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Mothers and others: who invests in children's health?

Anne Case*, Christina Paxson

Woodrow Wilson School and Department of Economics, Princeton University, Princeton, NJ 08544, USA

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Abstract

We estimate the impact of family structure on investments made in children's health, using data from the 1988 National Health Interview Survey Child Health Supplement. Controlling for household size, income and characteristics, we find that children living with step-mothers are significantly less likely to have routine doctor and dentist visits, or to have a place for usual medical care, or for sick care. Who invests in children's health? It appears these investments are made, largely, by a child's mother, and that step-mothers are not substitutes for birth-mothers in this domain.

JEL classification: I1; D1

Keywords: Children's health investments; Family structure

1. Introduction

Much has been written about outcomes for children in the US who grow up with at least one of their birth-parents absent. These children, roughly half of all children in the US, are more likely to have academic problems and to drop out of school; they are also more likely to exhibit a range of behavioral problems, including substance abuse, delinquency, and early sexual activity; and they are more likely to live in poverty later in life. [1] Although much

* Corresponding author. Tel.: +1-609-258-2177; fax: +1-609-258-5974.
E-mail address: accase@princeton.edu (A. Case).

[1] See Hetherington et al. (1998) for a review of this literature. Recent work analyzing the impact of divorce on children's outcomes later in life has focused on the impact of unilateral divorce legislation. Gruber (2000) uses variation across time and US states to document the effect of unilateral divorce regulation on the incidence of divorce. He finds that exposure to unilateral divorce earlier in life is correlated with lower educational attainment and lower family income in adulthood. Johnson and Mazingo (2000) find similar results, using length of exposure to unilateral divorce laws to identify the impact of the regulation.

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of this research has centered on the impact of father absence, recent work by Biblarz and Raftery (1999) suggests that mother absence is much more detrimental than father absence to children's educational and occupational attainment.

While much is known about the outcomes for children raised by a single parent, or by a birth- and step-parent, less is known about the mechanisms that give way to these outcomes. Scarring left by an earlier unhappy home life, and the stress of living in a new blended family, both appear to play a role (Cherlin and Furstenberg, 1994), as does the economic insecurity that accompanies marital disruption (Duncan and Brooks-Gunn, 1996). Children who do not reside with both birth-parents move more frequently (McLanahan and Sandefur, 1994), which adds an additional layer of instability in the children's lives.

Differences in outcomes may also be due to differences in the investments made in step-children relative to birth-children. Parents may choose to invest less in step-children because they are not as attached emotionally to these children. Furstenberg (1987) cites results from a nationally representative child survey which followed 2200 children for a 5-year period, and which found that 15% of step-parents failed to mention step-children living in their household when asked to identify all family members (compared to 1% with birth-children). Similarly 31% of children did not mention a residential step-parent when asked the same question (Furstenberg, 1987, p. 54). This lack of emotional attachment may be at least partially the result of the step-child's behavior toward the step-parent. The child may view the step-parent as a threat to his or her relationship with the birth-parent, and may resent having a new person in a position of authority (see Stevenson and Black, 1995, pp. 53–56). Whether the lack of emotional attachment is driven by the indifference of a step-parent or the resentment of a step-child, the end result may be less investment on the part of the parent. Step-parents who are less attached to step-children may also hold lower expectations of reciprocal giving of time and money with their step-children, leading to lower investment.

A complementary explanation for lower investments is provided by Daly and Wilson (1987, 1998), who examine the possibility that parents invest to protect their own genetic material and, for this reason, are more keen to invest in their birth-children. They argue that there is "a strong theoretical rationale for expecting that the evolved human psyche contains safeguards against allowing a mere step-child, however appealing, easy access to that special mental category occupied by genetic children, the appropriate objects for the most nearly selfless love we know" (Daly and Wilson, 1998, p. 66).

There is little evidence on investments made in step-children. A small literature examines the role played by step-parents — usually step-fathers — in child maltreatment. Daly and Wilson (1985) documents the increased risk of physical child abuse and child homicide among children being raised by a step-parent, and finds that step-parents are selective in their abuse, abusing their step-children more often than their own birth-children. Step-fathers are also more likely than birth-fathers to be perpetrators of sexual abuse (NRC, 1993, p. 127). However, some evidence indicates that step-fathers are not associated with greater child neglect, usually defined as inadequate provision of food, clothing, housing, medical care, or education (Black et al., 1999).

Other research looks directly at whether step-parents invest in children's education. Beller and Chung (1992) present evidence that step-children are significantly less likely to attend college, perhaps because a step-parent is less willing to underwrite the college education of

a step-child. Case et al. (2000b) use data from the Panel Study of Income Dynamics (PSID) to compare educational outcomes of children from families with at least one birth-child of the mother and one step, adopted or foster child of the mother. They find that, relative to the birth-child of the mother, the other child obtains significantly less education — a result robust to the addition of time-varying household characteristics and mother fixed effects. However, one cannot reject that the results on children's educational attainment reflect scarring or stress faced by step-children, rather than the investment strategy of a step-parent.

Case et al. (1999, 2000a) use panel data from the PSID to examine one input into children: food. They find that if a birth-child of the mother figure in a household were to be replaced by a step-child, food expenditure would fall by roughly 5%. Consistent with an attachment based on genetic connection, one cannot reject that the size of the fall in food expenditure is identical, whether the child is a step, or foster or adopted child of the mother. The results in Case et al. are consistent with those discussed in Daly and Wilson (1998) in many respects. The results are strongest for the youngest children, and are much diminished by the time a child reaches adolescence. In addition, the step-parent effect is independent of the effect that poverty has on children's outcomes (see Daly and Wilson, 1998, p. 30).

Although the results on food spending are interesting, the connection between food expenditure and child well-being is not well forged. It may be that reduced food expenditure has a positive effect on children's outcomes, if it reduces the odds of obesity, for example. It may be that the reduced expenditure is on some product thought to be bad for children's health. With the limited data available in the PSID, it is not possible to pinpoint which food expenditure is lower or which household members eat less.

In this paper, we add to what is known about the relationship between household structure and investments made in children, by examining parental investments in children's health. We find, controlling for household income and parental and household characteristics, that children living with a step-mother appear to be disadvantaged in health investments and behaviors. Children living with birth-fathers and step-mothers are significantly less likely to have routine doctors visits, or places for usual health care, or to wear seatbelts. In fact, we cannot reject that investments for children living with birth-fathers and step-mothers are the same as those made by birth-fathers living as single parents with their children.

We identify two mechanisms that may protect the health investments of children raised by step-mothers. If the child's birth-mother has regular contact with the child (in the order of two to three times a month or more), then the child is reported to be at no disadvantage with respect to doctors visits or places for usual health care. [2] In addition, when a step-mother has birth-children of her own living in the household, then her step-children appear to benefit with respect to those health-related goods that are household public goods. For example, children living with a step-mother are less likely to have a place for regular medical care, unless the step-mother has birth-children in the household as well. Our results are specific to step-mothers; children living with foster and adoptive mothers have health investments

[2] Children's medical visits and health status are reported by a *child's health respondent* in the NHIS. Our findings are also consistent with the child's health respondent simply assuming that the birth mother was taking the child to the doctor or dentist — because she sees the child regularly. These children may, in fact, be at risk for lower health investments.

that are generally insignificantly different from those reported for children living with their birth-mothers.

In Section 2, we describe our data, and in Section 3 we present results. Section 4 concludes with a discussion of the role of mothers in the provision of children's health.

2. Data

The data we use come from the 1988 Child Health Supplement to the National Health Interview Survey (NHIS-CH). The NHIS is an annual nationally representative survey that collects extensive information on chronic and acute heath conditions, doctor visits, and hospital stays, for American adults and children. The survey also collects socioeconomic information for each family that is interviewed. Although the socioeconomic information is less extensive than the health information, measures of family income (in bracketed amounts), parental education and parental work status are available. In 1988, 50,061 households containing 33,945 children younger than 18 years old were surveyed. The 1988 child health supplement was then administered to a single randomly-selected child from each family with one or more children, yielding a sample of 17,110 sample children. [3] The person in the family most knowledgeable about the child was asked to answer the survey, which collected information on the child's health outcomes, behavioral problems, and parental investments in the child's health. Unlike the basic NHIS, the child health supplement also collected detailed information on the relationships between the sample child and other household members. Parent figures are identified as being birth ("biological" in the survey), adoptive, step, foster, or other relatives or non-relatives of the child. Other children in the household are identified as full, step- or half-siblings, or as unrelated children. In cases in which the sample child does not live with one or both birth-parents, questions were asked about the length of time the child has lived apart from the birth-parent, and the current frequency of contact with the birth-parent.

