Are Complex Families Becoming More Common?

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In earlier research, we examined the levels of family complexity for children in Wisconsin whose parents were not married when they were born, considering the first 10 years of their lives (Cancian, Meyer, and Cook 2011). In that study, our measure of family complexity was the extent to which children gained half-siblings on their mother's side, their father's side, or both, (that is, the extent to which either parent had multiple-partner fertility). We documented high levels of this type of family complexity. For example, about 60 percent of first-born nonmarital children born in 1997 had at least one half-sibling by the time they were 10 years old.

Because our previous research followed a group of children born in a single year, it did not provide information on whether this phenomenon is increasing or decreasing over time. In this paper, we are able to examine this issue. We compare the evolution of family complexity of the children born in 1997 documented in our previous research to the evolution of complexity for nonmarital children born five and ten years later, in 2002 and 2007. This enables us to examine whether this type of family complexity (children whose parents have had children with other partners, and therefore children with half-siblings) is becoming more or less common.

This paper begins with a brief review of the literature on family complexity, highlighting the level of multiple-partner fertility, its correlates, and the limited evidence we have on whether it is increasing over time. None of the studies examine whether complexity is increasing from a child's perspective, so our focus here contributes important information to this emerging literature. After reviewing what is known (and not yet known), we then describe the data and methods used in this paper, before presenting our results and discussing their implications.

Literature Review

There is a growing awareness of the complexity of some children's family situations. Over their childhood, many children experience one or both of their parents leaving the family unit, forming new residential unions, and/or having children with new partners. We and others have examined a portion of this complexity, considering whether children's parents had gone on to have children with other partners (multi-partner fertility).

Multiple-partner fertility has been the subject of several research papers. Most of the studies have examined levels at a single point in time, with a variety of samples (Bronte-Tinkew et al. 2009; Cancian and Meyer 2011; Cancian, Meyer, and Cook 2011; Carlson and Furstenberg 2006, Dorius 2010, 2012; Fomby and Osborne 2013; Guzzo and Furstenberg 2007a, 2007b; Kennedy and Fitch 2012; McLanahan and Beck 2010; Meyer, Cancian, and Cook 2005, Scott et al. 2013.) Estimates varied based on whether the researchers examined mothers or fathers, whether survey reports or administrative records were used, whether the parents being considered were likely to be have completed their fertility, whether subgroups were considered (e.g., nonmarital births, births in large cities or in a single state), etc. In an early paper, (Meyer, Cancian, and Cook 2005), we reported that over half the children who entered TANF in Wisconsin had either a mother or a father who had multiple-partner fertility; in another early paper, Carlson and Furstenberg (2006) reported that over

35 percent of couples with new births had multiple-partner fertility on either the father's or mother's side (or both), with substantially higher rates for nonmarital births.

Some studies have examined the correlates of multiple-partner fertility, and found it to be substantially higher among those with nonmarital births than those with marital births (Cancian et al. 2011; Carlson and Furstenberg 2006; Guzzo and Furstenberg 2007b). It is also particularly high among those who have children early, in part because they will then have a longer risk period in which they could have a child with a new partner (Cancian et al. 2011; Carlson and Furstenberg 2006; Evenhouse and Reilly 2011; Manlove et al. 2008). Rates of multiple-partner fertility are significantly higher among people of color (Cancian et al. 2011; Carlson and Furstenberg 2006; Evenhouse and Reilly 2011; Guzzo and Furstenberg 2007a; Manlove et al. 2008). In general, the literature shows that multiple-partner fertility is more common among disadvantaged parents (Cancian et al. 2011; Carlson and Furstenberg 2006; Evenhouse and Reilly 2011; Meyer et al. 2005).

Three studies that we are aware of have examined multiple-partner fertility over time, and these have conflicting findings. Evenhouse and Reilly (2011) examine trends in multiple-partner fertility among mothers between 1984 and 2008 using the Survey of Income and Program Participation and find that there is no strong trend over this period. Manlove and colleagues (2008) examine multiple-partner fertility among cohorts of fathers in the National Survey of Family Growth and find that men born more recently are less likely than men born earlier to have children with more than one partner. In contrast, Guzzo and Furstenberg (2007a), also using the National Survey of Family Growth, find the opposite, with those fathers born more recently at higher risk than earlier cohorts. Differences in data sources, definitions, or models (including control variables) may be the reasons for these conflicting findings. None of these studies has taken a child's perspective, so none of them incorporate both mothers' and fathers' multiple-partner fertility simultaneously. In this paper we are able to take a child's perspective, comparing children born in 1997, 2002 and 2007, and using consistent procedures that allow us to consider multiple-partner fertility on both the mothers' and fathers' sides.

Data and Approach

We use a unique set of data derived from State of Wisconsin administrative systems, primarily from the child support enforcement data system, KIDS, as contained in the Multi-System Person File (MSPF). The MSPF contains information from the administrative records systems of child support, welfare benefits, earnings, unemployment insurance, child welfare, and criminal justice systems.

KIDS (and therefore MSPF) contains a record for every child for whom a referral to the child support agency was required (welfare cases) as well as for any child whose parent initiated contact with the child support agency for help with paternity establishment, locating a non-resident parent, establishing or changing a child support order, or collecting a child support order. It also includes divorce cases in which child support orders are issued, whether the parents initiated contact with the agency or not. Nearly all nonmarital children are in KIDS (and therefore MSPF); a comparison of nonmarital cases in KIDS with birth records (Brown and Cook 2008) found that 86 percent of all nonmarital children born in Wisconsin had records in KIDS.

This study follows the procedures we developed in Cancian, Meyer, and Cook (2011), so that these results are comparable.[1] From the child support administrative records, we extract records for all children born in 1997, 2002, and 2007 and identify whether they were nonmarital or marital. We then identify the parents of the nonmarital children and merge the records for all siblings and half-siblings of the initial 1997, 2002, and 2007 birth cohorts found in the KIDS system as of December 2012. We select children of unmarried mothers in KIDS for whom both parents are known, totalling 15,777 born in 1997, 17,787 born in 2002, and 21,809 born in 2007. We then exclude a few children who have maternal siblings born in the same year they were born (primarily twins or other multiple-births). Our focus is on nonmarital children who were their mother's first child; in our final sample there are 7,999 such children born in 1997, 8,897 born in 2002 and 10,385 born in 2007.[2] We are able to follow these children through the end of 2012 and to document the extent to which they have full siblings, half-siblings on their mother's side (that is, their mother has had children with a new partner), and half-siblings on their father's side (that is, their father has had children with a different partner).

These data present several advantages for this analysis. Starting with children born in a particular year allows us to observe the experience of gaining siblings and half-siblings from the perspective of a particular cohort of focal children. We are able to observe the frequency and timing of a child's parents' multiple-partner fertility over a longer period than most previous research, at least 15 years for children born in 1997, 10 years for children born in 2002, and 5 years for children born in 2007. The construction of our data by birth cohorts gives a straightforward look at whether complexity is increasing or decreasing over time. Finally, by using a sample of mother's firstborn children, we are able to consider several years of fertility experiences for each mother in our sample.

