarried
Parents' Union Status at 1-Year	Cohabiting	Married	Married	Married	Unmarried
Parents' Health and Health Behavior					
Mother's Self-Reported Health =					
Fair or Poor	.080	.070	.087	.000*	.080
Mother: Prenatal Smoking (If at all)	.217	.230	.217	.200	.225
Mother: Prenatal Drug Use (If at all)	.039	.028	.022	.000*	.066*
Mother: Prenatal Drinking (If at all)	.089	.075	.043	.000*	.113 ⁺
Father's Self-Reported Health =					
Fair or Poor	.082	.070	.065	.000*	.055*
Father Smokes (If at all)	.416	.423	.478	.300	.308*
Father: Substance Abuse Problems					
Limiting Work	.082	.066	.065	.200	.127*
Parenting Behavior and Alternative Childcare					
Child Cared by Others (Hours/Week)	12.7	11.1	14.1	12.2	16.5*
Mother Spans the Child (If at all)	.205	.239	.304	.000*	.297*
Mother Reads to the					
Child (Days/Week)	3.98	4.14	3.61	4.10	4.12
Mother Sings to the					
Child (Days/Week)	5.47	5.70	5.52	5.60	5.46
Mother Plays Outdoor Games with					
Child (Days/Week)	6.05	6.21	5.72	6.00	5.99
Mother Plays Indoor Games with					
Child (Days/Week)	5.89	6.05	5.47	5.78	5.90
Parental Relationship Characteristics					
Years Parents Know Each Other					
before Childbirth	4.35	3.78 ⁺	4.19	5.08	3.57*
Parity of Focal Child (w/n union					
of biological parents)	1.29	1.23	1.28	1.30	3.57*
Father Suggested Abortion During					
Pregnancy	.115	.075 ⁺	.196	.200	.226*
Number of Observations					
(% of sample)	697 (29.9)	213 (9.1)	46 (2.0)	10 (0.4)	1365 (58.6)

Notes:

(1) Significantly different from "cohabiting at childbirth and cohabiting at age one": * = 5% level, + = 10% level;

(2) The "unmarried–unmarried" category includes the following parental relationship transitions from the time of childbirth to when the child reaches age one (Let C = "Cohabiting", V = "Visiting", NI = "Not Involved"): $C \rightarrow V$, $C \rightarrow NI$, $V \rightarrow C$, $V \rightarrow V$, $V \rightarrow NI$, $NI \rightarrow C$, $NI \rightarrow V$, and $NI \rightarrow NI$.

parents were cohabiting at birth and at age one (“persistently cohabiting”). For the sample of children whose biological parents get married within a year after childbirth, means are separately reported based on parental relationship structure observed at childbirth (cohabiting (2), visiting (3), and not (romantically) involved (4)). Variable means for the remaining sample of children are presented in column (5). This latter group is the largest (58.6% of the sample), consisting of all children whose biological parents were unmarried at childbirth and at one year, excluding those children whose parents cohabited at birth and at age one.²⁴ Table 1 also shows results of means tests using children of biological parents in persistently cohabiting unions as reference group.

4.2 Measures of child wellbeing

We examine health and behavioral outcomes of children measured at age one. Specifically, we employ measures of whether the child has asthma or asthma attacks, child’s general health status, and a behavioral problem index. All three measures are based on mother’s reports at the one-year follow-up.

Asthma is the most common chronic illness affecting children,²⁵ with symptoms formulated since infancy (Klinnert et al., 2001). Genetic predisposition combined with exposure to environmental toxins, such as allergens and cigarette smoke, are commonly identified as risk factors for asthma onset (Wiesch et al., 1999; Sporik et al., 1991; Cogswell et al., 1987; Weitzman et al., 1990). In the U.S., children from lower socioeconomic and minority backgrounds develop higher rates of asthma, a pattern attributable to toxic environmental exposures and poor health investments (Neidell, 2004; Gergen et al., 1988; Oliveti et al., 1996). Psychosocial stress is known to aggravate asthma, and the relationship between stressful life events and the onset of asthma has been well established among the adult population (Teiramaa, 1979; Levitan, 1985; and Kileläinen et al., 2002). Recent research points to stress experienced by a caretaker as an independent factor contributing to child asthma (Wright et al., 2002).²⁶ Stressful life events, such as parental relationship conflicts, have been found to be associated with asthma onset in infants, mainly through

²⁴This category includes the following transitions from the time of childbirth to when the child reaches age one (Let C = “Cohabiting”, V = “Visiting”, NI = “Not Involved”): $C \rightarrow V$, $C \rightarrow NI$, $V \rightarrow C$, $V \rightarrow V$, $V \rightarrow NI$, $NI \rightarrow C$, $NI \rightarrow V$, and $NI \rightarrow NI$.

²⁵“Asthma in Children Fact Sheet,” American Lung Association, 2004.

²⁶Wright et al. studied the role of caregiver stress on infant asthma. Using a birth cohort with a family history of asthma to account for genetic predisposition, they found that greater levels of stress experienced by caregivers when the child is 2 to 3 months old (before any symptoms of asthma is observed) is associated with increased risk of recurrent episodes of wheezing (clinical definition of asthma) among children during the first 14 months of life. The findings are robust to established controls and potential mediators (including socioeconomic status, birth weight, race/ethnicity, maternal smoking, breast-feeding, indoor allergen exposure, and lower respiratory infections). In addition, the direction of causality runs from caregiver stress levels to infant wheezing, rather than the reverse.

the mother's coping abilities that translate into her parenting behavior (Klennert et al., 1994).

In the FFCWS, mothers are asked to report whether their child has asthma (or were told s/he does by a health care professional) or an asthma attack by age one.²⁷ Among our sample of children born out-of-wedlock, 12.8% report having asthma or an asthma attack by age one.²⁸ About 10% of the children born to cohabiting parents are reported to have asthma and/or have had an asthma attack by age one, compared to 15% and 17% of children born to visiting or not (romantically) involved parents, respectively.²⁹

Table 1 shows that there are significant differences in child asthma incidence among different types of parental relationship settings. A higher proportion of children whose biological parents remained unmarried (nor persistently cohabiting) when they reach age one are reported to have asthma or an asthma attack by age one (16.0%), compared to children of continuously cohabiting (8.2%) or unmarried at childbirth and subsequently married parents (between 2% to 10%). This pattern is consistent with the hypothesis that a lower level of involvement between the biological parents is detrimental for child well-being. Among children born to cohabiting parents, comparable incidences of asthma are found between those whose parents remain cohabiting, and those whose parents transitioned into marriage within one year after childbirth.

