Trajectories of Maternal Repartnering and Child Development*

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ABSTRACT

Maternal repartnering through (re)marriage or cohabitation is an increasingly-common experience for young children. However, relatively little is known about how the diverse pathways through which social father families are formed and the different ages at which children experience maternal repartnering may influence children's subsequent development. This paper uses data from the Fragile Families and Child Wellbeing Study to examine associations between maternal repartnering and children's cognitive and behavioral development during the first nine years of life. We pay close attention to the type and timing of family structure transitions experienced by children, and examine whether the effects of these transitions tend to persist or fade over time. We find that entering a social father family (relative to living with a stably-single mother) between ages 3 and 9 is associated with significantly higher rates of aggressive and anxious/depressive behavior problems for boys, but not for girls. We find little evidence that the associations we identify vary based on when the transitions occurred, or that they grow or dissipate over time. Future analyses will focus more on exploring potential moderators of the associations between maternal repartnering and child development—including gender, SES, and race/ethnicity.

Maternal repartnering through (re)marriage or cohabitation is an increasingly-common experience for young children. Estimates from the mid-1990s suggest that about a third of all children will spend some time living with one of their parent's (usually their mother's) new spouse or cohabiting partner (Bumpass, Raley & Sweet 1995). More recent estimates based on a cohort of nonmarital births occurring between 1998 and 2000 indicate that 55 percent of mothers who end their relationship with their child's biological father within five years of the child's birth will also repartner during that time period, with more than half of these mothers repartnering through a coresidential union (Bzostek, McLanahan & Carlson, 2012).

Maternal repartnering may have both positive and negative consequences for mothers and their children. The entrance of a new partner into a household may provide access to greater financial and parenting resources. It may also lead to increases in maternal happiness and reductions in maternal stress and depression, which could have positive influences on child well-being. At the same time, a new partner might disrupt established family roles and routines and lead to increased conflict in the family. This could happen if, for example, maternal repartnering generates or exacerbates existing tensions with a child's non-resident biological father, or if the child resists accepting a new authority figure and/or competes with the new partner for the mother's time and attention (Hetherington & Stanley-Hagan 1999; Marsiglio & Hinojosa 2010). It is also possible that the effects of maternal repartnering will not be the same (or even function in the same direction) for mothers and their children. That is, repartnering may have positive effects for maternal well-being at the same time that is has neutral or even negative influences on child development.

In this study, we focus on the consequences of maternal repartnering for child well-being during children's preschool and early schooling years (ages 3-9). Most previous studies of maternal repartnering have compared well-being between children living in a social-father family and those living in an undisrupted, (married) two-biological-parent family. However, given that mothers' decisions regarding repartnering are most likely to happen *after* breaking up with a child's biological father, a more appropriate comparison is between children living with continuously single mothers (those who do not repartner after ending their relationship with the child's father) and those who repartner. We take this approach. Our analyses also account for the fact that both the pathways through which social father families form and the ages at which children experience maternal repartnering are diverse, with potentially important implications regarding the influence of maternal repartnering on children's subsequent development. For example, prior research suggests that children who experience a greater number of family structure transitions before (or after) entering a social father family may be at a higher risk of negative outcomes than children who experience fewer transitions (Magnuson & Berger 2009). Likewise, the consequences of a social father entering a household may differ depending on the age of the child (Amato & Sobolewski 2004). Relatively few existing studies explicitly test these possibilities.

To address these issues, we use new data from the Fragile Families and Child Well-Being Study (FFCW) to examine the influence of maternal repartnering (the formation of a cohabiting or marital union with a social father) and other maternal relationship transitions on trajectories in children's cognitive and behavioral development during the first nine years of life. We consider both the total amount of family structure instability and the

particular types of transitions a child has experienced (whether each transition constitutes a union entrance or exit for the child's mother and whether it involves the child's biological father or a social father). We also investigate whether there is variation in the effects of these transitions by the child's sex, and by the timing (child age) at which any transitions occur, as well as whether any effects fade, persist, or grow over time. We conduct these analyses using a Hierarchical Linear Modeling approach in which we incorporate a number of analytic strategies to minimize the likelihood that any associations we observe are due to social selection. Given that most US children will not spend their entire childhood living with both of their biological parents, it is important to understand how diverse family experiences are likely to influence child development and well-being.

BACKGROUND

As previously-noted, most existing research on the consequences of parental repartnering for child well-being has compared outcomes for children living with one biological parent and one social parent (most often a stepfather who is married to a child's biological mother) to those for children living with both of their (married) biological parents. Such research has generally found negative associations between living with a social parent and cognitive/academic, behavioral, psychological and social outcomes, although the magnitude of these associations tends to be relatively small (Amato 1994, 2005; Brown 2004; Coleman, Ganong & Fine 2000; Hetherington & Jodl 1994; Hofferth 2006; Manning & Lamb 2003; Marsiglio & Hinojosa 2010; Thomson, Hanson, & McLanahan 1994). Specifically, prior studies have identified associations between living with a social parent and lower levels of educational attainment and academic achievement; higher levels of internalizing behaviors and emotional problems; higher levels of

externalizing behavior problems; and a greater probability of early family formation (Amato 1994; Amato & Kane 2011; Coleman et al. 2000; Hetherington & Jodl 1994). In addition, most prior studies of child well-being in social father families have focused on children who have experienced their parents' divorce followed by their mother's remarriage. Although fewer studies have focused on children living in cohabiting mother-social-father families or those born to unmarried parents, there is evidence to suggest that these children are also less well-off than those living with both of their (married) biological parents (Berger & McLanahan 2011; Brown 2004; Hofferth 2006; Manning & Lamb 2003; Thomson et al. 1994).