These data differ from the more typical survey analyses and have a number of distinct advantages and limitations. First, nearly all (86 percent) nonmarital children born in Wisconsin in 1997 had records in KIDS (Brown and Cook 2008), so our coverage of nonmarital births (both in forming the sample and in identifying later nonmarital fertility) is not perfect, but it is quite good. Second, subsequent marital children will usually be recorded in the child support records only if their parents divorce and there is a child support order, so the child support records would miss some half-siblings; however, if these half-siblings appeared in another administrative record (Food Stamps/SNAP or child welfare, for example) they would appear in the MSPF, and we would count them. Moreover, other research has found relatively low rates of marital fertility with a new partner after a first nonmarital birth, suggesting that our interests—in a focal child's half-siblings—are likely to be well covered in our data. A third issue is that for less than 20 percent of the nonmarital births, paternity is not established, so we are generally unable to examine the (legal) father's multiple-partner fertility. Our previous research on this topic (Cancian, Meyer and Cook, 2011) has demonstrated that key results are not very sensitive to alternative assumptions about the fertility of these unknown fathers. A final issue that arises from using state records is that births that occur after the parent has moved out of state may also be under-observed. We find, however, that in each

[1] One difference is that we now use a new single data source, the Multi-System Person File (MSPF), in which the administrative records of child support, welfare, earnings, criminal justice, and child welfare have been combined. This enables us to observe some half-siblings that we did not observe before; for example, if a focal child's mother later married and had a child with her new partner and they received SNAP benefits, the MSPF enables us to observe this new half-sibling. Another difference is that because administrative records can be corrected at a later date, our calculations here will not exactly match the calculations made from our earlier research. Nonetheless, our results for the 1997 cohort are very similar to those we reported previously.

[2] We do not restrict our sample to births that are both parents' first because these births represent a more select sample: every child's mother has had a first birth, but not every child's mother has had a first birth with a father who was also becoming a father for the first time.

cohort 85 to 90 percent of mothers in our sample have open KIDS records, public assistance participation, or UI earnings in Wisconsin through the end of our observation period, so the rate of these mothers leaving the state appears to be quite low. Unfortunately, we have very little information on the extent to which fathers move out of state or have children with women who live outside Wisconsin.

Note that two of the factors in which the direction of bias is known (missing some marital fertility and out-of-state fertility) lead us to underestimate multiple-partner fertility, but do not generally mean that the level of the underestimate would change over time. In contrast, the likely disproportionate underrepresentation in our main sample of mothers who do not apply for welfare programs nor want child support probably leads us to overestimate complexity. Notwithstanding these potential biases, our original research (Cancian, Meyer and Cook, 2011) suggested that outcome estimates were robust to alternative assumptions, and confirmed high rates of family complexity.

One final note is that our focus is on the half-siblings that result from multiple-partner fertility. We do not have good data for (nor do we incorporate) any stepsiblings that result from a child's parent forming a union with a new partner who has had previous children; however, if the union produces new children, these half-siblings are considered if they are nonmarital, if a marital union ends in divorce, or if the family receives some other benefit for which we have administrative data.

Analytical Approach and Factors Related to Acquiring a New Half-Sibling

We follow the mother and father of the children in each of our birth cohorts, recording any full siblings and half-siblings born over as many years of the focal child's life as we have data. We then create measures reflecting the dynamics of children's siblingship (no sibling, or full or half-sibling[s] from the mother, the father, or both) from birth in each year for which we have data. Because children can have multiple half-siblings, we also consider the number of half-siblings. In each case, we are especially interested in the extent to which the patterns for the 1997, 2002, and 2007 cohorts differ.

One reason the patterns for the cohorts might differ is that the characteristics of cases might differ; for example, the age and race of mothers who have a nonmarital birth and for whom that child is their firstborn may differ over our three cohorts. We examine how the age and race of both parents differ over the cohorts, and then examine whether the levels of complexity differ within age groups and race groups.

Finally, we use an event history model to examine characteristics associated with the timing of each parent having a subsequent child with a new partner. We consider separate models for the risk of having a new half-sibling on the father's side and a new half-sibling on the mother's side; in both models, we begin at the child's birth and follow parents until they make the transition we are examining or until the data end. What characteristics might be related to the risk of a new half-sibling (multiple-partner fertility)? We are particularly interested in the relationship between the addition of a new half-sibling on the father's side and a child's risk of having a half-sibling on the mother's side, and vice versa. If these are positively correlated, it will mean there is a risk of very high levels of complexity for some children. If the relationship between mother's and father's fertility persists even when we control for a variety of socioeconomic and demographic characteristics, this relationship raises the possibility that multiple-partner fertility may be mutually reinforcing.

We consider two main types of control variables in examining the risk of a mother having a child with another partner: economic status and demographic characteristics. Based on the prior literature, we anticipate that a new half-sibling on the mother's side will be more likely for mothers with lower economic status. We incorporate several time-varying measures of economic status, such as mother's annual earnings and whether she was consistently employed, both measured 10 months prior to the period being considered, at about the potential time of conception for a new half-sibling. We also include whether the mother received food stamps/SNAP or was covered by publicly subsidized health insurance, and the amount of formal child support the focal child's father paid the mother. The expected relationship with child support is unclear, those who receive child support may be more economically independent and less likely to partner for economic reasons (and therefore less likely to have a child with a new partner). On the other hand, this economic support may mean that these mothers are more attractive in the partnering market and are therefore more likely to have new children (see Cancian and Meyer 2013; Gassman-Pines and Yoshikawa 2006; Gibson-Davis et al. 2005). We also include baseline demographic characteristics. Based on the previous literature, we expect younger women and women of color to be more likely to have a child with a new partner. Finally, we include child's gender, whether the parents lived in an urban area, and parity. We also allow for the baseline hazard to vary over time.

Our model of the risk of the father having a child with a new partner (the focal child having a new half-sibling on the father's side) is generally parallel to the mother's model: we consider the focal mother's multiple-partner fertility, the father's economic status (expecting higher risk for fathers with lower earnings or employment), and the father's demographic characteristics (expecting higher risk for younger fathers, fathers of color, and those who partnered with someone of another race). In addition, the model of the risk of half-siblings from the father includes prior half-siblings from the father (because the focal child may not have been a first child for the father) and two measures of father's child support payments: the amount paid to the focal child's mother and the amount paid to other mothers. These models allow us to consider how multiple economic and demographic characteristics are related to the likelihood of firstborn children having new half-siblings from their mother or father with a different partner.

We run these event history models within each cohort, which enables us to examine characteristics associated with family complexity. We then run a combined model in which all cohorts are pooled, with the birth cohort identified by an indicator variable. This enables us to examine whether this type of family complexity (multiple-partner fertility) is becoming more or less likely over time, once a variety of socioeconomic factors are held constant.

Results

The Evolution of Complexity for the 1997 Cohort

The previous research demonstrated that even though the focal children we examined in 1997 were their mother's first birth, more than one in five had half-siblings at birth because their father had already had had a child with another woman. We showed that complexity built steadily. At age 10, about 40 percent had "simple" families—that is, no siblings or only full siblings. About 20 percent had half-siblings only on their mother's side, about 20 percent had half-siblings only on their fathers side, and about 20 percent had half-siblings on both sides.

With new years of data, in this analysis we are able to extend these results for another five years, until the focal children are 15. Figure 1 shows that most of the complexity (in the way we measure it here) has already occurred by age 10. The percentage of children who have no siblings of any type does decrease from 21 percent to 18 percent between age 10 and age 15, and the proportion with

only full siblings also declines from 15 percent to 13 percent. Most of the change is an increase in the proportion of children with the most complicated families (half-siblings on both sides), which increased from 22 percent to 27 percent.