Most of our analysis uses a sample of children for whom both a "mother figure" and "father figure" are reported being present in the household, and for whom the relationships between the child and both parent figures are known. The sample is restricted to children who are 0–16 years of age. Seventeen-year-olds are excluded because they were allowed to answer the survey questions themselves, and also because several of the parental investments we examine (for example, seat belt use) may, by age 17, be under the control of the child. In several cases, 17-year-olds in the survey were married or had a child themselves. We also remove a small number of "rare" household structures: children living with birth-mothers and foster fathers (four cases); step-mothers and adoptive fathers (one case); step-mothers and step-fathers (three cases); and adoptive mothers and step-fathers (seven cases). Results do not change when we keep these cases in our sample. However, because these cases were rare, we wanted to ensure that our results were not being driven by them. In addition, 475 cases were dropped because the child health respondent was reported to have an age of zero or be less than 12 years old. The final sample contains 10,541 children. In some of the results that follow we compare investments in children with two-parent figures with those for children who have only one parent figure. In this case, the sample described above is

[3] For no apparent reason, 40 households contain two sample children each.

combined with a sample of 2715 children who live with either their birth-mother (and have no father figure), or with their birth-father (and have no mother figure).

The definition of "step-parent" requires some discussion. The NHIS-CH asked the respondent to identify the child's "mother figure" and "father figure," making it clear that mother or father figures could be people other than the birth-parents of the child. Then, the respondent was asked to specify the nature of the relationship between the sample child and each of the parent figures (biological, foster, step, etc.). Of the 17,110 children sampled, 478 (or, 2.79%) of children had mother figures for whom the type of mother figure was coded as "unknown" — although in many of these cases, the mother figure was herself the respondent! Another 566, or 3.31%, of children had a father figure with type unknown. We suspect that these parents of unknown type consist largely of "informal" step-parents, who are living with but are not married to one of the child's birth-parents. However, without better information on exactly who these "type unknown" parents are, we chose a conservative strategy of coding children as having a step-parent only if an answer of "step-parent" was given, and children with "type unknown" parents were excluded from the analysis. Thus, this study does not address the role that non-marital partners of birth-parents play in children's lives.

Table 1 contains descriptive statistics, by family type, on the set of parental investments and behaviors we analyze, as well as information on the socioeconomic characteristics of families. The investments and behaviors we examine include: whether the child had a routine doctor visit in the last year; whether the child visited a dentist in the last year; whether the child has a usual bedtime; whether the child has a usual place for routine medical care and a usual place for sick care; whether the child wears a seatbelt most of the time; whether household members smoke in the home; and whether the child is covered by either private health insurance or Medicaid. The first three of these measures are used only for children over the age one. All but 5% of the sample children aged one or less had a doctor visit in the year before the interview, and almost none had a dentist visit. The question on "usual bedtime" was not asked for children under the age one; whether we choose a sample of children greater than age one, or greater than or equal to age one makes little difference to the results that follow.

We chose the investments and parental behaviors listed above because they are *inputs* into children's health, rather than health outcomes. Outcomes, although interesting in their own right, may be the driven by earlier events in a child's life, that are in turn correlated with current family structure. For example, a finding that children of step-parents are more likely to have accidental injuries could be due to less careful parenting by step-parents. However, it could also be that children whose parents have divorced and remarried develop behaviors that make them more accident-prone. Similar arguments can be made for children's behavioral outcomes or their educational performance.

The descriptive statistics in the top panel of Table 1 indicate that there are substantial differences in health investments across the different family types. Overall, pairs of adoptive parents appear to do the best, and are even more likely to invest in their children than are pairs of birth-parents. Adoptive parents are more likely than birth-parents to have taken the child to a routine doctor visit (0.65 versus 0.61) and a dentist visit (0.73 versus 0.64) in the last year, and are less likely to smoke at home (0.24 versus 0.36). Although the sample of foster children is small, this group also appears to fare well. A comparison of step-parent families with birth-parent families reveals differences in some, although not all,

Table 1
Sample means of investment variables and family characteristics (National Health Interview Survey Child Health Supplement 1988)[a]

	Birth-mother/ birth-father	Birth-mother/ step-father	Step-mother/ birth-father	Birth-mother/ adoptive father	Adoptive mother/ birth-father	Adoptive mother/ adoptive father	Foster parents
Observations	9023	1022	162	85	9	207	33
Observations with child age >1 year	7454	1006	161	84	9	187	31
Routine doctor visit in last year (age >1)	0.61	0.53	0.46	0.45	0.68	0.65	0.94
Dentist visit in last year (age >1)	0.64	0.66	0.63	0.82	1.0	0.73	0.62
Has usual bed time (age >1)	0.85	0.84	0.89	0.84	1.0	0.89	0.92
Has place for routine medical care	0.91	0.83	0.79	0.79	0.91	0.92	0.90
Has place for sick care	0.94	0.88	0.88	0.88	0.91	0.93	0.88
Wears a seat belt almost all the time	0.74	0.63	0.52	0.57	0.37	0.80	0.67
Household members smoke in the home	0.36	0.56	0.54	0.48	0.22	0.24	0.48
Covered by medical insurance	0.86	0.79	0.84	0.86	0.82	0.92	0.93
Family income (US$)	33772	30474	33512	31089	33196	40087	35608
Age of child	7.3	10.4	11.5	11.8	11.7	7.9	7.4
Child is white	0.85	0.82	0.90	0.92	0.61	0.80	0.45
Number of household members	3.6	3.7	4.0	3.4	5.2	3.3	5.4
Respondent is the father	0.11	0.08	0.53	0.13	0.08	0.09	0.13
Age of mother	34.1	33.3	34.0	34.4	35.5	41.0	44.2
Years of education of mother	12.8	12.1	12.6	12.8	13.3	13.4	11.9
Mother works	0.52	0.65	0.63	0.51	0.18	0.55	0.27
Age of father	36.8	35.7	37.4	36.8	43.5	42.6	48.8
Years of education of father	13.1	12.4	12.5	12.7	12.4	13.8	10.8
Father works	0.94	0.93	0.95	0.93	1.0	0.93	0.82

[a] Family income is constructed by setting income equal to the midpoint of the 26 possible income categories. Families with income of US$ 50,000 or more were assigned an income of US$ 57,500. Some families have missing values for the income category. The number of observations used to compute average family income was (in order of the columns): 8103, 909, 152, 76, 7, 185, and 27. Means are weighted using survey-provided weights.

of the health investment measures. Children in families with step-fathers are less likely to have routine doctor's visits, usual places for medical care, to regularly wear seatbelts, and to have health insurance coverage. They are more likely to be exposed to cigarette smoke at home. The same patterns appear for children in families with step-mothers, and for several of the measures, investments are even less likely in step-mother families than in step-father families.

There are also large differences across family types in other household characteristics, such as income, education, and the age of the child. It is possible that these differences account for the different patterns in investments noted above. For example, families with pairs of adoptive parents have, on average, higher family incomes, smaller family sizes, and more parental education than do other families. Considering that, in addition, adoptive parents have been screened as "good parents" prior to adopting, it is hardly surprising that the levels of investments among these families is high. Foster families on average have lower levels of income and education, but they are also screened, trained, and monitored.

The characteristics of step-families differ in small but potentially important ways from those of birth-parent families. Income and education levels are slightly lower in step-families, especially in those with a step-father. In addition, children in step-families are on average older than those who live with their birth-parents. If health investments vary systematically with the age of the child (so that, for example, older children have less frequent routine doctor's visits), then the differences in investment behavior shown in the top part of the table could simply reflect differences in children's ages. In the results that follow, it will be important to control for differences in characteristics of children and their households that may influence health investments. [4]

3. Results

Our analysis of the effect of family structure on health outcomes begins in Table 2, where we regress the probability of investment in child health for children aged 0 to 16 years old on variables identifying family structure and measures of household socioeconomic status. We include indicator variables for all of the following: child's age, household income (28 categories — of which one is "income unknown"), household size (11 categories, one for each household size); and MSA status (four categories). We also control for parents' ages and educations, and indicators of parents' work status. Work status is included both to give us a richer picture of household finances, and to control for parents' other time commitments. We also include mother's age at the child's birth as a measure of a child's vulnerability, and indicators that the child is female and that the child is white. We observe in these data that when the father figure is the child's health respondent, the child is less likely to be reported

[4] For all health investments with the exception of dental visits, the results on step mothers presented in the tables that follow are quantitatively and quantitatively similar when we include indicators of mother type and father type, but include no other household or child characteristics. The difference in results for dental visits is due to children's ages: children living with step mothers tend to be older, and older children are on average significantly more likely to go to the dentist. When one controls only for types of mother and father and indicators for children's ages, the results for dental visits are also quantitatively and qualitatively similar to those presented in the tables that follow.