The measure of the child's general health status ("health status") is based on the mother's rating of her child's health condition. Mothers are asked to rate their child's health from 1 being "excellent", to 5 meaning the child is in "poor" health.³⁰ Mothers who remain unmarried (and not persistently cohabiting with the father) when the child reaches age one (column 5) are more likely to report that the child is in poor health, compared to mothers in persistently cohabiting relationships and mothers who marry the biological fathers within the first year since childbirth. However, the differences in the means are not statistically significant.

We construct a behavioral problem index based on the mother's answers to the following six questions: whether the child is shy, fussy or cry often, gets upset easily, reacts strongly when upset, whether the child is sociable and whether he or she is friendly to strangers. Mothers are asked to rate each question from a scale of 1 to 5, with 1 = (not

²⁷This is consistent with the standard definition of childhood asthma which is measured based on the response of a parent or adult household member ("America's Children: Key National Indicators of Well-Being, 2001," Federal Interagency Forum on Child and Family Statistics, Washington D.C.: U.S. Printing Office.

²⁸According to the 2002 National Health Interview Survey, about 12% of U.S. children under the age of 18 are diagnosed with asthma but the incidence is greater among minority children (CDC, 2004). Diagnosing asthma in babies is more difficult than in older children but an estimated 50% of kids with asthma develop symptoms by age 2.

²⁹Summary statistics furnished upon request from the authors.

³⁰Mother's rating of her child's "health status" is categorical: 1 = Excellent, 2 = Very Good, 3 = Good, 4 = Fair, and 5 = Poor.

at all), and 5 = (very much). The behavioral problem index is constructed based on the mean responses to the six questions,³¹ with a sample mean of 2.60 and standard deviation of 0.77. The *Cronbach's alpha* for the behavioral index is 0.501,³² implying a correlation between the set of behavioral measures we use to construct the index and the underlying factor is $\sqrt{\alpha} \approx 0.71$. On average, the behavioral problems index is highest for children of persistently unmarried (nor persistently cohabiting) parents. However, the means are not statistically significantly different.

4.3 Multivariate models

The descriptive statistics provide some evidence consistent with our hypothesis that a relationship between the biological parents that advances towards marriage is beneficial for child wellbeing. To explore the robustness of the associations between parental relationship and child wellbeing, multivariate analysis are conducted to assess: (i) whether children who experience the marriage of their biological parents within the first year after childbirth exhibit better outcomes compared to children whose parents remain unmarried, controlling for relationship status at birth; and (ii) whether children born into various non-marital relationship settings benefit from the (biological) parents' relationship transitioning towards greater commitment.

For the biological parents of child i who were unmarried upon childbirth, the process of investing in their child's wellbeing and the potential influence of their relationship arrangements on their offspring may be formalized as follows (assuming a continuous dependent variable and linear effects):

$$Y_i = \alpha_0 + \alpha_1 X_i + \alpha_2 \{M\}_i + \alpha_3 \{V_0\}_i + \alpha_4 \{NI_0\}_i + \alpha_5 \{V_1\}_i + \alpha_6 \{NI_1\}_i + \epsilon_i, \quad (1)$$

where Y_i is a measure of child wellbeing, X_i is a set of observed child- and family-specific variables (discussed below). Parental relationship status observed at childbirth ($t = 0$) and at age one ($t = 1$) are captured by a set of binary variables: $M =$ "Married" (as of age one), $V_t =$ "Visiting", and $NI_t =$ "Not Romantically Involved". The reference category is $C_t =$ "Cohabiting", $t \in \{0, 1\}$. For example, α_2 captures the effect of biological parents'

³¹In constructing the behavioral problem index, the original responses to the first four questions are used, with 1 denoting the least problematic behavior and 5 indicating the most troubled. The responses to the last two questions are reversed so that a 1 would also indicate the least problematic behavior and a 5 would be the most troubled.

³²Estimation of the *Cronbach's alpha* is unaffected by the reversal of the item scale (See previous footnote). The Cronbach's alpha assesses the reliability of a summative rating scale composed of variables specified. The reliability α is defined as the square of the correlation between the measured scale and the underlying factor. See Cronbach (1951) and Likert (1932) for a detailed discussion.

subsequent marriage after childbirth on child wellbeing at age one relative to cohabitation, controlling for initial relationship status and other non-marital arrangement at age one. The error term, ϵ_i , captures unobserved child- and family-specific heterogeneity.

The effects of parental relationship arrangements (at age one) may differ by the specific type of relationship transition the parents experienced within the first year since childbirth. To test for the effect of parental relationship transitions within the first year of the child's life (i.e. allowing for differential effects by initial status compared to Equation (1)), we consider the following specification:

$$\begin{aligned}
 Y_i = & \beta_0 + \beta_1 X_i + \beta_2 \{C \rightarrow M\}_i + \beta_3 \{C \rightarrow V\}_i + \\
 & + \beta_4 \{C \rightarrow NI\}_i + \beta_5 \{V \rightarrow M\}_i + \dots + \beta_8 \{V \rightarrow NI\}_i + \\
 & + \beta_9 \{NI \rightarrow M\}_i + \dots + \beta_{12} \{NI \rightarrow NI\}_i + \mu_i,
 \end{aligned} \tag{2}$$

where a set of binary variables are used to capture the evolution of the parents' relationship since childbirth. The first letter(s) stand for status at birth (C = "Cohabiting", V = "Visiting", NI = "Not Romantically Involved") and the second letter(s) denote the status of the relationship one year later.³³ μ_i represents the random error term.

We note that the reference category (the "omitted" category) for the parental relationship transition is arbitrary. We choose the persistently cohabiting arrangement as it is the most common arrangement (30% of the children in our sample are of parents in persistently cohabiting relationships). In specification (2), a statistically significant positive coefficient of, for example, β_2 indicates that children who experience their biological parents transitioning from cohabitation at childbirth to marriage a year later are better off than those in persistently cohabiting arrangements (assuming that the dependent variable takes higher values for better outcomes).

The empirical framework adopted here can be interpreted as a child wellbeing production process. Factors measured at birth capture pre-birth influences and constant background factors. Measures of relationship status transitions and other inputs are based on the entire period from birth to assessment. This type of specification is also known as the "cumulative model" (Todd & Wolpin, 2003) and is widely used when the appropriate data are available (e.g., Heiland, 2002). Adopting this view, the determinants of child wellbeing fall into three categories: quantity of care, quality of care, and child endowments. Following the conceptual discussion above, we expect that the relationship structure between the biological parents relates to both the quantity (time and economic resources) and the quality (parenting resources) of services provided to the child.