The Evolution of Complexity for the 2002 and 2007 Cohorts

Figures 2 and 3 show the evolution of complexity for the 2002 and 2007 cohorts, showing as many years as we have data. Similar to the earlier cohort, complexity builds steadily in each cohort. For the 2007 cohort, 56 percent have no half-siblings by the time they are five years old. About one in eight have half-siblings on their mother's side only, and about one in four have half-siblings on their father's side only. Having half-siblings on both sides is fairly uncommon, experienced by only 8 percent. The 2002 cohort has similar rates at age five: 52 percent have no half-siblings, 13 percent have them only on their mother's side, 24 percent only on their father's side, and 10 percent on both sides. However, by the time they are 10, rates of complexity have increased so that only 39 percent have no half-siblings, 19 percent have half-siblings only on their mother's side, 22 percent only on their father's, and 20 percent on both sides.

Because the three cohorts are each shown on their own figure, it is not easy to compare across cohorts to see if complexity has grown. Thus, in Figure 4, we show the percentage of children in simple families (that is, without any half-siblings) across the three cohorts. The pattern is quite similar across the three cohorts, and the levels are close to each other. There is a slight trend for an increasing likelihood of simple families in the later cohorts: at age five, the proportion in simple families in the 1997 cohort is 50 percent, increasing to 52 percent in the 2002 cohort and 56 percent in the 2007 cohort; at age ten, the proportion in simple families is 36 percent in the 1997 cohort and 39 percent in the 2002 cohort.

A different way to examine this question is to look at the risk of gaining the first new half-sibling. Figure 5 shows the proportion of those who have not yet gained a new half-sibling since birth, who gain one during the year. (In this figure we combine the risks of gaining a new half-sibling on the father's side and the mother's side). This figure shows that the patterns of fertility are similar across the three cohorts; the risk of gaining a new half-sibling rises until about the third or fourth year and then declines. The figure also shows that the risks are highest in the 1997 cohort; adding a new half-sibling is less likely at each age for the other two cohorts.

Figure 6 examines the proportion of children who have the most complex families, that is, with half-siblings on both sides, across the three cohorts. Again the pattern and levels are strikingly similar, but, consistent with Figures 4 and 5, there is a small trend toward less complexity in the later cohorts. The proportion in this most complex family at age 5 is 11 percent in the 1997 cohort, 10 percent in the 2002 cohort, and 8 percent in the 2007 cohort. Similarly, at age 10 the proportion in this type of complex family is 22 percent in the 1997 cohort and 20 percent in the 2002 cohort.

The Number of Half-Siblings

The figures thus far have only considered whether a child has any half-siblings on each side; some children have multiple half-siblings on either their mother's or father's side, or both. In Figure 7 we categorize children in each cohort by the number of their half-siblings. The first four bars show the 1997 cohort. Earlier we saw that 22 percent have a half-sibling on their father's side at birth; this figure reveals the breakdown: 13 percent have one half-sibling at birth, 5 percent have two, and 4 percent have three or more. By the time these children are 15 years old, fully one-third have three or more half-siblings, slightly more than the number who have no half-siblings. If we instead examine the number of their parent's partners (rather than the number of half-siblings, not shown

on figure), these children have highly complex family arrangements: 18 percent have three or more individuals who are identified in the administrative data as having had children with one of their parents.

The next sets of bars show the later cohorts. The figures reveal that even though the distribution of the number of half-siblings at birth has not changed much over the cohorts, there are somewhat fewer half-siblings with each cohort. For example, at age 10, 26 percent of the 1997 cohort have three or more siblings, compared to 23 percent in the 2002 cohort. Similarly, at age 5, 12 percent of those in the 1997 and 2002 cohorts have three or more siblings, but this declines to 9 percent by the 2007 cohort.

Characteristics of Cases

We find small declines in family complexity across the cohorts. To what extent might this be explained by differences in characteristics of the mothers and fathers in the three cohorts? The first columns of Table 1 show basic information on parents' age and race within each cohort. These columns show that a little more than half of the mothers in the 1997 cohort were teenagers at the child's birth, but this declines by 12 percentage points in the 2007 cohort, to 39 percent. Similarly, the proportion of men who were teenagers when they became fathers of the focal children we consider also declines over time, by 9 percentage points.

These changes are potentially consequential because our prior work shows high rates of multiple-partner fertility for those who become parents as teenagers (e.g., Cancian, Meyer, and Cook 2011). This is corroborated in our new data as well, as can be seen in the remaining columns of the table. For example, by the time the focal children are five years old, those born to teen mothers are more likely to have the most complex families (half-siblings on both sides) than those whose mothers were older, and this is true across cohorts. Similarly, those born to teen fathers are also more likely to have the most complex families at age five than those whose fathers were older, and again this true of every cohort. The table thus demonstrates that the small decline in family complexity across the cohorts is partly because of changes in the composition of those having their first nonmarital birth: because over time fewer focal children are born to teenagers, who have a high risk of complexity, complexity is decreasing. But the table also shows small declines over time within age categories. For example, the likelihood of having half-siblings on both sides declines slightly across the cohorts even among those whose mothers were teenagers—from 10.9 percent to 10.3 percent to 8.5 percent. A similar pattern can be seen among teen fathers.

The bottom panels show somewhat smaller changes in race across the cohorts: over the ten-year period, the proportion of mothers who are Hispanic increased by five percentage points, with declines for whites (three percentage points) and African Americans (two percentage points). Father's race shows similar patterns. This also has implications for trends in family complexity because African Americans have the highest rates of family complexity (e.g., Carlson and Furstenberg 2006). Thus, the fact that children in the most recent cohort are less likely to have African American parents than those in the older cohort could be expected to decrease the rates of complexity over time, even if everything else stayed equal. The results show that not only is the composition switching toward groups with lower rates of complexity (more Hispanics, fewer African Americans), but rates of complexity within racial groups are also decreasing over time.

To summarize, over the three cohorts, the level of family complexity has declined by a small amount. This is due in part to trends in the characteristics of those with their first nonmarital birth: these

individuals are becoming older and less likely to be African American. But that is not the whole story, as the rates of complexity within the higher-risk age and race groups are also declining.

What Factors Are Associated with Gaining a New Half-Sibling

Our earlier research (Cancian, Meyer and Cook, 2011) reported two multivariate analyses examining the risk of gaining a new half-sibling. The first examined children until they gained a half-sibling on their mother's side (that is, until their mother had a child with a new partner) or the ten years of observation elapsed. The second was a parallel examination of gaining a new half-sibling on their father's side (that is, until their father had a child with a new partner). A key finding was that new half-siblings on one side were associated with new half-siblings on the other: if mothers had already had a child with another partner, this was associated with an increased risk of the father having a child with another partner, and vice versa. This finding is important because it means that some children will be at risk of very high levels of family complexity. Another important finding was that those with higher levels of disadvantage were more likely to gain half-siblings; for example, children whose mothers had higher earnings were less likely to gain a half-sibling on their mother's side, and children whose fathers had higher earnings were less likely to gain a half-sibling on their father's side.

Table 2 shows the result of our analysis of gaining a half-sibling on the mother's side. We follow each cohort until they gain a half-sibling or the period of observation ends. Results are generally similar across cohorts and consistent with previous research. For example, in each cohort, when fathers have a child with a new partner, this is associated with an increase in the risk of having the mother having a child with a new partner. There are also general patterns of those mothers with more disadvantage having a higher risk of having a child with a new partner, although the relationships are not always the same across cohorts. In the 1997 and 2007 cohorts, those who were employed in each quarter have a lower risk of having a child with a new partner, as do those with high earnings (2002 and 2007 cohorts). Those receiving Food Stamps/SNAP have a higher risk of having a child with a new partner (all cohorts), as do those receiving government medical benefits (1997 and 2002 cohorts). In all cohorts, those who have their first child as a teenager are at higher risk of having a child with a new partner. Consistent with the previous research, the risk of a new half-sibling is high when the mother is receiving more child support and when both a child's parents are African American. Consistent with Figure 5, the risk increases as the child ages, but then declines.