Table 2
Investments in child health and well being[a]

Explanatory variables [means in brackets]	Dependent variables [variable means in brackets][b]							
	Routine doctor visit in past year for child age >1 year		Dentist visit in past year for child age >1 year		Child has place for usual medical care		Child has place for sick care	
	[0.625] (a)	[0.635] (b)	[0.650] (a)	[0.665] (b)	[0.910] (a)	[0.925] (b)	[0.934] (a)	[0.946] (b)
Adoptive mother [0.020]	0.099 (0.058)	0.120 (0.059)	0.006 (0.049)	−0.005 (0.050)	0.124 (0.034)	0.125 (0.032)	0.011 (0.030)	0.037 (0.028)
Step-mother [0.015]	−0.084 (0.038)	−0.052 (0.041)	−0.082 (0.033)	−0.055 (0.034)	−0.086 (0.023)	−0.075 (0.023)	−0.042 (0.020)	−0.041 (0.020)
Adoptive father [0.028]	−0.063 (0.049)	−0.069 (0.050)	0.035 (0.042)	0.040 (0.042)	−0.107 (0.029)	−0.096 (0.028)	−0.018 (0.026)	−0.031 (0.024)
Step-father [0.097]	−0.017 (0.016)	−0.009 (0.017)	−0.027 (0.014)	−0.028 (0.014)	−0.034 (0.010)	−0.030 (0.009)	−0.029 (0.009)	−0.023 (0.008)
Foster parents [0.003]	0.303 (0.084)	0.357 (0.093)	0.059 (0.072)	0.146 (0.079)	0.026 (0.049)	0.027 (0.050)	0.057 (0.043)	0.073 (0.043)
White [0.842]	−0.026 (0.014)	−0.028 (0.015)	0.071 (0.012)	0.077 (0.013)	0.008 (0.008)	0.009 (0.007)	0.001 (0.007)	−0.001 (0.006)
Female [0.487]	−0.006 (0.010)	−0.001 (0.010)	0.020 (0.008)	0.021 (0.009)	0.008 (0.005)	0.009 (0.005)	0.001 (0.005)	0.001 (0.004)
Mother < 20 at child's birth [0.104]	0.031 (0.019)	0.026 (0.019)	−0.012 (0.016)	−0.009 (0.016)	−0.020 (0.011)	−0.024 (0.010)	0.003 (0.009)	0.002 (0.009)
Mother's education [12.84]	0.009 (0.006)	0.011 (0.006)	0.021 (0.005)	0.023 (0.005)	0.008 (0.003)	0.011 (0.003)	0.006 (0.003)	0.006 (0.003)
Father's education [13.09]	−0.001 (0.002)	−0.002 (0.003)	0.007 (0.002)	0.008 (0.002)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Father is respondent on child's health [0.120]	−0.001 (0.018)	0.008 (0.019)	−0.006 (0.016)	−0.002 (0.016)	−0.024 (0.010)	−0.024 (0.010)	−0.040 (0.009)	−0.037 (0.008)
Number of observations	8932	8420	8932	8420	10541	9971	10541	9971

[a] Results reported are for linear probability models. Standard errors are provided in parentheses. The full sample is restricted to children for whom both a "mother figure" and "father figure" are reported being present in the household, and for whom the relationships between the child and both parent figures are known. Sample is restricted to children aged 0–16 years of age, with the following exceptions: the child sample for doctors and dentists visits is restricted to children aged 2 and above. We also remove a small number of "rare" household structures: children living with birth-mothers and foster fathers (four cases); step-mothers and adoptive fathers (one case); step-mothers and step-fathers (three cases); and adoptive mothers and step-fathers (seven cases). Results do not change when we keep these cases in our sample. However, because these cases were rare, we wanted to ensure that our results were not being driven by them. 475 cases were dropped because the child health respondent was reported to be zero or less than 12 years old. All regressions include indicators for child's age, for household income (28 categories), for household size (11 categories), and for MSA status (MSA-Central city, MSA-non-Central city, non-MSA, non-farm); child health respondent's age, education and work status; indicators that that the child health respondent is "another female" or "another male" in the household; parents' ages and indicators of parents work status; and a constant term. Omitted categories for parental types are "birth-mother" and "birth-father".

[b] For each outcome, the first column (a) reports results for the full sample, with answers coded: $R = 1$ if respondent says this is true for the child, and $R = 0$ otherwise. That is, "do not know" and "refused" and "no" are coded as zeros. The second column (b) reports results for which "do not know" and "refused" are set equal to missing. The results here are for the sub-sample for which none of the dependent variables in Tables 2 and 3 were answered as "do not know" or "refused".

as suffering from any physical ailments. In part we believe this reflects the fact that women are the primary health care givers and investors, and the fathers may not know as much about child's health or health investments. For this reason, we include a control indicating the father figure is the child's health respondent (results do not change when we remove all children whose father figures were their health respondents). In an attempt to control for respondent effects more generally, we include controls for child health respondent's sex, age and education, and an indicator of his or her work status.

Our focus will be primarily on the indicators identifying family structure — that the child is living with a step-mother, an adoptive mother, a step-father, an adoptive father, or foster parents. The omitted categories throughout will be 'birth-mother' and 'birth-father,' so that the coefficients on family structure answer the question: holding constant all of the household income and socioeconomic characteristics discussed above, relative to living with his or her birth-mother, how does living with (say) an adoptive mother affect the probability that the child has had a routine doctor's visit in the past year. Household structure does not provide a "natural experiment" on the effects of parent–child relationships on child investments (indeed it is difficult for us to envision what a natural experiment would look like vis-à-vis household structure). In Section 3.3, we discuss interpretations of our findings, and test as many interpretations as we can with the data available in the NHIS.

In each of our tables, column (a) presents results in which responses to questions on investments in child health have been coded as follows. If the respondent answers affirmatively to the question posed, then the response is coded as a "1" Otherwise, the response is coded as a "0" In contrast, in column (b) for each health investment, an affirmative response is coded as a "1," a negative response is coded as a "0" and answers in which the respondent "does not know" or "refuses to say" is set as a missing value. For some health investments, that the respondent does not know the answer to the question has information value. For example, if the respondent does not know whether the child has been to the dentist in the past year, this may signal something about the attention the child receives. We will find small but important differences in the results when the "do not know" answers are treated as a negative response, relative to when they are treated as missing. Results in columns marked (b) are restricted to the sub-sample for which there are no missing values for any of the dependent variables.

3.1. Investments in child health and well being

Results for routine doctors' visits in the past year are presented in the first two columns of Table 2. We find that children with adoptive mothers and those with foster parents are significantly more likely to have been to the doctor than are children who reside with their birth-mothers, and that for foster children this result is quite large (this may reflect a legal duty that foster parents must discharge). Children with step-mothers are significantly less likely to have been reported as visiting the doctor — about 8% less likely — and much of this appears to be due to the fact that the respondent did not know whether the child had seen a doctor for a routine visit (we examine below why this might be the case).

For this health investment, as well as the others presented in Table 2, the education of the mother figure in the household is a much larger and more significant determinant of health investment than is father's education. In all of these investments, the impact of an

additional year of mother's education is 5–10 times as large as that of additional year of education of the father figure. Again, this may be because mothers are generally the health care investors in the household.

Results for dental visits are presented in columns 3 and 4. The most prominent effect is for step-mothers and, again, it appears that for children being raised by a step-mother, the child health respondent is significantly less likely to know whether the child has been to the dentist. White children are significantly more likely to have been to the dentist, and girls are more likely than boys.

Results in columns 5 and 6 present results on whether children have a place for usual medical care. Evidence from Lutz (1990) suggests that such children are at risk for not being up to date on their immunizations. Children living with step-mothers are significantly less likely to have a place for usual medical care. Similarly, children living with step-mothers are significantly less likely to have a usual place for sick care. Children living with step-fathers are also disadvantaged in having a place for usual or sick care, relative to those living with birth-fathers, although the effects are only half as large as those found for step-mothers.

Results in Table 2, consistent with the cross-tabulations presented in Section 2, show that children living with step-mothers are disadvantaged in health investments, even after controlling for parents' age, education and household income. We find that these children are also at risk in some important household health behaviors, results for which are presented in Table 3. Children living with step-mothers are significantly less likely to wear a seatbelt "most or all of the time." It is also more likely that someone in the child's household smokes, when a child is living with a step-mother than when living with a birth-mother. That the child is less likely to have a place for routine medical care (results reported in Table 2) is not due to lack of health insurance: children with step-mothers are no less likely than those living with birth-mothers to be reported as covered by medical insurance. The children of step-fathers, in contrast, are more likely to be without health insurance coverage or for the respondent to not know if the child is covered. We do not know if this means that step-fathers are less willing to invest in health insurance for their step-children, or if step-father's job-related health insurance policies do not extend to step-children, effectively making health insurance for these children more expensive.

Differences in mother's and father's spheres of influence may be responsible for the differences in the effects of their education on these outcomes. Unlike what was observed in Table 2 on health investments, father's education is a more important determinant in children's seatbelt usage, in smoking in the household, and in health insurance coverage. Mother's education dominates for children having a regular bedtime.