To control for child health endowments we include measures of low birth weight and gender in all empirical models on the effect of family structure on child wellbeing. To

³³For example, the indicator $\{C \rightarrow M\}_i$ equals one if the biological parents are cohabiting at childbirth and get married within a year.

investigate the robustness of the correlations between the family structure measures and child outcomes, we consider models with controls for potential mediating factors such as the quantity and quality of inputs received by a child.

Specifically, to account for differences in the quantity of care received, we control for financial resources of the biological parents (labor income and home ownership), their work behavior, whether the grandmother lives in the same household as the child at age one, amount of non-maternal childcare, number of adults (at least 18 years of age) in the household, number of children (less than 18 years old) in the household, and the birth order of the child (within the union of the biological parents).

Financial resources may proxy for the ability of the parents to purchase inputs in the production of child wellbeing (measured by child health and behavioral outcomes). As a measure of non-maternal childcare, an arrangement where the grandmother resides in the same household may be beneficial for the child if the grandmother provides additional care. Conversely, care provided by a grandmother may exert no effect (or a detrimental effect) if on average it is a poor substitute for maternal care.

The disadvantages associated with the absence of a resident biological father for children whose parents are in "visiting" or "not involved" arrangements at age one may be mitigated by contact with an unrelated father figure (i.e. social or stepfather), therefore we additionally control for whether the mother has a new partner, for children of visiting or not involved parents at age one.

Measures of the quality of care provided include the educational attainment of the biological parents, a set of parenting style measures (whether mother spansks the child, how often mother reads, sings, or plays with child), and whether the father engages in activities that can endanger the health of the child ("smokes", "substance abuse problems limiting work").

Child health endowments are measured using (detrimental) health inputs during pregnancy (maternal smoking, drug use and drinking), ethnicity/race, child gender, and whether the child is of low birth weight. Differences in the parents' innate abilities to provide for the child are captured by each parent's age at childbirth, whether the mother is foreign-born, parents' health, parents' religiosity and participation in religious activities. All background characteristics are measured at baseline (childbirth).

Factors that influence parents' investment in their children's wellbeing may be correlated with factors that also determine the course of the biological parents' relationship. There is ample evidence of selection into types of relationship arrangements. Women who are white, older, better educated, have no children from previous relationships, and more religious have been found to be more likely to marry before the child is born (Manning, 1993, 2001). For many unmarried couples that become pregnant, setting up an independent cohabiting household is their immediate goal (Gibson et al., 2003). This suggests that parents who remain in separate households (visiting unions) by the time of child-

birth may observe low expected gains from entering into marriage/cohabitation prior to childbirth.

We analyze whether the correlation between the parents' relationship status and child wellbeing is robust, by controlling for the parents' characteristics that relate to both the union formation between the parents and child outcome: parental background factors such as age, race/ethnicity, whether the parents are of different racial backgrounds, and existing children. To account for differences in the expected gains from a union, we control for each parent's education background, father's education relative to the mother's, and each parent's religious affiliation and participation of religious activities. Cohabiting couples may have been involved longer compared to less involved couples upon conception, and hence have had more time to transition into cohabitation before marriage. To account for this difference, we control for the length of time in which the parents have known each other (not necessarily romantically involved) before the child was born, and the parity of the focal child within their union.

Table 1 presents means of the explanatory variables by relationship transitions. Mothers who either marry or continue to cohabit with the child's father within the first year since childbirth, are on average older, more likely to be white, better educated, and own an apartment/house, compared to mothers who remained unmarried (and non-persistently cohabiting with the child's father). In terms of health behavior, although subsequently-married mothers who were romantically involved with the biological father at childbirth (either cohabiting or visiting) are less likely to drink alcohol or use drugs during pregnancy, their partners (child's biological fathers) are more likely to smoke. Finally, cohabiting parents who marry after childbirth may invest more parenting time in their child compared to the other groups, as we observe that these mothers utilize fewer hours of alternative childcare per week and interact more with the child through reading, singing and playing games.

5. Results

This section presents the estimation results of the multivariate analysis: examining the differences in the outcomes of young children by the relationship structure between the biological parents. Three dimensions of child wellbeing measured at age one are examined (the results are presented respectively): whether the child has asthma or an asthma attack (Table 2A), child's general health status (Table 2B), and a behavioral problem index (Table 2C). The multivariate analysis discussed in the previous section is carried out as follows.

Table 2A: Effects of Parental Union Transitions on Child's Propensity of Developing Asthma or Asthma Attack by Age One[†]

	(1)	(2)	(3)	(4)	(5)	(6)
Union Status at 1 Yr						
Married	-.040 ⁺	-.023	-.016			
	(.019)	(.022)	(.022)			
(Ref: Cohabit)						
Visiting		-.030	-.045			
		(.029)	(.027)			
Not Involved		.045*	.023			
		(.015)	(.018)			
Union Status at Childbirth						
(Ref: Cohabit)						
Visiting			.047*			
			(.018)			
Not Involved			.054*			
			(.026)			
Union Transitions: Childbirth → 1 Yr						
Cohabit → Married				.029	.031	.038
				(.030)	(.029)	(.033)
(Ref: Cohabit → Cohabit)						
Cohabit → Visiting				.029	-.028	-.027
				(.072)	(.052)	(.059)
Cohabit → Not Involved				.080*	.077*	.074*
				(.034)	(.036)	(.038)
Visiting → Married				-.081	-.072	-.090 ⁺
				(.036)	(.031)	(.024)

(Continued)

Table 2A (Continued): Effects of Parental Union Transitions on Child's Propensity of Developing Asthma or Asthma Attack by Age One[†]

	(1)	(2)	(3)	(4)	(5)	(6)
Visiting → Cohabit				.116*	.080*	.081*
				(.032)	(.030)	(.032)
Visiting → Visiting				-.001	-.007	-.010
				(.044)	(.040)	(.044)
Visiting → Not Involved				.087*	.047*	.035
				(.027)	(.028)	(.029)
Not Involved → Married				.041	.139	.144
				(.129)	(.178)	(.185)
Not Involved → Cohabit				.153*	.164*	.227*
				(.087)	(.092)	(.109)
Not Involved → Visiting				-.021	-.051	-.060
				(.082)	(.052)	(.049)
Not Involved → Not Involved				.105*	.089*	.104*
				(.028)	(.034)	(.040)
Log Pseudo-Likelihood	-865.2	-859.2	-854.7	-846.9	-754.8	-706.0
Pseudo R²	.025	.032	.037	.046	.115	.137
Wald Test χ^2	47.1*	57.2*	64.2*	75.7*	173.1*	194.2*
N	2321	2321	2321	2321	2193	1959

Notes: (†) Probit marginal effects reported here; (a) Robust standard errors reported in parentheses; (b) * = Significance at 5% level, and + = 10% level; (c) All models control for whether the child is of low birth weight, and whether the child is female; Model (5) additionally controls for parents' background characteristics, religion and religious activities, educational background, earnings, and home investments; Model (6) includes all controls in Model (5) + parents' health and health behavior, parenting behavior, and parental relationship characteristics (Refer to Appendix Table 1, Column 1 for detailed estimates of additional controls included in Model (6)).