Table 3 shows parallel results for gaining a half-sibling on the father's side. Again, results are generally consistent across cohorts and consistent with previous research. In every cohort, fathers who had already had a child with a different partner when the focal child was born are at increased risk of having another child with a new partner (a new half-sibling for the child). In every cohort, when mothers have a child with a new partner, this is associated with an increased risk of the father having a child with a new partner. However, there is no additional risk from the mother having a child with a second new partner. In every cohort, fathers paying more child support to the focal child's mother are at higher risk of having a child with a new partner, all else equal. Similar to the results from Table 2, socioeconomic disadvantage is associated with increased risk. Across all cohorts, fathers with the highest earnings are at low risk of having a child with a new partner, young fathers have high risk of having a new partner, and the risk of a new half-sibling is high when both a child's parents are African American. The three cohorts show a similar pattern in that the risk of gaining a new half-sibling on the father's side increases and then decreases as the child ages.

These analyses show factors associated with gaining a new half-siblings within each cohort. Although the cohorts show similar patterns, the separate models do not answer whether the risk of multiple-partner fertility is increasing or decreasing across the cohorts. One way to examine this is

to combine all three cohorts into a single model, differentiating cohorts with an indicator variable, and examining the risk of gaining a new half-sibling over the focal child's first five years. This model controls for changes in the characteristics of cases.[3] The analyses show that those in the 2002 cohort are at lower risk of gaining a half-sibling on their mothers' side ($p < .01$) and on their fathers' side ($p < .05$) than the 1997 cohort. The 2007 cohort is even less likely on both sides (both $p < .01$).

Summary and Implications

This paper presents the first examination of the trends in multiple-partner fertility from a child's perspective. We examine nonmarital children who were their mother's first-born, and trace their parents' multiple-partner fertility over time. We are able to examine 15 years for those born in 1997, 10 years for those born in 2002 and 5 years for those born in 2007. We find that levels of this type of family complexity are quite high in every cohort. For example, in the 1997 cohort, by the time children are fifteen, more than two-thirds have a half-sibling, and the number with three or more half-siblings is actually higher than the number without any half-siblings. In the 2002 cohort, more than 60 percent have a half-sibling by the time they are ten years old. And even in the 2007 cohort, who are only five years old when we last observe them, 44 percent have a half-sibling. The timing of gaining half-siblings is similar across the cohorts, with much of the complexity occurring relatively early in a child's life. The characteristics associated with gaining a half-siblings are also relatively similar across cohorts – mothers and fathers who were young when they first became parents, who are African American, and who are disadvantaged, all show increased risk of multiple-partner fertility. Finally, there is some evidence that multiple-partner fertility is mutually reinforcing: a mother's multiple-partner fertility is associated with an increased risk of a father having children with more than one partenr, and vice versa.

While the patterns of multiple-partner fertility are similar across these three cohorts, there is a small trend toward less complexity across the cohorts. For example, when children are aged five, the proportion in simple families (without half-siblings) is 50 percent in the 1997 cohort, 52 percent in the 2002 cohort, and 56 percent in the 2007 cohort. This is partly explained by the composition of cases in our sample: mothers with first-born nonmarital children are less likely to be teenagers and less likely to be African Americans in the later cohorts, two groups that have higher rates of multiple-partner fertility. But this is not the only explanation, as we have shown that rates within these groups have also declined over time, and the multivariate analysis demonstrates that even holding background characteristics constant, rates are declining.

So, these results show small declines in the risk of family complexity across cohorts of firstborn nonmarital children. However, these analyses have not taken into account that the cohorts are of different sizes. Because the number of nonmarital births is increasing, as well as the proportion of births that are nonmarital (State of Wisconsin), the *number* of nonmarital children with half-siblings could be increasing, even though the *likelihood* is declining given that one is a nonmarital child. In fact, some of our findings do show increasing complexity. We showed that at age 5, the proportion of nonmarital first children that have at least one half-sibling declines across the cohorts from 50 percent, to 48 percent, to 44 percent. However, because there are more nonmarital births in the later cohorts, the cohorts are increasing in size. Thus, the number of children who have at least one half-sibling by age five is increasing over time, from 3,976, to 4,228, to 4,556. However, the increasing size of the cohorts does not mean that all of our measures of complexity are increasing: the number of children who have half-siblings on both sides by age five (the most complicated families) increases from 884 in the 1997 cohort, to 912 in the 2002 cohort, before declining to 857 in

[3] Note, however, that this does not allow for changes in the process across cohorts; for example, in each cohort, mother's age is constrained to have the same relationship with the risk of gaining a new half-sibling.

the 2007 cohort. This increase and then decline in the number affected contrasts with our numbers for risk, which declines from 11 percent, to 10 percent, to 8 percent.

In summary, then, we find high but generally decreasing risks of family complexity over time. But because the pool at risk is increasing, some measures of family complexity actually show increases in the number of children affected, while others show declines.

This paper has some implications for further research. Clearly, research needs to consider both the level of risk and the number of those at risk. Similarly, these results highlight the utility of examining the child's perspective, and thus considering the behaviour of both parents simultaneously.

Our findings that the number of children affected is not necessarily declining (even if the risk is declining) highlights the need for child support policy to consider how best to handle these complicated families. The appropriate level of support expected when a mother has had children with multiple fathers and when a father has had children with multiple mothers is not clear (Meyer and Cancian, 2012). The high numbers of children affected means these are significant policy concerns.

Table 1: Characteristics of Cohorts and Family Complexity At Age 5 by socioeconomic characteristics