3.2. Contact with birth-parents and effects of step- and half-siblings

This section examines how contact with birth-parents and the presence of step- and half-siblings mediates the relationship between step-parents and health investments. There are several reasons to think that contact with a birth-parent affects health investments. First, the degree of emotional attachment between a step-child and step-parent may be altered if a birth-parent is in regular contact with the child. The child development literature offers several conflicting hypotheses about how emotional attachment will be affected by contact with a birth-parent. For example, Clingempeel and Segal (1986) discuss how regular

Table 3
Behaviors influencing child health and well being[a]

Explanatory variables [means in brackets]	Dependent variables [variable means in brackets]							
	Child wears a seatbelt all or most of the time		Someone in household smokes		Child has a regular bedtime (for child age > 1 year)		Child is covered by health insurance or medicaid	
	[0.743] (a)	[0.753] (b)	[0.391] (a)	[0.397] (b)	[0.840] (a)	[0.855] (b)	[0.860] (a)	[0.873] (b)
Adoptive mother [0.020]	0.033 (0.049)	0.017 (0.050)	−0.096 (0.057)	−0.118 (0.059)	0.080 (0.044)	0.064 (0.044)	−0.012 (0.040)	−0.011 (0.040)
Step-mother [0.015]	−0.081 (0.033)	−0.060 (0.035)	0.146 (0.038)	0.108 (0.041)	0.039 (0.029)	0.038 (0.031)	−0.020 (0.027)	0.013 (0.028)
Adoptive father [0.028]	0.005 (0.042)	0.015 (0.043)	0.032 (0.049)	0.049 (0.050)	−0.026 (0.038)	−0.020 (0.037)	0.037 (0.034)	0.049 (0.034)
Step-father [0.097]	−0.015 (0.014)	−0.018 (0.014)	0.142 (0.016)	0.144 (0.017)	0.014 (0.013)	0.024 (0.013)	−0.030 (0.011)	−0.017 (0.011)
Foster parents [0.003]	0.088 (0.071)	0.030 (0.078)	0.146 (0.082)	0.145 (0.091)	0.183 (0.065)	0.222 (0.069)	0.064 (0.058)	0.055 (0.061)
White [0.842]	0.057 (0.011)	0.058 (0.011)	0.040 (0.013)	0.041 (0.013)	0.062 (0.011)	0.064 (0.011)	−0.011 (0.009)	−0.009 (0.009)
Female [0.488]	0.024 (0.008)	0.023 (0.008)	0.002 (0.009)	0.002 (0.009)	0.007 (0.008)	0.007 (0.008)	−0.012 (0.006)	−0.010 (0.006)
Mother < 20 at child's birth [0.104]	−0.054 (0.016)	−0.056 (0.016)	0.025 (0.018)	0.026 (0.018)	−0.028 (0.015)	−0.028 (0.014)	−0.023 (0.012)	−0.024 (0.012)
Mother's education [12.84]	0.010 (0.005)	0.005 (0.005)	−0.005 (0.005)	−0.003 (0.006)	0.014 (0.004)	0.013 (0.005)	0.004 (0.004)	0.005 (0.004)
Father's education [13.09]	0.018 (0.002)	0.017 (0.002)	−0.029 (0.002)	−0.030 (0.002)	0.004 (0.002)	0.005 (0.002)	0.010 (0.002)	0.009 (0.002)
Father is respondent on child's health [0.120]	−0.008 (0.014)	−0.007 (0.015)	−0.017 (0.017)	−0.011 (0.018)	−0.024 (0.014)	−0.013 (0.014)	−0.025 (0.012)	−0.022 (0.012)
Number of observations	10541	9971	10451	9971	8932	8420	10541	9971

[a] See footnotes to Table 2 for information about the sample. Results reported are for linear probability models. Standard errors are provided in parentheses.

contact with a non-custodial birth-parent may "reduce children's fears that the step-parent is a parent replacement and result in more positive step-parent–step-child relationships," but such contact at the same time may undermine the cohesiveness of the step-family.

Second, the behavior of a step-parent may be affected by the presence of an involved birth-parent. Non-custodial birth-parents may monitor step-parents' behavior, and contact with a birth-parent could result in greater investments by the step-parent. Finally, it is possible that the non-custodial birth-parent undertakes the health investments that we observe: the reason we find that the respondent does not know whether the child has been to the dentist, or the reason the child has no regular place for medical care, may be because the birth-mother is responsible for the children's medical visits. In this case, apparent negligence on the part of step-mothers may simply reflect the fact that they do not have responsibility for these aspects of a child's care.

The possible effects of half- or step-siblings on health investments are similarly ambiguous. Although there is little written on this topic, existing research indicates that the presence of half- or step-siblings will adversely affect the relationship between a child and a step-parent, and that step-parents display preferential treatment toward their own children. For example, Mekos et al. (1996) study differences across siblings in the type of parenting behavior they receive (and in a set of child behavioral outcomes), and conclude that differential treatment between siblings is "magnified when siblings differ in relatedness to the parent" (p. 2161). However, many of the health investments and behaviors we consider fall into the category of household "public goods," and in this case step-children could benefit from the presence of half- or step-siblings. Exposure to cigarette smoke is the clearest example of a household public good. The decision to allow smoking in a home involves comparing the cost of *not* smoking with the sum of benefits over all household members. The addition of a more-preferred birth-child may count more heavily in a parent's decision than the addition of a less-preferred step-child, so that step-children with more step- or half-siblings (holding the total number of children fixed) may fare better. Several of the other health investments we consider — for example whether a child has a place for routine medical care — will have similar properties, if there are fixed costs associated with making these investments.

To explore these extensions, we augment the regressions run in Tables 2 and 3 with several variables. In Table 4, we split the indicator for step-mothers into two variables: (i) child lives with step-mother, and has "regular contact" (at least two or three visits per month) with the non-resident birth-mother, and (ii) child lives with step-mother, but does not have regular contact with the non-resident birth-mother. We also break the indicator for step-fathers according to whether they report regular contact with birth-fathers. We continue to include indicators for adoptive and foster children, but do not report them in Tables 4 and 5, in order to concentrate on the step-families. [5]

We find large differences in the health investments reported for those step-children who see their non-resident birth-mothers regularly and those who do not. Those children who have regular contact with their non-resident birth-mothers have health investments that are

[5] In Tables 4 and 5, we present only the results in which the child health respondent's answers are coded as "1" if he or she knows an event has taken place, and "0" otherwise. The results are qualitatively and quantitatively similar if we eliminate all respondents who do not know whether an event has occurred (see Case and Paxson, 2000, Tables 4 and 5).

Table 4
Investments in child health, controlling for access to birth-parents[a]

Explanatory variables [means in brackets]	Dependent variables							
	Doctor routine visit in past year (age > 1)	Dentist routine visit in past year (age > 1)	Child has place for usual medical care	Child has place for sick care	Seatbelt all or most of the time	Someone in household smokes	Child has a regular bedtime (age > 1)	Child covered by health insurance or medicaid
Step-mother, child has regular contact with birth-mother [0.005]	−0.012 (0.065)	−0.058 (0.056)	−0.034 (0.039)	0.033 (0.034)	−0.185 (0.057)	0.174 (0.065)	−0.003 (0.050)	0.029 (0.046)
Step-mother, child does not have regular contact with birth-mother [0.010]	−0.118 (0.046)	−0.093 (0.039)	−0.112 (0.028)	−0.078 (0.024)	−0.030 (0.040)	0.133 (0.046)	0.058 (0.035)	−0.044 (0.032)
Step-father, child has regular contact with birth-father [0.018]	0.026 (0.035)	−0.038 (0.030)	0.010 (0.021)	0.015 (0.018)	−0.025 (0.030)	0.129 (0.035)	0.036 (0.027)	0.038 (0.024)
Step-father, child does not have regular contact with birth-father [0.079]	−0.026 (0.018)	−0.024 (0.015)	−0.044 (0.011)	−0.039 (0.009)	−0.013 (0.015)	0.145 (0.018)	0.008 (0.014)	−0.045 (0.012)
F-test: step-mother has no regular contact with birth-mother = step-father has no regular contact with birth-father (*P*-value)	3.64 (0.0565)	2.77 (0.0958)	5.43 (0.0198)	2.42 (0.1197)	0.16 (0.6882)	0.06 (0.8085)	1.82 (0.1772)	0.00 (0.9598)
Number of observations	8932	8932	10541	10541	10541	10541	8932	10541

[a] Results reported are for linear probability models. Standard errors are provided in parentheses. See footnotes to Table 1 for information on the sample. "Regular" contact with a birth-parent refers here to respondent reporting that child sees the birth-parent at least two or three times a month. All regressions include indicators that child is adoptive child of the mother figure, dichotomized by whether the child has regular contact with birth-mother; indicators that child is adoptive child of the father figure, dichotomized by whether the child has regular contact with birth-father; an indicator that the child is a foster child of both the mother and father figure in the household; indicators for child's age, sex, race (white = 1), and born to a teenage mother; indicators for household income category, for household size (11 categories), and for MSA status (MSA-Central city, MSA-non-Central city, non-MSA, non-farm); child health respondent's age, education and work status; indicators that the child health respondent is "father figure," "another female," or "another male" in the household; parents' ages, educations and work status; and a constant term. Omitted categories for parental types are "birth-mother" and "birth-father."