Table 2B: Effects of Parental Union Transitions on Child Health Status: Prob[Y = Child Health Status as Reported by Mother (1 = Excellent; 5 = Poor)][†]

	(1)	(2)	(3)	(4)	(5)	(6)
Union Status at 1 Yr						
Married	-.118 (.085)	-.114 (.089)	-.107 (.090)			
(Ref: Cohabit)						
Visiting		-.088 (.120)	-.127 (.123)			
Not Involved		.019 (.055)	.038 (.064)			
Union Status at Childbirth (Ref: Cohabit)						
Visiting			.073 (.061)			
Not Involved			.135 ⁺ (.081)			
Union Transitions: Childbirth → 1 Yr						
Cohabit → Married				-.102 (.103)	-.093 (.108)	-.009 (.116)
(Ref: Cohabit → Cohabit)						
Cohabit → Visiting				-.045 (.248)	.082 (.252)	.096 (.276)
Cohabit → Not Involved				.029 (.095)	.059 (.110)	.051 (.117)
Visiting → Married				.002 (.202)	-.034 (.202)	.011 (.210)
Visiting → Cohabit				.121 (.082)	.169 ⁺ (.090)	.172 ⁺ (.096)
Visiting → Visiting				-.177 (.148)	-.166 (.164)	-.235 (.171)
Visiting → Not Involved				.049 (.081)	.083 (.095)	.081 (.101)
Not Involved → Married				.148 (.325)	-.204 (.420)	-.436 (.502)
Not Involved → Cohabit				.184 (.214)	.146 (.225)	-.146 (.264)
(Continued)						

Table 2B (Continued): Effects of Parental Union Transitions on Child Health Status: Prob[Y = Child Health Status as Reported by Mother (1 = Excellent; 5 = Poor)][†]

	(1)	(2)	(3)	(4)	(5)	(6)
Not Involved → Visiting				.564 ⁺	.495	.524 ⁺
				(.319)	(.329)	(.315)
Not Involved → Not Involved				.085	.152	.181
				(.077)	(.104)	(.118)
Log Pseudo-Likelihood	-2170	-2170	-2168	-2166	-1982	-1712
Pseudo R²	.009	.009	.010	.011	.044	.070
Wald Test χ^2	40.4*	41.9*	45.0*	48.9*	186.9*	268.7*
N	2320	2320	2320	2320	2196	1975

Notes: (†) Ordered-probit coefficient estimates reported here; (a) Robust standard errors reported in parentheses; (b) * = Significance at 5% level, and + = 10% level; (c) All models control for whether the child is of low birth weight, and whether the child is female; Model (5) additionally controls for parents' background characteristics, religion and religious activities, educational background, earnings, and home investments; Model (6) includes all controls in Model (5) + parents' health and health behavior, parenting behavior, and parental relationship characteristics (Refer to Appendix Table 1, Column 2 for detailed estimates of additional controls included in Model (6)).

**Table 2C: Effects of Parental Union Transitions on Child Problematic Behavior:
Y = Child Behavioral Problem Index (1 = Least Problematic; 5 =
Very Problematic)[†]**

	(1)	(2)	(3)	(4)	(5)	(6)
Union Status at 1 Yr						
Married	-.134*	-.078	-.077			
	(.068)	(.071)	(.072)			
(Ref: Cohabit)						
Visiting		.053	.053			
		(.109)	(.111)			
Not Involved		.117*	.128*			
		(.049)	(.055)			
Union Status at Childbirth (Ref: Cohabit)						
Visiting			.007			
			(.053)			
Not Involved			-.031			
			(.071)			
Union Transitions: Childbirth → 1 Yr						
Cohabit → Married				-.105	-.061	-.051
				(.082)	(.083)	(.088)
(Ref: Cohabit → Cohabit)						
Cohabit → Visiting				.274	.260	.220
				(.183)	(.180)	(.198)
Cohabit → Not Involved				.027	-.060	-.159 ⁺
				(.082)	(.092)	(.096)
Visiting → Married				-.010	-.002	-.165
				(.157)	(.157)	(.157)
Visiting → Cohabit				-.065	-.053	-.079
				(.073)	(.080)	(.084)
Visiting → Visiting				-.072	.001	.006
				(.138)	(.145)	(.155)
Visiting → Not Involved				.171*	.191*	.182*
				(.073)	(.086)	(.089)
(Continued)						

Table 2C (Continued): Effects of Parental Union Transitions on Child Problematic Behavior: Y = Child Behavioral Problem Index (1 = Least Problematic; 5 = Very Problematic)[†]

	(1)	(2)	(3)	(4)	(5)	(6)
Not Involved → Married				-.277 (.370)	-.170 (.502)	.186 (.579)
Not Involved → Cohabit				.009 (.146)	.032 (.163)	-.101 (.177)
Not Involved → Visiting				.169 (.350)	.173 (.321)	.068 (.307)
Not Involved → Not Involved				.072 (.071)	.143 (.093)	.181 ⁺ (.307)
Constant	2.91* (.032)	2.85* (.039)	2.85* (.042)	2.87* (.045)	2.75* (.239)	3.21* (.291)
<i>R</i> ²	.005	.007	.007	.010	.058	.098
F-Test	3.84*	3.44 ⁺	2.52*	1.77 ⁺	2.63*	2.96*
N	2318	2318	2318	2318	2194	1972

Notes: (†) OLS coefficient estimates reported here; (a) Robust standard errors reported in parentheses; (b) * = Significance at 5% level, and + = 10% level; (c) All models control for whether the child is of low birth weight, and whether the child is female; Model (5) additionally controls for parents' background characteristics, religion and religious activities, educational background, earnings, and home investments; Model (6) includes all controls in Model (5) + parents' health and health behavior, parenting behavior, and parental relationship characteristics (Refer to Appendix Table 1, Column 3 for detailed estimates of additional controls included in Model (6)).

For each outcome measure, six model specifications are adopted,³⁴ and the estimated results are presented in each table respectively. First, we examine the effect of parents' marriage within the first year of the child's life. Three models based on the aforementioned general specification (1) are estimated: Model (1) estimates the overall association of marriage between the biological parents within the first year after childbirth relative to all other non-marital arrangements; Model (2) examines the differential effects of marriage, visiting, not romantically involved relative to cohabitation one year after birth; and Model (3) examines the effects of relationship status at year one, holding parental relationship arrangements at childbirth constant.