	1997	2002	2007	1997 cohort - Family complexity at age 5					2002 cohort - Family complexity at age 5					2007 cohort - Family complexity at age 5				
				No New Half Sibs		New half Sibs			No New Half Sibs		New half Sibs			No New Half Sibs		New half Sibs		
	Percent of Sample	Percent of Sample	Percent of Sample	No Half Sibs At Birth	half Sibs at Birth	Moms Only	Dad Only	Both	No Half Sibs At Birth	half Sibs at Birth	Moms Only	Dad Only	Both	No Half Sibs At Birth	half Sibs at Birth	Moms Only	Dad Only	Both
Mothers Age At Birth																		
1)Under20	51.4	44.4	39.1	45.1	6.4	23.3	14.3	10.9	47.9	6.9	22.2	12.7	10.3	51.5	7.1	21.6	11.4	8.5
2)20-25	36.6	43.4	47.6	54.3	14.8	14.6	12.0	4.4	54.4	16.1	13.8	11.1	4.6	58.3	16.6	13.5	8.5	3.2
3)26-30	7.5	8.2	9.6	58.6	22.0	7.1	10.6	1.9	60.9	22.7	7.9	7.3	1.2	61.1	24.1	6.3	6.8	1.6
4)31-35	3.1	2.8	2.4	61.8	24.8	4.9	7.7	0.8	63.1	25.4	4.8	6.4	0.4	63.6	24.0	7.6	4.0	0.8
5)36+	1.4	1.2	1.3	63.1	28.8	5.4	2.7	0.0	65.7	27.6	2.9	3.8	0.0	65.4	27.9	4.4	2.2	0.0
Fathers Age At Birth																		
1)Under20	29.6	22.0	20.9	47.7	2.6	22.7	15.0	11.9	50.6	3.0	20.8	14.2	11.3	56.2	2.5	20.4	12.0	8.9
2)20-25	43.3	49.7	48.4	52.4	9.7	17.3	13.5	7.1	55.9	9.6	16.5	12.0	6.0	60.0	9.5	15.9	9.4	5.2
3)26-30	15.7	16.5	18.2	48.8	21.0	13.6	12.8	3.7	47.8	22.0	14.8	9.5	5.8	53.0	24.2	11.6	8.5	2.7
4)31-35	6.8	7.1	7.4	50.2	27.9	13.2	6.5	2.2	46.1	32.1	11.5	7.6	2.7	45.0	34.1	12.3	7.1	1.4
5)36+	4.6	4.6	5.0	48.5	31.1	14.3	4.7	1.4	48.4	36.9	9.3	3.7	1.7	43.7	39.5	11.2	4.4	1.2
Mother's Race																		
White	60.42	58.15	57.55	54.79	11.9	16.97	10.8	5.55	55.04	13.41	16.27	9.72	5.55	58.59	14.87	15.06	7.65	3.83
Black	21.49	19.3	19.2	30.83	12.16	23.79	18.73	14.49	34.54	12.87	21.08	18.7	12.81	36.36	16.2	21.46	15.35	10.6
Hispanic	7.51	12.29	12.96	55.57	8.15	21.3	9.15	5.82	62.95	9.88	15	7.59	4.57	66.94	8.32	13.74	7.13	3.86
Other	3.06	3.97	4.94	55.1	6.94	16.33	12.65	8.98	54.39	12.18	19.26	7.65	6.52	63.16	10.92	14.81	7.8	3.31
Unknown/Missing	7.51	6.29	5.34	62.56	11.65	7.49	16.14	2.16	62.14	15.71	7.86	11.96	2.32	67.93	11.53	6.85	11.89	1.8
Father's Race																		
White	48.97	46.8	42.51	56.17	12.18	16.19	10.44	5.03	57.25	13.26	14.82	9.58	5.09	58.96	15.9	13.43	7.77	3.94
Black	26.07	22.78	22.25	30.41	14.92	19.76	21.29	13.62	30.64	17.46	17.66	20.82	13.42	32.76	19.21	19.08	18.35	10.6
Hispanic	9.69	14.11	14.29	51.74	9.16	18.45	13.16	7.48	58.8	11.24	15.78	9.24	4.94	65.57	10.65	11.99	7.82	3.98
Other	3.43	3.46	4.32	55.11	9.12	13.14	13.14	9.49	52.27	15.91	15.58	9.42	6.82	62.36	13.36	14.25	6.9	3.12
Unknown/Missing	11.85	12.85	16.62	67.19	3.8	22.89	3.8	2.32	66.93	5.07	22.66	3.06	2.27	70.45	4.63	20.34	2.95	1.62
Sample size: 7999 for 1997 cohort; 8897 for 2002 cohort; 10385 for 2007 cohort.																		
Missing data not shown on first two panels: for mother's age mising totals 27 in the 1997 panel, 19 in the 2002 panel and 12 in the 2007 panel. For father's age, missing totals 81 in the 1997 panel, 89 in the 2002 panel, and 91 in the 2007 panel.																		

Table 2: Piecewise Exponential Hazard Model Predicting Mother's Child with a New Partner

	1997 Cohort Followed for 15 Years			2002 Cohort Followed for 10 Years			2007 Cohort Followed for 5 Years		
Parameter	Estimate		SE	Estimate		SE	Estimate		ES
Half-Siblings on Father's Side After Focal Child's Birth 10 Months Prior (ref. = none)									
From one mother	0.349	**	0.043	0.315	**	0.047	0.380	**	0.061
From two or more mothers	0.268	**	0.079	0.175		0.099	0.481	**	0.144
Half-Siblings on Father's Side at Focal Child's Birth (ref. = none)									
Frome one mother	0.029		0.048	0.050		0.049	0.064		0.061
From two or more mothers	-0.100		0.079	0.173	*	0.073	0.137		0.091
Mother Worked (ref = mother not fully employed)									
All Four Quarters of Last Year	-0.121	*	0.050	-0.020		0.053	-0.165	**	0.063
No UI Match	-0.067		0.241	-0.410	**	0.151	-0.224		0.169
Mother Annual UI Earnings, Lagged (ref = $1-$10,000)									
Not reported earnings	-0.241	**	0.054	-0.141	**	0.051	-0.082		0.057
$10,001 - $25,000	0.059		0.055	-0.046		0.057	-0.051		0.068
$25,001-$50,000	-0.032		0.063	-0.222	**	0.067	-0.130		0.082
$50,001+	-0.082		0.068	-0.228	**	0.072	-0.316	**	0.102
Mother Used Food Stamps 10 Months Prior	0.229	**	0.046	0.281	**	0.042	0.302	**	0.050
Mother Used Medicaid or State Children's Health Insurance 10 Months Prior	0.178	**	0.041	0.174	**	0.045	-0.042		0.055
Child Support Paid Father to Mother, Annual Lagged (ref. = none)									
$1-$1,000	0.034		0.051	0.083		0.049	0.043		0.055
$1,000+	0.254	**	0.041	0.251	**	0.042	0.256	**	0.054
Mother's Age at First Birth (ref. = <20)									
20-25	-0.615	**	0.038	-0.564	**	0.038	-0.492	**	0.046
26-30	-1.456	**	0.104	-1.254	**	0.100	-1.049	**	0.111
31-35	-2.447	**	0.249	-2.252	**	0.250	-1.076	**	0.228
36+	-2.756	**	0.415	-4.459	**	1.027	-2.805	**	0.712
Mother's Age Relative to Father's at Focal Child's Birth (ref. = within 1 years of same age)									
10 or more years younger	0.214	**	0.073	0.096		0.074	0.104		0.091
5-9 years younger	0.116	*	0.049	0.074		0.050	0.022		0.064
2-5 years younger	0.016		0.039	-0.060		0.041	0.120	*	0.049
2-5 years older	0.034		0.078	0.013		0.086	0.202	*	0.095
5+ years older	0.275		0.204	0.349		0.188	0.148		0.249
Parents' Race (ref. = both white)									
Both black	0.370	**	0.056	0.363	**	0.059	0.408	**	0.072
Both Hispanic	0.234	**	0.086	0.161		0.082	-0.027		0.107
Mom white/father black	0.082		0.076	0.201	*	0.083	0.224	*	0.100
Mother white/father Hispanic	0.067		0.083	0.224	**	0.082	-0.065		0.114
All other combinations	0.253	**	0.048	0.274	**	0.047	0.180	**	0.055
Child's Gender Male	-0.021		0.033	-0.006		0.034	-0.071		0.041
County (ref. = Milwaukee County)									
Other urban	-0.003		0.047	0.030		0.049	-0.024		0.060
Rural	0.033		0.059	0.110		0.060	0.120		0.072
Out of State	-0.483	**	0.102	-0.397	**	0.103	-0.432	**	0.130
Full Siblings, 10 Months Prior (ref. = none)									
One	-0.534	**	0.052	-0.635	**	0.054	-0.561	**	0.072
Two	-0.744	**	0.097	-1.004	**	0.117	-0.352	*	0.178
Three or more	-0.695	**	0.178	-1.038	**	0.239	-0.488		0.709
Years Since Focal Child Birth (ref. = 1)									
2	1.958	**	0.139	1.749	**	0.135	1.811		0.129
3	2.295	**	0.138	2.040	**	0.134	2.008	**	0.130
4	2.312	**	0.140	2.267	**	0.134	2.121	**	0.131
5	2.348	**	0.141	2.378	**	0.135	2.238	**	0.131
6	2.258	**	0.143	2.274	**	0.137	2.402	**	0.138
7	2.166	**	0.145	2.110	**	0.140			
8	2.009	**	0.148	2.053	**	0.142			
9	1.824	**	0.152	1.782	**	0.147			
10	1.699	**	0.156	1.842	**	0.148			
11	1.708	**	0.157	1.490	**	0.181			
12	1.497	**	0.164						
13	1.077	**	0.178						
14	1.036	**	0.180						
15	0.446	*	0.211						
16	0.145		0.309						
Intercept	-7.239	**	0.145	-7.321	**	0.144	-7.198	**	0.149
-2 Log Likelihood	46856.41			43540.99			29759.4		

Note: The models also include indicator variables denoting missing child gender and missing county.