Table 5
Investments in child health, controlling for step- and half-siblings[a]

Explanatory variables [means in brackets]	Dependent variables							
	Doctor routine visit in past year (age > 1)	Dentist routine visit in past year (age > 1)	Child has place for usual medical care	Child has place for sick care	Seatbelt all or most of the time	Someone in household smokes	Child has a regular bedtime child age>1 year	Child covered by health insurance or medicaid
Step-mother, child has half- or step-siblings in the household [0.007]	−0.014 (0.105)	−0.101 (0.090)	0.075 (0.063)	0.064 (0.055)	−0.121 (0.091)	−0.054 (0.105)	0.186 (0.081)	−0.051 (0.074)
Step-mother, child does not have half- or step-siblings in the household [0.009]	−0.087 (0.051)	−0.107 (0.043)	−0.148 (0.030)	−0.109 (0.027)	−0.040 (0.044)	0.126 (0.050)	0.014 (0.039)	−0.030 (0.035)
Step-father, child has half- or step-siblings in the household [0.035]	−0.075 (0.079)	−0.040 (0.068)	−0.103 (0.047)	−0.050 (0.041)	0.043 (0.068)	0.170 (0.079)	−0.086 (0.061)	−0.008 (0.055)
Step-father, child does not have half- or step-siblings in the household [0.062]	0.005 (0.020)	−0.004 (0.017)	−0.033 (0.012)	−0.023 (0.010)	−0.018 (0.017)	0.153 (0.020)	0.025 (0.015)	−0.025 (0.014)
Birth-mother, child has step-siblings in the household [0.012]	0.019 (0.081)	−0.041 (0.069)	0.071 (0.048)	0.005 (0.042)	−0.067 (0.070)	−0.024 (0.080)	0.074 (0.062)	−0.054 (0.057)
Number of observations	8932	8932	10541	10541	10541	10541	8932	10541

[a] Results reported are for linear probability models. Standard errors are provided in parentheses. See footnotes to Table 2 for information on the sample. All regressions include indicators that child is adoptive child of the mother figure; indicators that child is adoptive child of the father figure; an indicator that the child is a foster child of both the mother and father figure in the household; indicators that child is a birth-child of the mother figure and has half-siblings in the household; indicators that the child is a birth-child of the father figure, and has step-siblings in the household; indicator that the child is a birth-child of the father figure, and has half-siblings in the household; indicators for child's age, sex, race (white = 1), and born to a teenage mother; indicators for household income categories, for household size (11 categories), and for MSA status (MSA-Central city, MSA-non-Central city, non-MSA, non-farm); child health respondent's age, education and work status; indicators that the child health respondent is "father figure," "another female," or "another male" in the household; parents' ages, educations and work status; and a constant term. Omitted categories for parental types are "birth-mother" and "birth-father."

not significantly different from children with *resident* birth-mothers. Step-children who do not have regular contact with their birth-mothers, in contrast, are significantly less likely than children with resident birth-mothers to have seen a doctor or dentist or have a place for regular or sick care. Having regular contact with the birth-mother appears to protect the children's health investments, although we note that these results are also consistent with the child's health respondent simply assuming that the birth-mother was taking the child to the doctor or dentist — because she sees the child regularly. These children may, in fact, be at risk for lower health investments. Seat belt use is less likely among children who have regular contact with their birth-mothers (a result we do not understand).

For children living with step-fathers, we see a similar pattern. Those children who have regular contact with their non-resident birth-fathers are no more at risk of not having a place for regular or sick care than are children with resident birth-fathers. Those children without regular contact with their birth-fathers are 4% less likely to have a place for sick or usual medical care. These effects are significant but, again, much smaller in magnitude than what was observed for children living with step-mothers, where the effects were on the order of 10% less likely. Row 5 of Table 4 presents *F*-tests of the hypothesis that the effect of living with a step-mother, without regular contact with birth-mother, is equal to the effect of living with a step-father, without regular contact with birth-father. The effect of living with a step-mother is significantly larger for routine doctor visits, dentists visits and for having a place for usual medical care.

In Table 5, we include interaction terms for step-parents and indicators of whether the child has step- or half-siblings in the household. If a woman has a place to take her own children for medical care, this may spill over for her step-children. Indeed, we find that, for a child living with a step-mother, the presence of step- or half-siblings is a significant determinant of the child's health investments. We cannot reject that the presence of step- or half-siblings entirely offsets the effect of living with a step-mother when it comes to doctor and dentists visits, and having a place for medical care. Having a place for medical care may be a public good, in that once a place has been identified, all children are eligible to use this facility.

Contact with a non-resident birth-mother does not change the smoking habits of a step-mother and, in Table 4, we saw that this does not change the probability that the child is living with a smoker. In the case of cigarette smoke, what is protective for the child is the presence of step- or half-siblings. Among children living with step-fathers, it is those children who lack regular contact with their birth-fathers who are less likely to be covered by medical insurance.

Overall, evidence in Tables 4 and 5 display a pattern in which the health investments made in children living with a step-parent, particularly those living with a step-mother, are protected by their non-resident birth-parents and by the presence of the step-parent's own birth-children.[6] Children who have neither contact with the birth-mother nor step- or half-siblings appear to be most vulnerable.

[6] We have run the complete sets of interaction terms: step children with and without access to birth parent with and without step- or half-siblings in the household. The patterns, allowing for the complete set of interactions, look like those we have presented here.

3.3. What do we know about step-mothers and step-children?

There are many possible reasons why children living with step-mothers are at greater risk with respect to health investments. Some of these explanations center on the nature of the women who become step-mothers, and others on the nature of children who become step-children.

One could build a selection model in which women who become step-mothers have less aptitude for mothering. These women would make fewer investments in both their birth-children and their step-children. A more sophisticated version of the step-mother as 'bad' mother story could be told by appealing to the greater difficulty blended families have in developing norms — like children going to the dentist regularly — when the children come from different original families. The difficulties inherent in being a stepmother may make women less good mothers to both their step- and birth-children.

To learn more about the women who are step-mothers, it would be interesting to follow multiple children in the same households, to test whether the birth-children of a woman and the step-children of that same woman received different health investments. Unfortunately in these data that is not possible: the NHIS sampled only one child per household. However, we can look at the outcomes of birth-children who have step-siblings in the household to see whether these birth-children are at risk. If step-mothers are 'bad' mothers or if families with step- and birth-children have a harder time negotiating, then we would expect to observe that birth-children who live with step-siblings have fewer health investments than birth-children who do not live with step-siblings. The last row of Table 5 presents information on birth-children who are living with step-siblings. These results show that birth-children living with step-siblings have health investments that are insignificantly different from birth-siblings without step-siblings, making stories based on step-mothers being 'bad' mothers untenable. [7]

Additional tests of whether step-mothers are less health conscious than other types of mothers are possible, using data collected on the mothers themselves. Table 6 presents results of tests for whether step-mothers are significantly different from other types of mothers in four health-related dimensions: body-mass index, self-reported health status, mother's own doctor visits, and mother's bed-days due to illness.

The NHIS collects self-reports of weight and height for all adults, allowing calculation of individuals' body-mass index (BMI $=$ kg/m^2). BMI is a standard measure of relative weight used as a proxy for body fatness in studies of adults (NIH, 1998). Obesity (defined as a BMI in excess of 30) results in substantial morbidity and mortality. Columns 1 and 2 of Table 6 compare the fraction of step-mothers who are obese (BMI $>$ 30) with the fraction of birth-mothers, adoptive mothers and foster mothers who are obese. Column 1 presents the means by types of mothers; these are from a regression in which an indicator of BMI $>$ 30 is regressed on indicators of mother-type. In the 1988 NHIS, 11% of birth-mothers and 12% of step-mothers were measured with BMIs in excess of 30. In column 2, we

[7] This result is consistent with the findings of Case et al. (2000b) who find, controlling for mother's fixed effects in PSID households, that the birth children of the household mother figure receive significantly more education than the step children of the mother figure. Moreover, birth children raised with non-birth children receive on average the same amount of education as birth children raised only with other birth children.

Table 6
Mother's health investments[a]

	Dependent variable							
	Indicator: mother obese (BMI > 30)		Indicator: mother in poor health		Indicator: mother has not been to a doctor in past 12 months		Indicator: mother has had no bed-days in past 12 months	
Indicator: birth-mother	0.109 (0.003)	0.203 (0.144)	0.058 (0.002)	0.235 (0.108)	0.192 (0.004)	0.011 (0.181)	0.464 (0.005)	0.080 (0.222)
Indicator: step-mother	0.123 (0.025)	0.214 (0.146)	0.074 (0.018)	0.246 (0.109)	0.239 (0.031)	0.012 (0.184)	0.503 (0.039)	0.060 (0.226)
Indicator: adoptive mother	0.119 (0.022)	0.208 (0.146)	0.095 (0.016)	0.266 (0.109)	0.176 (0.027)	−0.027 (0.184)	0.476 (0.034)	0.030 (0.226)
Indicator: foster mother	0.353 (0.054)	0.360 (0.154)	0.147 (0.040)	0.262 (0.115)	0.176 (0.067)	−0.065 (0.194)	0.529 (0.086)	0.001 (0.238)
F-test: birth-mother = step-mother (P-value)	0.29 (0.5920)	0.19 (0.6652)	0.71 (0.3992)	0.37 (0.5451)	2.28 (0.1315)	0.00 (0.9809)	0.99 (0.3206)	0.26 (0.6087)
Household and child controls?	No	Yes	No	Yes	No	Yes	No	Yes

[a] Number of observations = 10714. In columns 2, 4, 6 and 8, we include indicator variables for child's age, household income category, household size, MSA status, parents' work status, ages and educations, mother's age at the child's birth, indicators that the child is female and that the child is white, indicators that the child health respondent is the father figure, or another female, or another male in the household, and controls for child health respondent's sex, age, education, and work status.

add to this regression all of the household, mother, father, and child characteristics we included in our earlier regressions.[8] With or without controls for household and individual characteristics, there is no difference between the probability that step-mother is obese and that a birth-mother is obese. The coefficients on these types of mothers are always very similar and *F*-tests for the equality of these coefficients (row 5 of Table 6) show that the differences are never significantly different from zero.