Furthermore, implementing specification (2) aforementioned, we examine the effects of all relationship transitions (combinations of all status) between the first year of the child's life. The reference situation is cohabiting biological parents at birth and the one-year follow-up. The results are presented in Model (4). To determine whether the differences in outcomes among children who experience changes in the relationship structure can be explained by differences in basic parental demographic and socioeconomic characteristics, Model (5) includes controls for these factors. Finally, Model (6) extends the specification of Model (5) by including controls for additional mediating factors such as parenting behavior, parental health and health behavior, as well as measures of parental relationship characteristics. In the discussion below we focus on the estimated effects of relationship structure; the complete set of estimates for the specification based on Model (6) can be found in Appendix Table 1.

5.1 Child's propensity to develop asthma or have an asthma attack

Tables 2A presents the estimated probit marginal effects of the biological parents' relationship on the probability that their child develops asthma or has an asthma attack by age one.

We first examine the overall association between parents' marriage (against all other non-marital arrangements) and child's propensity to develop asthma within the first year since childbirth. The results are shown in Model (1) in Table 2A. Children whose biological parents marry within the first year after childbirth are 4% less likely to develop asthma or an asthma attack by age one, on average, compared to children whose parents do not get married. This difference is largely driven by differences in asthma incidences between children whose parents marry and those whose parents are not romantically involved at age one, as shown in Model (2). No romantic involvement between the biological parents at age one is the most detrimental arrangement. Children whose biological parents are not romantically involved at age one have, on average, a 4.5% greater probability of

³⁴All six models include controls for child gender and whether the child is of low birth weight (< 88 oz. at birth).

developing asthma during their first year of life than children whose parents cohabit. Furthermore, Model (2) shows that children of parents who get married within a year after birth do not display a significantly lower incidence of asthma than children of parents who are cohabiting at age one.

Model (3) shows that once parental relationship structure at childbirth is accounted for (cohabiting as the reference group), the detrimental effect of non-involvement at age one is reduced by half and no longer statistically significantly different from cohabiting at age one (or married). The results indicate that relationship status at birth matters most. In particular, children born to parents who do not co-reside (i.e. are visiting or not involved) face significantly higher risk of asthma by age one, on average, than children born into families of cohabiting parents.

Model (4) considers the effect of parental relationship transitions within the first year since childbirth on the incidences of child asthma (children of cohabiting biological parents at childbirth and at age one are the reference group). Children whose parents' relationship evolves into marriage within the first year since childbirth have similar probabilities in developing asthma/asthma attack by age one, compared to children of cohabiting parents at childbirth and age one. However, parental non-involvement (never involved or devolving into non-involvement) is associated with a 8% to 10% higher probability of child asthma. Consistent with Models (2) and (3), we find some evidence that even if the relationship advances, children born to visiting or not involved parents (visiting → cohabit, not involved → cohabit) are more likely to have asthma compared to those born to (stable) cohabiting parents. Looking within the group of children born to visiting parents, on the other hand, we find that children who experience a marriage between their biological parents are better-off than those who do not.

To assess whether this pattern can be explained by differences in family characteristics, Model (5) includes controls for each parents' background characteristics (race/ethnicity, foreign-born, and religiosity), parental educational background, labor market activities, earnings, and other home investments including the number of adults in the child's household and whether the mother has a new partner.³⁵ As expected, the inclusion of these measures improves the fit of the model significantly. While differences in socioeconomic status and other family background characteristics partially explain the effects of being born to visiting or not-involved parents, the harmful effects of parental relationship devolving into non-involvement (or remaining not involved) do not appear to be mediated by these factors. Model (6) additionally controls for parental health and health behavior (such as smoking), parenting behavior, and parental relationship characteristics to account for differences in the quality of parental inputs and factors potentially correlated

³⁵For a detailed description of all the explanatory variables included in each category, refer to Table 1. Estimates of these additional controls included in Model (5) are available upon request.

with unobservable characteristics of the parents' relationship.³⁶ Differences along these dimensions explain some of the differences in asthmatic outcomes among children whose parents transitioned into non-involvement within the first year since childbirth, but the harmful effect associated with being born to not (romantically) involved parents remains. The overall pattern of the association between relationship changes and child asthma remains unaltered.

5.2 Child's general health status and behavioral problems

The effects of the biological parents' relationship developments on children's general health status are presented in Tables 2B. Given that mother's reports of her child's "general health status" is categorical (1 = "Excellent" health to 5 = "poor" health), the models are estimated using ordered probit. The results show that parental non-involvement at childbirth is associated with worse child health conditions at age one. Marriage between the biological parents within the first year since childbirth is not associated with significantly better child health at age one, compared to children of cohabiting parents. In addition, no differential effects among various relationship transitions are found, and the inclusion of additional controls does not alter this pattern (Models (5) and (6)).³⁷

Table 2C illustrates the effects of parental relationship on a child's propensity to display behavioral problems at age one. Ordinary least squares regressions are estimated for the continuous behavioral problems scale discussed above (which ranges between 1 = "least problematic" to 5 = "most troubled"). We find some evidence that children of parents who marry within the first year since childbirth display less problematic behavior, compared to children whose biological parents remain unmarried (Model (1)). Parental marriage within the first year following the child's birth is associated with a 0.13 unit reduction on the child behavioral problem scale (one tenth of a standard deviation). This difference is largely driven by behavioral differences between children whose parents transitioned into marriage and children whose parents are not involved at age one (Model (2)). Parental relationship structure at childbirth does not mitigate these differences (Model (3)).

Model (4) in Table 2C shows which relationship development is potentially detrimental (beneficial) for early child behavioral development. While we do not find any evidence that relationship changes toward greater involvement between the biological parents within the first year since childbirth are associated with improved child behav-

³⁶Detailed estimates of all control variables in the full specification (Model (6)), are presented in Column 1, Appendix Table 1.