Table 3: Piecewise Exponential Hazard Model Predicting Father's Child with a New Partner After Focal Child Birth									
	1997 Cohort			2002 Cohort			2007 Cohort		
	Followed 15 Years			Followed 10 Years			Followed 5 Years		
Parameter	Estimate		SE	Estimate		SE	Estimate		SE
Half-Siblings on Father's Side at Focal Child's Birth (ref. = none)									
Frome one mother	0.4733	**	0.0604	0.4886	**	0.0642	0.4719	**	0.0768
From two or more mothers	0.9887	**	0.0831	0.994	**	0.0856	1.0409	**	0.0998
Half-Siblings on Mother's Side 10 Months Prior (ref. = none)									
From one father	0.289	**	0.0555	0.2338	**	0.0627	0.2501	*	0.1111
From two or more fathers	0.1135		0.1349	0.0301		0.1945	0.7136		0.5808
Child Support Paid Father to Mother, Annual Lagged (ref. = none)									
$1-$999	0.2287	**	0.0616	0.1971	**	0.0619	0.0449		0.0723
$1000+	0.4845	**	0.0515	0.5067	**	0.0542	0.5286	**	0.0706
Father Worked (ref = father not fully employed)									
All Four Quarters of Last Year	-0.1126	*	0.0564	-0.0422		0.0617	-0.1738	*	0.0749
No UI Match	-2.0329	**	0.4131	-1.084	**	0.215	-1.2103	**	0.2103
Father Annual UI Earnings, Lagged (ref = $1-$10,000)									
Not reported earnings	-0.6162	**	0.0546	-0.4671	**	0.057	-0.2784	**	0.0631
$10,001 - $25,000	-0.0047		0.0641	0.013		0.069	-0.1242		0.0824
$25,001-$50,000	-0.1878	*	0.0755	-0.1427		0.0808	-0.1274		0.0964
$50,001+	-0.2488	**	0.0759	-0.3689	**	0.0836	-0.4192	**	0.1066
Child Support Paid Father to Others, Annual Lagged (ref. = none)									
$1-$999	0.1102		0.086	0.0011		0.0935	0.073		0.1037
$1000+	-0.3087	**	0.0789	-0.1092		0.079	0.0899		0.0943
Mother's Age Relative to Father's at Focal Child's Birth (ref. = within 1 years of same age)									
10 or more years younger	0.1481		0.1373	0.4033	**	0.1372	0.3294	*	0.1564
5-9 years younger	0.0898		0.0679	0.0063		0.0706	0.1447		0.0859
2-5 years younger	0.025		0.0457	0.0445		0.0487	0.1751	**	0.0596
2-5 years older	0.017		0.0754	-0.1428		0.0891	-0.0253		0.1017
5+ years older	0.0741		0.15	-0.3382		0.189	-0.3976		0.2626
Father's Age at Focal Child's Birth (ref.= <20)									
20-25	-0.4552	**	0.0451	-0.4472	**	0.0499	-0.4236	**	0.0621
26-30	-0.9366	**	0.0765	-0.9357	**	0.0825	-0.7886	**	0.0965
31-35	-1.6989	**	0.14	-1.5751	**	0.1395	-1.3332	**	0.1517
36-higher	-2.2191	**	0.2047	-2.3293	**	0.2118	-1.7871	**	0.2131
Parents' Race (ref. = both white)									
Both black	0.7173	**	0.0604	0.7992	**	0.066	0.59	**	0.0798
Both Hispanic	0.2026	*	0.1025	-0.0514		0.1019	0.2072		0.1135
Mom white/father black	0.6735	**	0.0785	0.7463	**	0.0852	0.7257	**	0.0972
Mother white/father Hispanic	0.4408	**	0.0893	0.1453		0.1015	0.1559		0.1268
All other combinations	0.1012		0.0579	-0.0005		0.0607	-0.096		0.0691
Child's Gender Male	-0.0215		0.0371	-0.0506		0.0394	0.0062		0.0473
County (ref. = Milwaukee County)									
Other urban	-0.0841		0.053	-0.0627		0.0573	-0.0903		0.0684
Rural	-0.0088		0.0666	0.0557		0.0718	-0.1295		0.0869
Out of State	-0.0348		0.0934	0.3128	**	0.0942	0.0985		0.1204
Full Siblings, 10 Months Prior (ref. = none)									
One	-0.1405	*	0.062	-0.1738	**	0.0637	-0.3656	**	0.0991
Two	-0.5657	**	0.1275	-0.5917	**	0.1508	-0.4227		0.3055
Three or more	-0.7702	**	0.2809	-0.222		0.2546	0.1412		1.002
Years Since Focal Child Birth (ref. = 1)									
2	-0.0552		0.0727	-0.1012		0.078	0.1571	*	0.0736
3	-0.1973	*	0.0774	-0.1031		0.0809	0.1318		0.0787
4	-0.2587	**	0.0813	-0.0421		0.0827	-0.1168		0.0866
5	-0.2458	**	0.0838	-0.0269		0.085	-0.1418		0.0907
6	-0.4053	**	0.0904	-0.1028		0.0891	-0.6234	**	0.1347
7	-0.3159	**	0.0911	-0.1787		0.0935			
8	-0.4757	**	0.0978	-0.4043	**	0.1017			
9	-0.632	**	0.1045	-0.5703	**	0.1094			
10	-0.8562	**	0.1144	-0.7542	**	0.118			
11	-0.82	**	0.1145	-1.2925	**	0.196			
12	-1.0335	**	0.1248						
13	-1.3959	**	0.1441						
14	-1.6547	**	0.1626						
15	-1.6936	**	0.1674						
16	-2.294	**	0.3094						
Intercept	-5.1402	**	0.0843	-5.3593	**	0.093	5.488	**	0.1067
-2 Log Likelihood	38531.92			33970.68			23775.93		
Note: The models also include indicator variables denoting missing child gender and missing county.									