Table 6 also reports results of tests for whether step-mothers are more likely to report themselves in "fair" or "poor" health (rather than in "excellent," "very good" or "good" health). In our data, 6% of birth-mothers and 7% of step-mothers report themselves in "fair" or "poor" health. These results (columns 3 and 4) show no significant difference in the self-reported health status of step- and birth-mothers.

We look at a mother's own health investments by coding whether she reports that she has seen a doctor in the past 12 months. Our dependent variable in columns 5 and 6 equals "1" if the mother figure reports that she has been to the doctor at least once, and "0" otherwise. The total number of doctor visits might be difficult to interpret: if the number were large, it would not tell us whether a woman was sickly, or hypochondriac, or simply very cautious. However, if a woman has not seen a physician in over a year for any reason (for example, for a routine physical exam or a pap smear), this may signal that she is underinvesting in health. We find 19% of birth-mothers and 24% of step-mothers report that they have not seen a physician in the past year. This difference is not significant, and becomes very small when we control for household characteristics (column 6).

Finally, we test whether step- and birth-mothers differ systematically in the number of days they spent ill in bed in the past 12 months. We find 46% of birth-mothers and 50% of step-mothers report having lost no days to illness and, again, the difference between step- and birth-mothers is insignificant, with or without controls for household and individual characteristics. The results in Table 6 display no significant differences in the health outcomes of women presented to us as step-mothers and those presented as birth-mothers.

A second possible explanation for some of our results is that step-mothers do not have the legal right to take their step-children to the doctor or dentist. Legal or other conflict with the non-resident birth-mother may make it difficult for a step-mother to invest in a child.[9] Our finding that regular visits with birth-mothers are protective of step-children casts doubt on this idea. However, it is still possible that birth-mothers who visit only irregularly with their children exert control over what step-mothers can do. To test whether restrictions placed on the step-mother by the non-resident birth-mother are responsible for the reduced investment we observe, we divide children living with step-mothers into two groups: those whose birth-mothers are deceased, and those whose birth-mothers are living. Presumably, if the birth-mother is deceased she can exert no control on the step-mother's behavior. Results for these groups are presented in Table 7. In the top panel, we compare the results when the child's birth-mother is alive to the results when the birth-mother is deceased. In

[8] We include indicator variables for child's age, sex, race (white = 1), household income category, household size, MSA status, parents' work status, controls for parents' ages and educations, mother's age at the child's birth, indicators that the child health respondent is "father figure," "another female," or "another male" in the household; and controls for child health respondent's sex, age, education, and work status.

[9] We are grateful to Janet Currie for this suggestion.

Table 7
Controlling for whether non-resident mother is alive[a]

	Dependent variables					
	Doctor routine visit in past year (age > 1)	Dentist routine visit in past year (age > 1)	Child has place for usual medical care	Child has place for sick care	Child wears a seatbelt	Someone in the household smokes
Panel A: birth-mother deceased[b]						
Child lives with step-mother, birth-mother is alive [0.014]	−0.067 (0.040)	−0.076 (0.034)	−0.079 (0.024)	−0.028 (0.021)	−0.104 (0.034)	0.165 (0.040)
Child lives with step-mother, birth-mother is deceased [0.001]	−0.263 (0.130)	−0.141 (0.111)	−0.160 (0.078)	−0.195 (0.068)	0.173 (0.113)	−0.060 (0.130)
Panel B: birth-mother deceased, or vital status unknown, or never present[c]						
Child lives with step-mother, birth-mother is alive [0.014]	−0.054 (0.044)	−0.074 (0.038)	−0.076 (0.027)	−0.029 (0.023)	−0.076 (0.039)	0.155 (0.044)
Child lives with step-mother, birth-mother is deceased, or vital status unknown, or never present [0.002]	−0.160 (0.071)	−0.103 (0.061)	−0.114 (0.043)	−0.075 (0.037)	−0.092 (0.062)	0.124 (0.071)
Number of observations	8932	8932	10541	10541	10541	10541

[a] Results reported are for linear probability models. Standard errors are provided in parentheses. See notes to Table 1 for information on the sample. All regressions include indicators that child is female, white, and born to a teenaged mother; indicators that the child is the adoptive child of the mother figure; indicators that child is adoptive child of the father figure; an indicator that the child is a foster child of both the mother and father figure in the household; indicators for child's age, for household income (28 categories, of which one is omitted), for household size (11 categories, of which one is omitted), and for MSA status (MSA-Central city, MSA-non-Central city, non-MSA, non-farm); child health respondent's age, education and work status; indicators that the child health respondent is "father figure," "another female," or "another male" in the household; parents' ages, educations and work status; and a constant term. Omitted categories for parental types are "birth-mother" and "birth-father."

[b] In Panel A, birth-mother is deceased = 1 if biological mother's vital status is listed as deceased, =0 otherwise

Birth mother is alive = [1 − deceased].

[c] In Panel B, definition of birth-mother deceased (etc.) = 1 if child reported to never see birth-mother, or birth-mother deceased, or it is unknown whether birth-mother is deceased, or it is "unknown, or answer refused, or no answer" to the question of how often the child sees his birth-mother.

Birth mother is alive = [1 − deceased (etc.)].

the bottom panel, we compare the results when the child's birth-mother is alive to those when the birth-mother is deceased or it is unknown whether she is alive, or it is recorded that the child "never sees" the birth-mother. In both panels, we find that the birth-mother's permanent absence leads to *fewer* health investments in the child. In every case, the health investments are reported to be lower for those whose birth-mothers are dead, although often the difference between the birth-mother deceased and birth-mother alive outcomes are insignificantly different from one another. The sample sizes are small here. Only 13 children living with step-mothers are reported as have deceased birth-mothers, and only 20 have a birth-mother who is dead, or whose vital status is unknown, or who never sees the child. This handful of cases, however, does not lend support to the hypothesis that the birth-mother is prohibiting the step-mother from taking a child to the doctor.

An alternative explanation for the lower health investments observed for children living with step-mothers is that these children are more difficult to negotiate with, and that the step-mothers cannot force them to go to the dentist, or to wear a seat belt. Children who have weathered a divorce may have more behavioral problems than children who have not. In addition, that a child lives with a step-mother indicates the child's birth-father was granted custody after a divorce (except in those cases in which the birth-mother has died). Paternal custody is relatively unusual, and it could signal that the child had a birth-mother who was unattached to the child or was an unusually poor parent, possibly creating a more severely scarred child. Or, it could signal that the child is exceptionally difficult, and was for that reason put in the father's custody. Whatever the mechanism, a finding that the children of step-mothers have more behavioral problems may provide clues as to why these children receive fewer health investments.

We explore this explanation of our results by examining whether children with step-mothers display worse behavioral outcomes than children in other living arrangements. Table 8 presents results of regressions of indicators for whether a child "frequently" displays a given behavior, regressed on the set of socioeconomic characteristics and measures of family structure used in the regressions reported above. The sample is restricted to children aged six or older, since behavioral outcomes were not coded for younger children. We find marked differences between children with either step-mothers or step-fathers and children who live with both birth-parents. Step-children are more likely to be reported to feel worthless, unhappy, sad, or depressed, or to be withdrawn. They are also more likely to be reported to display impulsive or restless behavior ("cannot concentrate", "acts without thinking", and "one-track mind"). With only cross-sectional data, we cannot determine whether these behaviors stem from the events surrounding the divorce of the birth-parents (or death of a birth-parent), or are the direct result of step-parenting. However, with the exception of a few behaviors ("cheats/tells lies," and "withdrawn"), children with step-mothers do not have worse behaviors than do children with step-fathers.

In addition, the children of step-fathers, but *not* step-mothers, are more likely to display the kinds of behaviors that might make them more difficult to negotiate with. For example, children with step-fathers are significantly more likely to be reported to argue too much, be disobedient at home and school, misbehave, have trouble getting along with teachers, be sullen, stubborn or irritable, and to have strong tempers. Lower health investments in children with step-mothers cannot be attributed to more belligerent behavior by these children.