³⁷Compared to our results on child asthma discussed in the previous section, the lack of statistical significance with respect to the child's general health measure may be due to the imprecision of the mother's rating of the child's general health status, compared to a relatively more detectable condition such as child asthma.

ioral outcomes compared to cohabiting at birth and age one, relationships that devolve into non-involvement can be linked to more behavioral problems. In particular, children born to visiting parents who end their romantic relationship within the first year since childbirth are significantly more likely to exhibit behavioral problems, compared to children of persistently cohabiting parents.³⁸ In addition, among children with cohabiting parents at birth, advancement towards marriage yields fewer behavioral problems than a transition from cohabiting to visiting. Children born to visiting parents who transition into cohabitation display fewer behavioral problems than children whose biological parents end their romantic involvement. These differences in child behavioral outcomes are robust to a rich set of potentially mediating factors such as family background, socioeconomic status, parenting resources and parental relationship characteristics (Models (5) and (6)).³⁹

5.3 Other determinants of child wellbeing

In analyzing the effect of parental relationship status and child outcomes, factors correlated with family structure (and changes) need to be accounted for. Factors such as parental background characteristics, socioeconomic conditions, parents' health and health behavior, parenting practices, and relationship-specific characteristics are included as additional controls in Models (5) and (6) for each of the three child outcome measures examined. This section provides a brief discussion of the estimates of these additional

³⁸Using data from the FFCWS, Osborne and McLanahan (2004) examine the cumulative effect of the number of maternal relationship transitions on child health and behavioral outcomes (Their study uses a different sample by including children born within marriage). They find that greater family instability, as measured by the number of maternal relationship transitions within the first three years since childbirth, is detrimental for child health and behavior outcomes measured at age 3. Unlike the present study, Osborne and McLanahan do not differentiate between the effects of evolving or devolving relationships, nor do they distinguish between relationships involving the biological father or unrelated partners. Although the primary goals of the two studies differ, our findings appear to be consistent: both studies find that children who experience a disturbance of parental relationship status, such as the separation of their biological parents (e.g. a transition in mother's romantic relationship as defined in their study), are at higher risks of exhibiting behavioral problems.

³⁹To explore which dimensions of behavior may be driving the pattern found for the behavioral problems index, we re-estimate the full specification (which includes the full set of controls as in Model (6), Table 2C), utilizing mother's actual responses to each of the six questions as the dependent variable using ordered probit analysis. The results are shown in Appendix Table 2. The overall pattern found here is consistent with our main findings using the constructed child behavioral problem index. We find no significant difference (at the 5% level) between children of persistently cohabiting parents and children of parents experiencing most other types of relationship transitions. Children born to visiting parents who separate within one year after childbirth (devolving into non-involvement) have higher tendencies to get upset easily, compared to children in persistently cohabiting families.

control variables. Detailed estimates of the fully specified model (Model (6)) for each outcome measure, are presented in Appendix Table 1.⁴⁰

Consistent with findings based on physician-diagnosed asthma in children (Gergen et al., 1988 and Rodríguez et al., 2002), we find higher incidences of asthma among children of African American and Hispanic mothers (up to 11%), compared to children of white (non-Hispanic) mothers.⁴¹ Male children and children of low birth weight are at higher risks of developing asthma. The former has also been found in samples representative of all children in the U.S. (e.g., Gergen et al., 1988). Children of foreign-born mothers are significantly less likely to be reported to have asthma/asthma attacks by age one.⁴²

Having a mother with at least a high-school degree is associated with 8% ~ 10% lower probability of the child developing asthma by age one. We find little evidence that a child's propensity to develop asthma is correlated with parental earnings.⁴³ However, having a college-educated father and/or high-earnings mother (more than \$25,000) are associated with better child health at age one.⁴⁴ Not surprisingly, mothers who report as being in fair/poor health herself are significantly more likely to have a child with asthma and in poorer health.

In terms of behavioral outcomes, black and Hispanic mothers are more likely to report problematic behavior in their children compared to white (non-Hispanic) mothers. Overall, parental socioeconomic status is not significant in explaining differences in child behavioral outcomes. As expected, parenting behavior and style are important in determining problematic behavior in children. Negative parenting behavior such as spanking, is associated with more behavioral problems. Conversely, productive parenting such as reading and frequent interactions with the child to stimulate positive development, are linked to fewer behavioral problems.

⁴⁰For brevity, estimates of parental relationship transitions within the first year since childbirth have been presented in Tables 2A, 2B, and 2C, and omitted here.

⁴¹A reduced risk of getting married after birth for minority mothers (Harknett & McLanahan, 2004) and an elevated asthma risk of their children (Gergen et al., 1988 and Rodríguez et al., 2002) have been previously reported.

⁴²However, foreign-born mothers are also more likely to report that their children are in poor health. It may be that children of foreign-born mothers are more likely to exhibit health problems other than asthma. Parental religiosity and practices are not significant factors in explaining the differences with respect to any of these health and behavioral outcomes.

⁴³Some previous studies also reported no significant effect of socioeconomic status on child asthma using more representative samples of U.S. children (e.g., Gergen et al., 1988).

⁴⁴It is interesting to note that the relationship between child behavioral outcome and mother's labor market behavior appears to be *U*-shaped: Mothers who do not work are more likely to report problematic behavior in their children; while having a mother who works more hours is also positively associated with child problematic behavior.

5.4 Additional analyses

Recent research points to potential racial differences in family formation behavior and fertility intention, which cannot be explained by differences in socioeconomic status (Manning, 2001).⁴⁵ Given that minority mothers are found to be (i) more likely to have a child outside of marriage (and that the pregnancy is more likely to be intended, especially among Hispanic women), and (ii) less likely to marry after the birth of a child, one may suspect that the racial differences in child outcomes (in particular child asthma) found in our main analysis may be attributable to systematic differences in the pattern of family formation across racial groups, such as fertility and the progression towards marriage (i.e. black parents who marry may be systematically different from white parents who get married), as opposed to factors correlated with race but not directly associated with family structure.

First, we examine potential differences in the effects of family formation on child development by race. We re-estimated model (1) in Table 2A by interacting “whether the parents marry within the first year since childbirth”, with indicators for “mother’s race”, while separately controlling for mother’s racial background.⁴⁶ Our results show that there are no significant differences in the marriage-racial interaction terms, but mother’s race remain significant. Consistent with the findings in our main analysis, this suggests that the differences in the incidences of child asthma is attributable to factors correlated with race but uncorrelated with parental relationship status, rather than potential systematic differences between black (and Hispanic) mothers vs. white mothers who marry.^{47, 48}

Second, we further explore whether the racial differences observed in child outcomes by relationship structure are influenced by whether the pregnancy was intended. Among parents who marry after having a child, there may be systematic differences between those who experienced a planned pregnancy, and those who did not. Parents who marry out of obligation, rather than mutual desire to progress towards more commitment, may differ with respect to their child investment behaviors. Assuming that abortion suggested by the father during pregnancy indicates that the birth likely was unintended, we re-estimate the marriage-race interaction model discussed above using the subsample of children whose fathers did not suggest abortion during pregnancy (results not shown). Among this subsample of potentially planned births, we find no significant racial differences in the child’s

⁴⁵Manning (2001) finds that minority women are more likely to have an intended birth during cohabitation compared to white women.