Figure 1
Family Complexity, 1997 Cohort

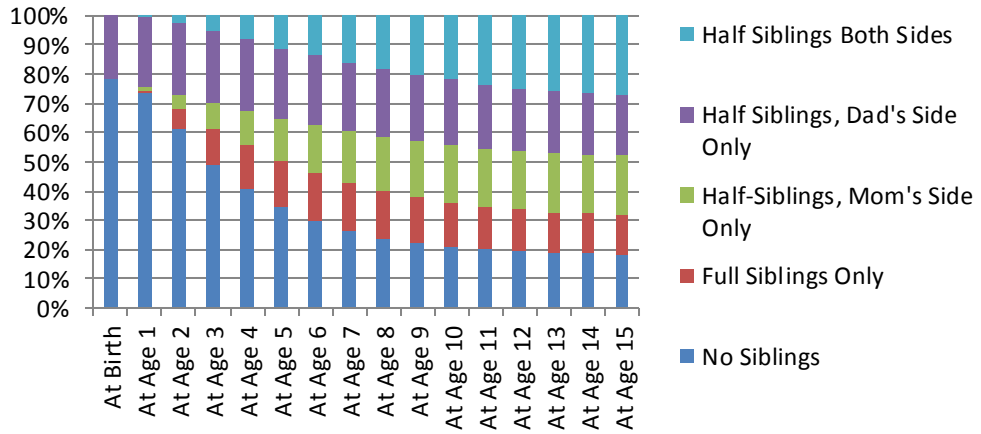


Figure 2
Family Complexity, 2002 Cohort

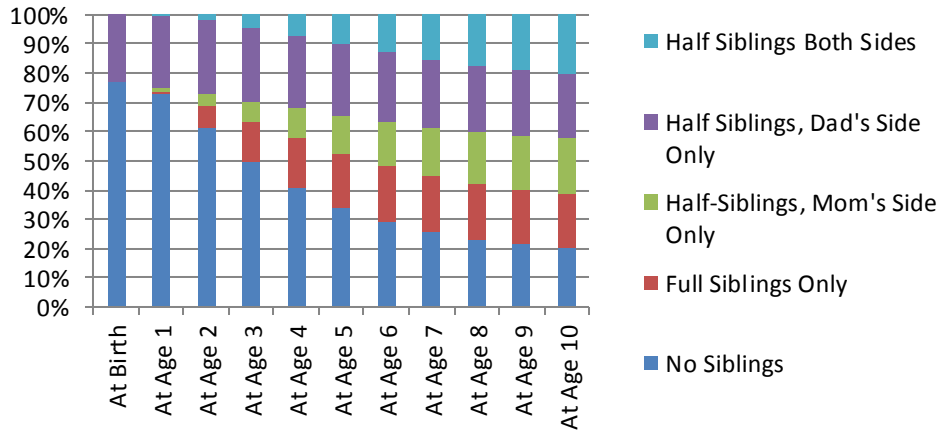
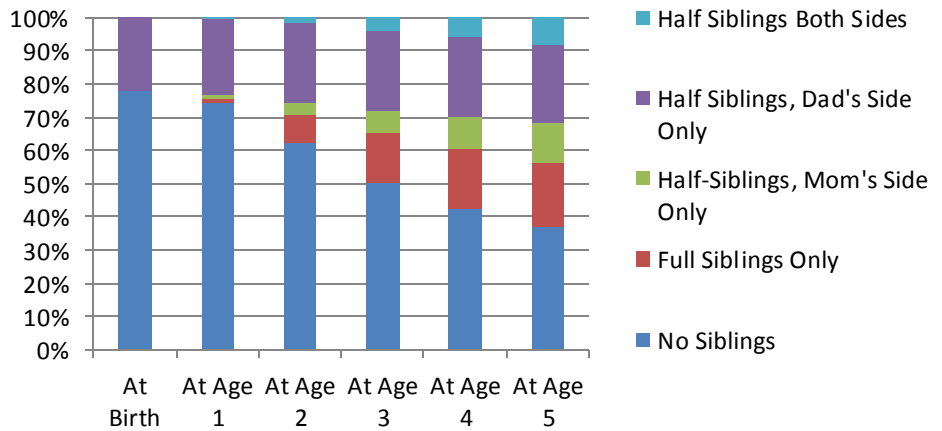


Figure 3
Family Complexity, 2007 Cohort



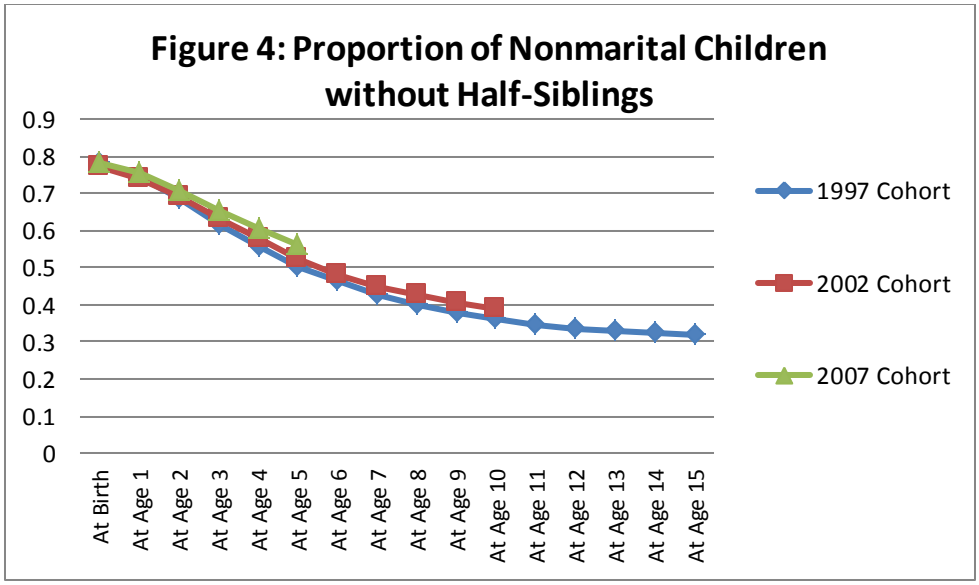


Figure 4: Proportion of Nonmarital Children without Half-Siblings
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
At Birth
At Age 1
At Age 2
At Age 3
At Age 4
At Age 5
At Age 6
At Age 7
At Age 8
At Age 9
At Age 10
At Age 11
At Age 12
At Age 13
At Age 14
At Age 15
1997 Cohort
2002 Cohort
2007 Cohort