Table 8
Behavioral outcomes of children aged 6 or more[a]

	Step-mother	Step-father	*F*-test: step-mother = step-father
Cheat/tells lies	0.041 (0.013)	0.010 (0.006)	5.62 (0.02)
Argues too much	0.015 (0.029)	0.043 (0.014)	0.91 (0.34)
Bullies, cruel or mean	−0.001 (0.008)	0.003 (0.004)	0.22 (0.64)
Disobedient at home	−0.012 (0.012)	0.021 (0.006)	7.31 (0.01)
Disobedient at school	0.003 (0.008)	0.014 (0.004)	1.77 (0.18)
Misbehaves	0.008 (0.013)	0.016 (0.006)	0.29 (0.59)
Trouble getting along with children	0.002 (0.007)	0.005 (0.003)	0.15 (0.70)
Trouble getting along with teachers	−0.001 (0.008)	0.014 (0.004)	3.78 (0.05)
Not liked by others	0.001 (0.006)	0.001 (0.003)	0.00 (0.99)
Stubborn, sullen or irritable	0.023 (0.018)	0.049 (0.009)	1.96 (0.16)
Has strong temper	−0.017 (0.019)	0.028 (0.009)	5.33 (0.02)
Cannot concentrate	0.086 (0.022)	0.053 (0.011)	2.04 (0.15)
Acts without thinking	0.056 (0.017)	0.031 (0.008)	2.10 (0.15)
One track mind	0.056 (0.014)	0.042 (0.007)	1.09 (0.30)
Cannot sit still	0.004 (0.021)	0.017 (0.011)	0.33 (0.56)
High strung	0.015 (0.020)	0.033 (0.010)	0.74 (0.39)
Fearful/anxious	−0.008 (0.016)	0.010 (0.008)	1.16 (0.28)
Easily confused	0.004 (0.011)	0.021 (0.005)	2.23 (0.14)
Complains about love	0.029 (0.015)	0.031 (0.007)	0.02 (0.88)
Feels worthless	0.030 (0.010)	0.029 (0.005)	0.01 (0.92)
Unhappy, sad or depressed	0.018 (0.007)	0.017 (0.004)	0.03 (0.87)
Withdrawn	0.045 (0.007)	0.013 (0.003)	18.10 (0.00)

[a] Each row represents the results from one linear probability model. The dependent variables are coded as 1 if the child frequently displays the behavior, else 0. The columns headed by "step-mother" and "step-father" contain the coefficients and standard errors (in parentheses) for these variables. The third column is an *F*-test statistic and associated *P*-value (in parentheses) for the hypothesis that the effect of a step-mother equals the effect of a step-father. The sample is defined as in Table 1, and is additionally restricted to those aged 6 or more. All regressions include indicators that child is female, white, and born to a teenaged mother; indicators that the child is the adoptive child of the mother figure; indicators that child is adoptive child of the father figure; an indicator that the child is a foster child of both the mother and father figure in the household; and indicator of whether the child has step- or half-siblings in the household; indicators for child's age, for household income, for household size, and for MSA status (MSA-Central city, MSA-non-Central city, non-MSA, non-farm); child health respondent's age, education and work status; parents' ages, educations and work status; and a constant term. Omitted categories for parental types are "birth-mother" and "birth-father."

We also estimated the equations in Table 8 with interaction terms for step-parents and indicators of whether the child has step- or half-siblings in the household, and for birth-parents and indicators for whether the child has step- or half-siblings (this is the same specification as was used for Table 5). Of interest is whether children with stepmothers and half- or step-siblings have worse behavioral outcomes than do children with birth-mothers and step-siblings. Although we do not have data on more than one child in each household, this comparison allows us to examine whether, in blended families, the relationship of the child to the mother is related to behavioral outcomes. For only four of the 22 behavioral outcomes listed in Table 8 (cheats/tells lies, cannot concentrate, acts without thinking, and feels worthless), children with step-mothers and step- or half-siblings have significantly worse

Table 9
Investments in child health, single and two-parent families[a]

Explanatory variables [means in brackets]	Dependent variables							
	Doctor routine visit in past year (age > 1)		Dentist routine visit in past year (age > 1)		Child has place for usual medical care		Child has place for sick care	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Two adoptive parents [0.016]	0.044 (0.035)	0.059 (0.036)	0.033 (0.031)	0.030 (0.031)	0.016 (0.021)	0.025 (0.020)	−0.009 (0.018)	0.003 (0.017)
Two foster parents [0.002]	0.294 (0.085)	0.345 (0.094)	0.034 (0.075)	0.127 (0.082)	−0.008 (0.051)	−0.013 (0.052)	0.015 (0.045)	0.028 (0.045)
Birth-mother, adoptive father [0.006]	−0.063 (0.051)	−0.065 (0.052)	0.062 (0.045)	0.061 (0.046)	−0.115 (0.032)	−0.092 (0.030)	−0.017 (0.028)	−0.023 (0.026)
Birth-mother, step-father [0.078]	−0.018 (0.017)	−0.009 (0.017)	−0.029 (0.015)	−0.032 (0.015)	−0.046 (0.010)	−0.041 (0.010)	−0.033 (0.009)	−0.027 (0.008)
Step-mother, birth-father [0.012]	−0.086 (0.041)	−0.058 (0.044)	−0.087 (0.036)	−0.062 (0.038)	−0.110 (0.025)	−0.103 (0.025)	−0.074 (0.022)	−0.078 (0.021)
Birth-father only [0.014]	−0.072 (0.047)	−0.068 (0.049)	−0.082 (0.041)	−0.099 (0.043)	−0.062 (0.028)	−0.084 (0.027)	−0.064 (0.025)	−0.078 (0.023)
Birth-mother only [0.185]	0.001 (0.017)	0.008 (0.018)	0.050 (0.015)	0.052 (0.015)	−0.010 (0.010)	−0.000 (0.009)	0.008 (0.009)	0.017 (0.008)
Adoptive mother only [0.002]	0.068 (0.108)	0.058 (0.107)	0.183 (0.095)	0.170 (0.093)	−0.067 (0.065)	−0.078 (0.060)	0.010 (0.057)	0.001 (0.051)
Child has regular contact with non-resident birth-mother [0.013]	0.049 (0.048)	0.061 (0.051)	0.053 (0.042)	0.058 (0.044)	0.080 (0.029)	0.097 (0.029)	0.113 (0.025)	0.125 (0.025)
Child has regular contact with non-resident birth-father [0.057]	0.031 (0.020)	0.027 (0.020)	0.029 (0.017)	0.035 (0.018)	0.047 (0.012)	0.039 (0.011)	0.028 (0.010)	0.026 (0.010)
F-test: step-mother, birth-father = birth-father only (*P*-value)	0.07 (0.786)	0.04 (0.850)	0.01 (0.919)	0.58 (0.447)	2.17 (0.141)	0.33 (0.564)	0.12 (0.730)	0.00 (0.991)
Number of observations	11355	10644	11355	10644	13256	12469	13256	12469

[a] Results reported are for linear probability models. Standard errors are provided in parentheses. To be included in the sample, the relationship between the child and parent(s) must be known. We dropped the following rare cases: foster fathers with no mother figure present (zero cases); foster mothers with no father figure present (eight cases); adoptive fathers with no mother figure (three cases); step-fathers with no mother figure present (two cases); step-mothers with no father figure present (five cases); adoptive mothers with birth-fathers (nine cases); birth-mothers with foster fathers (four cases); step-mothers with step-fathers (three cases). For each outcome, the first column (a) reports results for the full sample, with answers coded: behavior = 1 if respondent says this is true for the child, and behavior = 0, if otherwise. That is, "do not know" and "refused" and "no" are coded as zeros. The second column (b) reports results for which "do not know" and "refused" are set equal to missing. The results here are for the sub-sample for which none of the dependent variables in Tables 9 and 10 were answered as "do not know" or "refused." "Regular" contact with a birth-parent refers here to respondent reporting that child sees the birth-parent at least two or three times a month.

outcomes than children with birth-mothers and step-siblings. One behavior ("has strong temper") is significantly more likely in birth-children than step-children in blended families. These results do not provide compelling evidence that step-children are more difficult to negotiate with than birth-children (these results are available from the authors on request).

The results in Tables 4–8 lead us to dismiss any simple explanation of health investments being determined by women who are inadequate mothers — their own children receive adequate health care — or by children who are more troubled than those who live with birth-mothers and step-fathers.

3.4. Single and two-parent families

Thus far we have focused on two-parent households in which the relationship between the child and both parent figures was clear. We complete this section by adding back in information from single parent households, to see how health investments in single and two-parent households compare. Table 9 presents results from regressions that control for the same set of SES and household and respondent characteristics discussed above, and has the following controls for household structure: child lives with two adoptive parents, two foster parents, a birth-mother and adoptive father, a birth-mother and step-father, a step-mother and birth-father, a birth-mother only, a birth-father only, and adoptive mother only. We dropped the following rare cases: adoptive fathers with no mother figure (three cases); step-fathers with no mother figure present (two cases); step-mothers with no father figure present (five cases); adoptive mothers with birth-fathers (nine cases); birth-mothers with foster fathers (four cases); step-mothers with step-fathers (three cases); foster mothers with no father figure present (eight cases). There were no cases of foster fathers with no mother figure present. In all of the regressions reported in Tables 9 and 10, the omitted category is the "two birth-parent" household.

Children raised by two adoptive parents (row 1 of Tables 9 and 10) have health investments and behaviors that are not significantly different from those observed in two birth-parent households. Children raised by two foster parents (row 2) are significantly more likely to have been to the doctor in the past year, and are significantly more likely to have a regular bed time. They are also significantly more like to be living with a cigarette smoker. Those children living with a birth-mother and step-father are also significantly more likely to be living with a smoker.

Children living with a step-mother and birth-father are less likely to have been to the doctor, or to have a place for usual medical care or sick care, and are significantly more likely to be living with a cigarette smoker. The same is true for children living with their birth-father only. There is no behavior examined here for which the outcome for children with birth-fathers and step-mothers is significantly different from that for birth-fathers living alone (F-tests for this hypothesis are provided in row 11 of these tables).