⁴⁶Estimation results available upon request from the authors.

⁴⁷The same pattern emerges when we duplicated this analysis to examine whether there are systematic differences between black (and Hispanic) cohabiting parents vs. cohabiting white parents.

⁴⁸It may be of interest to examine the effects of more detailed types of family structure transitions on child outcomes separately by race. However, separate analysis of more detailed family structure transitions within racial subsamples is not warranted by the data as the sample sizes become too small.

tendency to develop asthma/asthma attack between those whose parents marry within the first year since birth and children in all other (non-marital) relationship arrangements. Regarding family structure effects overall, the estimates from the subsample of children whose father did not suggest abortion did not differ markedly from those shown in Tables 2A-C.

6. Discussion

Over the past forty years, a growing proportion of American children are born outside of marriage. As non-traditional family settings are becoming more common, understanding the ramifications of growing up in non-marital family arrangements between the biological parents (such as cohabiting, visiting and other non-marital relationship arrangements) for children's wellbeing becomes increasingly important. This study investigates the implications of the relationship structure between the biological parents and its evolution on infant health and behavioral developments. In particular, we examine whether more involvement between the biological parents benefits the child among a large sample of children born out-of-wedlock. Complementing earlier research, we focus on infancy, a crucial period in child development.

We provide some evidence that greater involvement between the biological parents at birth is beneficial for child development. Children born into families with cohabiting biological parents are less likely to have asthma by age one, on average, than those born to mothers who were less involved with the child's biological father at childbirth. Specifically, children born to biological parents who are not romantically involved experience a higher incidence of asthma and are of poorer health compared to children born to biological parents with greater involvement (visiting or cohabiting). This pattern is robust to the inclusion of mediating factors consistent with the hypothesis that parental relationship status at childbirth is a key predictor of subsequent parental involvement (Carlson et al., 2005). Furthermore, we find that children born into families of cohabiting or visiting parents who end their relationship within the first year of the child's life are up to 9 percent more likely to have asthma compared to children of continuously cohabiting, continuously visiting, cohabiting-at-birth or visiting-at-birth and subsequently married biological parents.

Stressful life events, such as parental relationship conflicts, have been found to be associated with asthma onset among infants, mainly through parents' coping abilities that translate into parenting behavior (Klennert et al., 1994). Relationship instability associated with the lack of romantic involvement at childbirth (or subsequent transitions into non-involvement) between the biological parents may explain the higher incidences of asthma found among these children, as stress levels experienced by their parents may be

higher compared to those in cohabiting arrangements, and the heightened stress can lead to inadequate parenting.

We do not find that a relationship between the biological parents progressing towards more involvement is associated with improved general health outcome of the child, compared to a (stable) cohabiting union. Conversely, we find some evidence that less involvement between the biological parents increases the prevalence of behavior problems, consistent with existing evidence of detrimental effects of partnership instability (Osborne and McLanahan, 2004). These results are robust to controls for parental characteristics, socioeconomic status, and other inputs in the child development process.

This study finds no evidence that children born to cohabiting biological parents who get married within a year after childbirth are better off than children whose parents continue to cohabit. This pattern is documented across different measures of child wellbeing and confirms earlier findings by Osborne et al. (2003) in the context of behavioral outcomes at age three. These findings cast doubt on the hypothesis that marriage between the biological parents after childbirth necessarily bestows additional benefits to children born out-of-wedlock. The environment provided by stable cohabiting biological parents appears to be similarly beneficial for children as the one provided by biological parents who get married soon after birth. Either environment is significantly better for the child than a deterioration of the relationship between the biological parents towards no (romantic) involvement.

Fearing that unmarried parenthood may have harmful effects on children, recent family policies in the U.S. have geared towards promoting marriage among unmarried parents. While children born within marriage are generally found to exhibit better outcomes compared to their counterparts born outside of marriage, concluding that these differences are attributable to parental marriage may be inappropriate, as families that have children before vs. after marriage may be selectively different (Ellwood, 2004; Carlson et al., 2004; and Osborne, 2005). Our analysis of out-of-wedlock children produces no evidence that children born to cohabiting at birth and subsequently married biological parents exhibit significantly better outcomes than children born and raised within cohabiting unions—an environment experienced by 30% of the children in our sample. While more research on the benefits of marriage to out-of-wedlock children is needed, in light of the existing evidence it seems questionable whether policy initiatives that focus on promoting marriage among unmarried parents can alleviate the disadvantages faced by out-of-wedlock children.

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Appendix Table 1: Full Specification Estimates for Each Child Outcome: Asthma, General Health Status, and Behavioral Problem Index

	Asthma ^a	General Health ^b	Behavioral Problem ^c
Child Characteristics			
Low Birth Weight (< 88 oz.)	.113*	.381*	.082
Child is Female	-.074*	-.203*	-.083 ⁺
Parental Background Characteristics			
Mother's Race:			
(Ref = White Non-Hispanic)			
Mother's Race: Black	.110*	.102	.177*
Mother's Race: Hispanic	.104*	.124	.172*
Mother's Race: Other	.035	-.136	.232
Parents are of Different Race	.036	.087	.008
Mother is Foreign Born	-.086*	.358*	-.173 ⁺
Mother's Age at Childbirth	-.001	.001	-.008
Father's Age at Childbirth	-.000	-.002	.006
Parents' Religion & Religious Activities			
Mother's Religion: None	-.031	.034	-.135 ⁺
Mother's Religion: Catholic	.014	-.017	-.004
Mother's Religion: Baptist	-.006	.010	-.069
Mother's Religion: (Ref = Other)			
Father's Religion: None	-.022	.007	.013
Father's Religion: Catholic	-.033	.080	-.018
Father's Religion: Baptist	.019	.088	-.088
Father's Religion: (Ref = Other)			
Mother Attends Relig. Activities			
(1=Never;4= \geq 1/Wk)			
Father Attends Relig. Activities	.007	.012	-.022
(1=Never;4= \geq 1/Wk)			
	.008	.036	-.014
Mother's Educational Background			
(Ref = Less than High School)			
High School Diploma (or GED)	-.081*	-.046	-.084
Some Colleges	-.100*	.055	-.118
College and Beyond	-.100*	-.082	-.148
Father's Educational Background			
(Ref = Less than High School)			
High School Diploma (or GED)	.056*	.056	-.019
Some College	.059	-.286 ⁺	-.180
College and Beyond	-.009	-.619*	-.163
Father's Education Level Relative to Mother's			
(Ref = Same as Mother)			
More than Mother	-.060*	.163	.007
Less than Mother	.041	-.059	-.052
(Continued)			