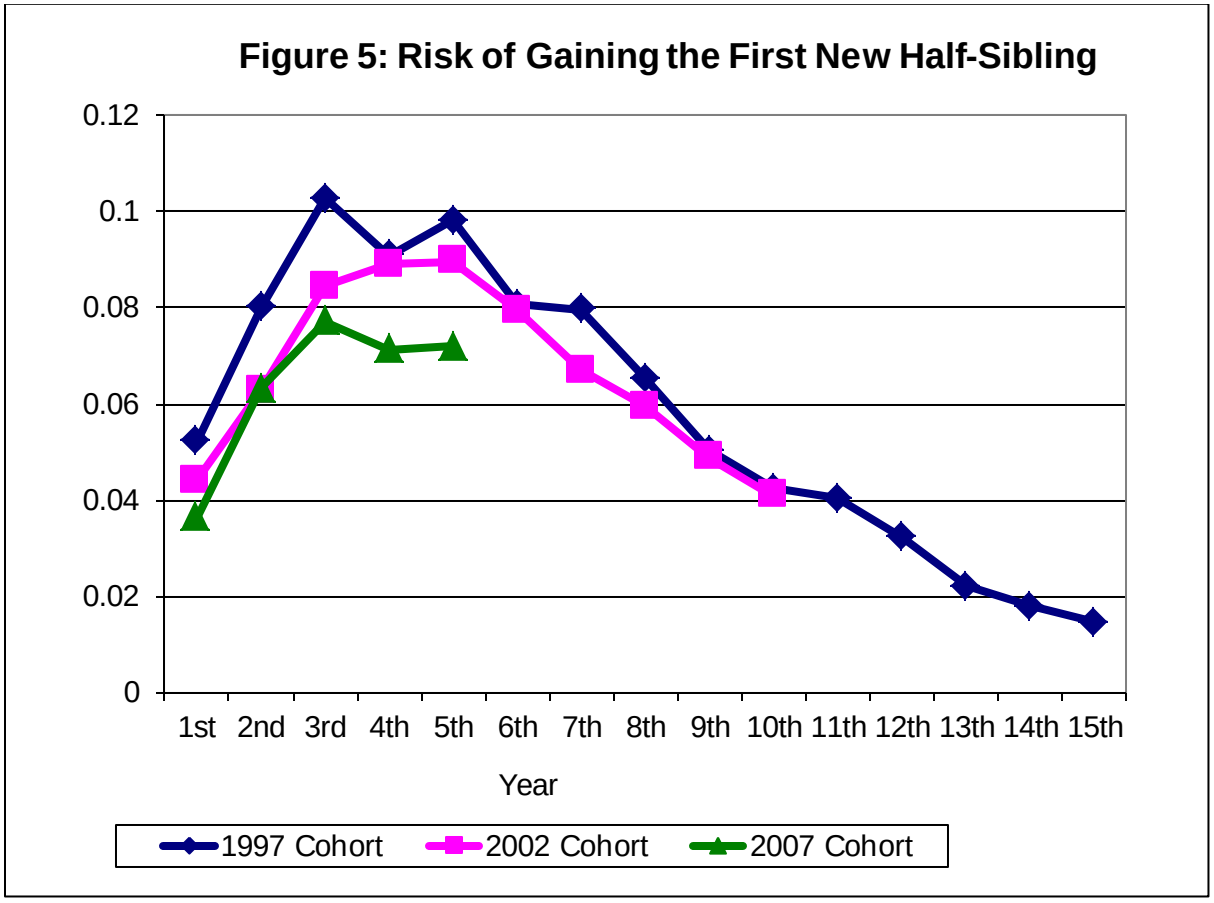


Figure 5: Risk of Gaining the First New Half-Sibling
0.12
0.1
0.08
0.06
0.04
0.02
0
1st
2nd
3rd
4th
5th
6th
7th
8th
9th
10th
11th
12th
13th
14th
15th
Year
1997 Cohort
2002 Cohort
2007 Cohort

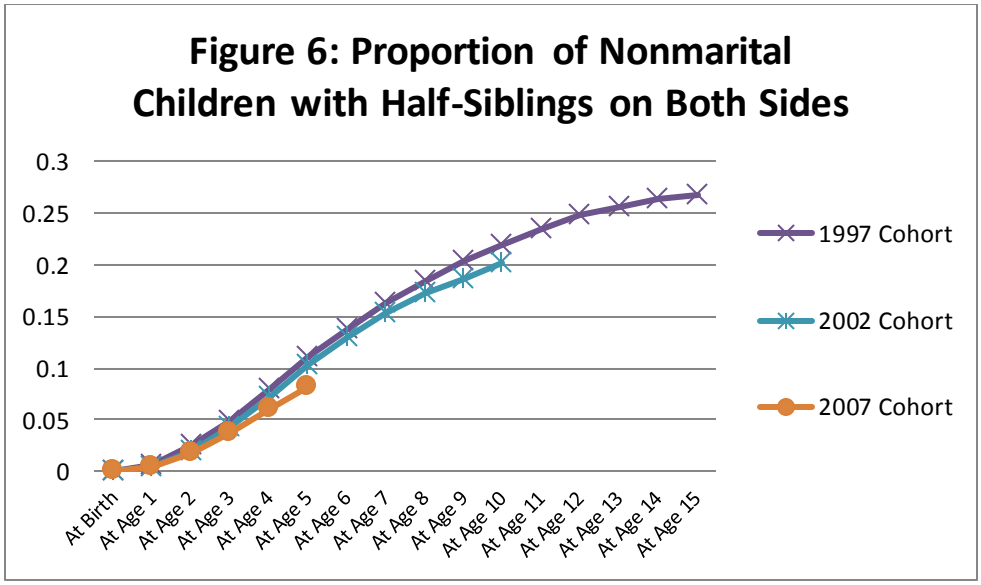


Figure 6: Proportion of Nonmarital Children with Half-Siblings on Both Sides
0.3
0.25
0.2
0.15
0.1
0.05
0
At Birth
At Age 1
At Age 2
At Age 3
At Age 4
At Age 5
At Age 6
At Age 7
At Age 8
At Age 9
At Age 10
At Age 11
At Age 12
At Age 13
At Age 14
At Age 15
1997 Cohort
2002 Cohort
2007 Cohort

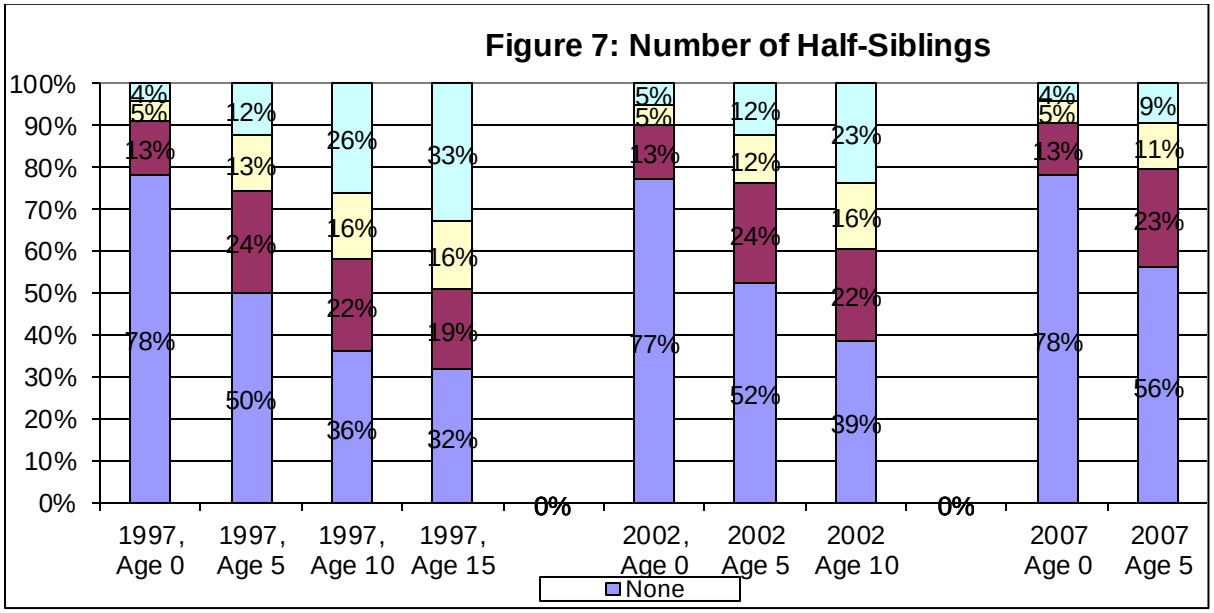


Figure 7: Number of Half-Siblings
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
4%
5%
13%
78%
12%
13%
24%
50%
26%
16%
22%
36%
33%
16%
19%
32%
0%
5%
5%
13%
77%
12%
12%
24%
52%
23%
16%
22%
39%
0%
4%
5%
13%
78%
9%
11%
23%
56%
1997, Age 0
1997, Age 5
1997, Age 10
1997, Age 15
2002, Age 0
2002 Age 5
2002 Age 10
2007 Age 0
2007 Age 5
None

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