4. The role of mothers in health investments

The results presented in Section 3 suggest that health investments are made disproportionately by a child's mother, and that on this dimension a step-mother is not an adequate

Table 10
Behaviors influencing child health, single and two-parent families[a]

Explanatory variables [means in brackets]	Dependent variables							
	Child wears a seatbelt all or most of the time		Someone in household smokes		Child has a regular bedtime Child age>1 year		Child covered by health insurance or medicaid	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Two adoptive parents	0.046 (0.030)	0.037 (0.030)	−0.068 (0.034)	−0.071 (0.035)	0.048 (0.028)	0.041 (0.027)	0.033 (0.024)	0.046 (0.024)
Two foster parents	0.063 (0.075)	0.012 (0.081)	0.211 (0.085)	0.194 (0.093)	0.178 (0.067)	0.225 (0.072)	0.028 (0.061)	0.024 (0.064)
Birth-mother, adoptive father	−0.018 (0.046)	0.001 (0.047)	0.050 (0.052)	0.059 (0.054)	−0.019 (0.040)	−0.013 (0.040)	0.031 (0.037)	0.052 (0.037)
Birth-mother, step-father	−0.013 (0.015)	−0.015 (0.015)	0.152 (0.017)	0.155 (0.017)	0.012 (0.013)	0.023 (0.013)	−0.044 (0.012)	−0.032 (0.012)
Step-mother, birth-father	−0.069 (0.036)	−0.054 (0.039)	0.172 (0.041)	0.123 (0.045)	0.049 (0.032)	0.046 (0.033)	−0.044 (0.030)	−0.012 (0.031)
Birth-father only	−0.044 (0.041)	−0.059 (0.042)	0.215 (0.046)	0.199 (0.049)	0.071 (0.037)	0.066 (0.037)	−0.075 (0.033)	−0.073 (0.033)
Birth-mother only	−0.039 (0.014)	−0.027 (0.015)	−0.025 (0.016)	−0.029 (0.017)	0.007 (0.013)	0.017 (0.014)	0.060 (0.012)	0.070 (0.012)
Adoptive mother only	0.192 (0.094)	0.184 (0.093)	0.110 (0.107)	0.096 (0.107)	0.149 (0.085)	0.136 (0.082)	0.016 (0.077)	0.003 (0.073)
Child has regular contact with non-resident birth-mother	−0.044 (0.042)	−0.031 (0.044)	−0.053 (0.048)	−0.021 (0.051)	−0.025 (0.038)	−0.023 (0.039)	0.068 (0.034)	0.067 (0.035)
Child has regular contact with non-resident birth-father	−0.014 (0.017)	−0.021 (0.018)	−0.013 (0.020)	−0.012 (0.020)	0.011 (0.016)	0.010 (0.016)	0.050 (0.014)	0.042 (0.014)
F-test: step-mother, birth-father = birth-father only (*P*-value)	0.28 (0.578)	0.01 (0.919)	0.65 (0.419)	1.79 (0.181)	0.27 (0.601)	0.21 (0.644)	0.66 (0.418)	2.53 (0.111)
Number of observations	13256	12469	13256	12469	11355	10644	13256	12469

[a] Results reported are for linear probability models. Standard errors are provided in parentheses. See footnotes to Table 9 for information on the sample. "Regular" contact with a birth-parent refers here to respondent reporting that child sees the birth-parent at least two or three times a month.

substitute for a birth-mother. There are two important questions here. First, why do mothers invest more than fathers in children's health? Second, why do step-mothers invest less than birth-mothers?

Mothers' primacy in children's health investments may be primarily the result of the magnification of small differences in parental responses. Hrdy reports on a study (Stallings et al., 1997) in which new parents listened in a laboratory to two recordings, one of a 1-day-old baby crying because he or she was hungry. In the other, a baby was crying during his circumcision. The parents' reactions were monitored, and their stress levels measured through their release of cortisol, testosterone and prolactin. The parents responded equally quickly to the "jagged and alarming cries" of the child being circumcised. However, the sound of the hungry baby's cry was responded to more quickly by the woman. Although it is not possible to know whether this response is learned or innate, it may well be the latter. Small differences in responses may be "exaggerated by life experiences and then blown out of all proportion by cultural customs and norms" (Hrdy, 1999, p. 212).

Sociobiologists also argue that men face trade-offs that differ in important ways from those faced by women. Men must decide how much effort to expend caring for children who may or may not be their children, and how much effort to expend mating with additional females. Unlike maternity, paternity is (or was) difficult to prove. Because women bear most of the costs of pregnancy, a mother's best response may weight more heavily the survival of each child, while a father's best response may include siring additional children. Consonant with the discussion by Becker (1981), this may lead to an equilibrium where children's health investments belong in the mother's sphere of influence.

Step-mothers' investments in step-children's health is consistent with *Hamilton's Rule*. Hamilton (1964a,b) hypothesizes that altruistic behavior between any two individuals will depend upon the degree of genetic 'relatedness' between them. Hrdy (1999) refers to Hamilton's rule as "a formally organized metaphor for how natural selection shaped the economy of maternal emotions" (p. 364). Hrdy, who at times discusses Hamilton's rule as if 'relatedness' were simply genetically based, and at times as if it were based on a broader notion of emotional connectedness, writes:

> As in all cooperative breeders, human animals have an internalized emotional calculus predisposing them to protect, care for, and allocate resources to individuals they classify as kin, their genetic relatives, or those they think of as kin. Familiarity from an early age would be the most common cue, affection and sympathy the immediate conscious motivations. Whenever costs of helping are less than the benefits to their "kin," alloparents [non-birth parental helpers] help (p. 271).

Step-mothers may invest less in step-children because the "affection and sympathy" needed to motivate them to act are not present. Apparently, "affection and sympathy" are available to foster and adoptive parents. Indeed these parents may have been selected for these qualities. [10]

[10] We recognize that once Hrdy's definition of 'relatedness' is adopted, it is no longer useful for hypothesis testing: anyone who invests does so because their coefficient of relatedness is large enough, given the costs and benefits of investment.

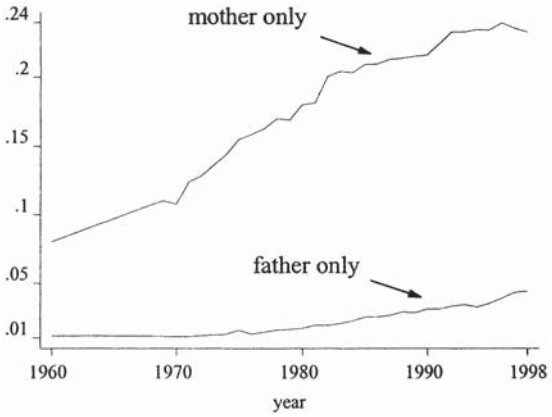

Fig. 1. Fraction of children less than age 18 living with father or mother only. Source: Marital Status and Living Arrangements, March, 1998 and earlier reports. US Bureau of the Census (1998), Current Populatin Reports, Series P20-514.

Should we be concerned about lower health investments among children with step-mothers? It is true that a relatively small fraction of children with divorced parents are "at risk" of being raised by step-mothers. Data from 19 states compiled by the National Center for Health Statistics in 1990 indicate that in divorces involving children, mothers received sole custody 72% of the time, fathers were awarded sole custody 9% of the time, and joint physical custody was awarded 16% of the time (US Department of Health and Human Services, 1995). We have little information on whether granting fathers sole custody has become more common over the past several decades. There was a clear shift in state custody laws in the 1970s and 1980s, with almost all states abandoning the "tender years" doctrine — which asserted that mothers are the best caretakers of children except in unusual cases — in favor of a standard in which custody is decided in the "best interests of the child." [11] Despite these changes in custody laws, evidence from scattered states indicates that divorced fathers are not more likely to receive custody at the time of the divorce than in the past (Bahr et al., 1994; Santilli and Roberts, 1990).

Although divorced fathers may not be more likely to be awarded custody, the overall increase in the prevalence of divorce means that there has been a dramatic increase in the fraction of children who live with their fathers only. Fig. 1 indicates that this fraction rose from little more than 1% in 1960, to over 4% in 1998. The fraction of children living with their mothers only has increased as well, but at a somewhat slower rate: the ratio of children living with mothers only to fathers only declined from 7.05 in 1960 to 5.29 in 1998. These figures do not tell us the change in the fraction of children being raised by step-mothers. However, a large number of children living with fathers only are likely to gain step-mothers when their fathers remarry — placing them at a greater risk of receiving lower health investments than if they were in the custody of their birth-mothers.

[11] For example, Bahr et al. (1994) write that, for 50 years prior to 1969, "Utah law specified that custody of minor children be given to the mother unless it was shown that she was an immoral or otherwise incompetent person." The presumption that the mother is the best caretaker was loosened and then finally abandoned in 1977.

Although our results indicate that children in step-mother households receive fewer investments in their health, they do *not* imply that mothers should always be granted custody of children, or that the "tender years" doctrine should be re-established. There are many dimensions to children's well-being in addition to health. If custody decisions are actually made in the best interests of children, then perhaps the reduced health investments in children in households with step-mothers are offset by benefits that we do not observe. We also know little about the long-term effects of having lower health investments in the domains studied in this paper. These are important areas for future research. However, our findings indicate that research on children's well-being should pay closer attention to the relationships between children and the parent-figures in their households. It is common to compare differences in investments in and outcomes of children in single-parent and two-parent families. However, our finding that children with step-mothers fare worse, and that children who live with a father alone fare no differently than children with a father and step-mother, indicate that the focus on the *number* of parents in a family, rather than the *kind* of parents in a family, is misplaced.

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