**Appendix Table 1 (Continued): Full Specification Estimates for Each Child
Outcome: Asthma, General Health Status, and Behavioral Problem
Index**

	Asthma^a	General Health^b	Behavioral Problem^c
Mother's Labor Income			
\$0	.064	.359*	-.060
\$1 to \$9, 999	.075	.246	-.162
\$10, 000 to \$25, 000 (Ref = More than \$25, 000)	.042	.331*	-.094
Father's Labor Income			
\$0	-.033	-.005	-.041
\$1 to \$9, 999	.004	.086	-.108
\$10, 000 to \$25, 000 (Ref = More than \$25, 000)	-.006	-.008	-.117 ⁺
Home Investments			
Number of Children in Household (Age < 18)	.008	.035	.024
Number of Adults in Household (Age ≥ 18)	.008	.018	.041
Mother has New Partner (1 Year)	.039	-.125	.098
Grandmother in Household (Childbirth)	-.037*	-.154*	-.051
Grandmother in Household (1 Year)	-.029	.024	.000
Mother's Weekly Hours Worked (1 Year)	-.000	-.004	.006*
Mother Does Not Work (1 Year)	-.003	.007	.270*
Father's Weekly Hours Worked (1 Year)	.000	-.004*	.009
Father Does Not Work (1 Year)	.008	-.167*	.018
Mother Owns Her Own House or Apartment (1 Year)	.089*	-.097	.149
Father Owns His Own House or Apartment (1 Year)	-.032	.031	-.298*
Parents' Health and Health Behavior			
Mother's Self-Reported Health = Fair or Poor	.072*	.600*	.178 ⁺
Mother: Prenatal Smoking (If at all)	.009	-.072	.083
Mother: Prenatal Drug Use (If at all)	-.009	.064	-.200 ⁺
Mother: Prenatal Drinking (If at all)	.009	.166	-.086
Father's Self-Reported Health = Fair or Poor	.040	-.193 ⁺	.104
Father Smokes (If at all)	-.016	.017	.052
Father: Substance Abuse Problems Limiting Work	-.043*	.025	-.128
(Continued)			

Appendix Table 1 (Continued): Full Specification Estimates for Each Child Outcome: Asthma, General Health Status, and Behavioral Problem Index

	Asthma ^a	General Health ^b	Behavioral Problem ^c
Parenting Behavior and Alternative Childcare			
Child cared by Others (Hours/Week)	-.001	.004 ⁺	.001
Mother Spanks the Child (If at all)	-.018	-.027	.280*
Mother Reads to the Child (Days/Week)	.003	-.058*	-.029*
Mother Sings to the Child (Days/Week)	.006 ⁺	.014	-.015
Mother Plays Outdoor Games with Child (Days/Week)	-.003	-.019	-.031 ⁺
Mother Plays Indoor Games with Child (Days/Week)	-.003	-.008	-.013
Parental Relationship Characteristics			
Years Parents Know Each Other before Childbirth	.001	.007	-.002
Parity of Focal Child (within union of biological parents)	.007	-.067	.014
Father Suggested Abortion During Pregnancy	.015	-.120	-.008
Constant ^d			3.21*
Log Pseudo-Likelihood	-706.0	-1712	
Pseudo R²	.137	.070	
Wald Test χ^2	194.2*	268.7*	
R²			.098
F-Test			2.96*
N	1959	1975	1972

Notes: Results presented are based on the full specification for each child outcome (Model (6) of Tables 2A, 2B, and 2C). Estimates of types of parental relationship transitions are omitted here. Significance levels are reported for the 5% (*) and 10% (+) levels. (a) Probit marginal effects; (b) Ordered-probit coefficients; (c) OLS coefficients. (d) Estimated ordered-probit cut-off points available upon request.

Appendix Table 2: Effect of Parental Union Transitions on Types of Child Behavioral Outcomes: Prob [Y = Mother's Ratings for a Specific Type of Child Behavior (1 = Not at All; 5 = Very Much)][†]

	Shy	Fussy or Cry Often	Upset Easily	Reacts Strongly when Upset	Sociable	Friendly to Strangers
Parental Union Transition (Childbirth → 1 Yr)						
Cohabit → Married	.035 (.096)	-.085 (.095)	.033 (.084)	-.069 (.091)	.042 (.103)	-.005 (.091)
(Ref: Cohabit → Cohabit)						
Cohabit → Visiting	.252 (.254)	.178 (.192)	.357 ⁺ (.217)	.020 (.227)	-.041 (.276)	.226 (.166)
Cohabit → Not Involved	-.081 (.104)	-.136 (.103)	-.135 (.106)	-.136 (.106)	.007 (.115)	.068 (.104)
Visiting → Married	-.073 (.165)	-.166 (.184)	-.187 (.152)	.026 (.176)	-.341 ⁺ (.198)	.152 (.204)
Visiting → Cohabit	-.072 (.090)	-.121 (.088)	-.020 (.086)	-.054 (.089)	-.009 (.092)	.106 (.087)
Visiting → Visiting	-.412* (.154)	.018 (.154)	.114 (.154)	-.132 (.160)	.136 (.160)	-.040 (.155)
Visiting → Not Involved	-.092 (.094)	.148 (.091)	.236* (.092)	.039 (.092)	.040 (.101)	.147 (.093)
Not Involved → Married	.271 (.464)	-.009 (.538)	.068 (.447)	.263 (.547)	‡ (-)	-.466 (.575)
Not Involved → Cohabit	-.692* (.251)	.047 (.237)	-.139 (.207)	-.112 (.238)	-.183 (.273)	-.278 (.209)
Not Involved → Visiting	-.267 (.312)	.150 (.381)	-.069 (.270)	.136 (.356)	.177 (.381)	.184 (.265)
Not Involved → Not Involved	-.028 (.107)	.061 (.102)	.181 (.110)	.158 (.105)	.039 (.113)	.102 (.102)
Log Pseudo-Likelihood	-2714	-2876	-3005	-2974	-2219	-2998
Pseudo R^2	.018	.026	.025	.024	.029	.024
Wald χ^2	102.7*	167.9*	171.0*	161.0*	135.3*	155.0*
<i>N</i>	1973	1972	1975	1973	1969	1975

Notes:

(†) Ordered probit coefficients reported here;

(‡) Omitted during estimation due to lack of variation in the dependent variable for this group;

(a) Robust standard errors reported in parentheses;

(b) * = Significance at 5% level, + = Significance at 10% level;

(c) All models control for whether the child is of low birth weight, and whether the child is female, parents' background characteristics, religion and religious activities, parental educational background, earnings, home investments, parents' health and health behavior, parenting behavior, and parental relationship characteristics (Refer to Table 1 for a detailed description of the variables included in each category).