Several bodies of theory have attempted to explain why negative associations between living with a social parent and child and adolescent well-being have been observed. In general, such explanations tend to focus on three primary factors associated with transitioning into or residing in a social-father family: (1) exposure to stress and conflict that often accompanies union disruption and repartnering; (2) limited involvement with and investment in children by social parents (and, potentially, by biological parents in social-parent families); and (3) social selection such that those children and families that are likely to experience instability and repartnering are also likely to experience a range of poor outcomes regardless of these experiences (Coleman et al. 2000).[1]

With regard to stress-related theories, scholars have argued that factors like disruption in family routines and expectations, inter-parental conflict, economic deprivation, parental stress, compromised parenting, and the cumulative effects of multiple family structure transitions over time—each of which is associated with family instability and repartnering—are potential

[1] These explanations are largely similar to those proposed by Amato (2005) in describing potential explanations for poorer outcomes observed among children living in single-parent families: economic hardship, parenting quality, exposure to stress, and social selection.

explanations for the negative effects of living with a social parent. In addition, several sociological, economic, and evolutionary theories posit that poorer outcomes for children in social-parent families relative to those in two-biological-parent families may, at least in part, reflect lower levels of investment in and involvement with children. According to such theories, investment in and involvement with children by social parents might be less intensive, of lower quality, or less beneficial than that of biological parents. This might occur because a social parent may be primarily focused on investing in the new relationship with the child(ren)'s biological parent rather than in the child(ren), the social parent does not have a vested (evolutionary) interest in the child(ren), and/or because the social parent consumes the biological parent's time, attention, or resources that would otherwise be devoted to the child(ren); each of these factors may suggest that parenting practices in social parent families will offer less engagement and affection than those in biological parent families (see, for example, reviews by Amato 2005, Coleman et al. 2000, and Marsiglio & Hinojosa 2010). Additionally, Andrew Cherlin (1978) and others have argued that social parents have less institutionalized and clearly-defined parental roles and norms within the family than do biological parents; this, too, may result in poorer family functioning and, thereby, adversely influence children's development.

At the same time, associations between family structure experiences and child well-being are likely to reflect social selection, at least in part. That is, observed differences in outcomes between children experiencing social-parent families and those only experiencing a stable two-biological-parent family are likely due, to some degree, to differences in the characteristics and behaviors of the individuals who experience repartnering, rather than to the repartnering itself. To date, however, empirical estimates of the extent of social selection explains differences in

well-being between children in social and biological-parent families has yielded mixed results (Coleman et al 2000).[2]

Despite considerable empirical evidence and associated theory that support the general conclusion that experiencing a social-parent family is associated with adverse outcomes for children, there are also reasons to expect that maternal re-partnering may yield some (potentially long-term) benefits for mothers and children. For example, repartnering may be an effective way for mothers to improve their (and their children's) economic situation (Dewilde & Uunk 2008; Jansen, Mortelmans & Snoeckx 2009). By taking on a new partner, a mother may be able to offer her children additional access to both financial resources and parental time. Recent evidence suggests that unmarried mothers who repartner tend to do so with men who have greater economic capabilities (education and earnings potential) than their child(ren)'s biological father (Bzostek et al. 2012), that these men are often quite involved with the mothers' children (Berger et al. 2008; Bzostek 2008), and that there is a (cross-sectional) correlation between social father involvement and child well-being (Bzostek 2008). In addition, there is some (albeit limited) evidence suggesting that, after an initial adjustment period, many social parents develop positive, nurturing relationships with children, and that this may positively influence child development (Marsiglio & Hinojosa 2010; White & Gilbreth 2001).

In short, whereas the preponderance of evidence suggest that relative to living in an undisrupted (married) two-biological-parent family, there are negative associations between living in a social parent (usually social father) family and child and adolescent well-being, it remains possible that mothers and their children may benefit when a mother enters into a high quality, long-lasting partnership with a man who is invested in her and her children and is willing

[2] Amato's 2005 review of studies evaluating the role of social selection as a possible explanation for the negative consequences associated with living with a single parent (versus both biological parents) concluded that there is solid evidence that such associations are not exclusively due to social selection.

and able to contribute financial and social resources to the family. These benefits may be particularly apparent when children in social-father families are compared to those in single-mother families.

Studies that compare the well-being of children living in undisrupted two-biological-parent families to that of children living social-father families generally conflate the consequences of father absence (and, in many cases, parental break-up) with those of maternal repartnering (which has occurred *after* breaking up with a child's biological father). As such, these studies are unable to isolate the influence of maternal re-partnering itself. This is problematic in that the decision to end a biological parent union and for a mother to repartner are likely to be distinct, as is their influence on child well-being. Thus, it may be more appropriate to compare outcomes for children whose mothers repartner after breaking up with their biological father to those for children whose mothers remain single (do not repartner).[3] By adopting this strategy, we avoid conflating the effect of parental union dissolution with that of maternal repartnering.

It is also important to consider the divergent pathways through which children come to experience a given family structure, in terms of both the total number of family structure transitions a child has experienced as well as the particular type(s) of transitions and the timing of these experiences. A growing body of research suggests that family structure instability, in general, is associated with adverse outcomes for children and families (Beck et al. 2010; Cooper et al. 2011; Fomby & Cherlin 2007; Magnuson & Berger 2009; Osborne & McLanahan 2007). Family instability is likely to affect child well-being by disrupting family routines and, perhaps,

[3] Children living in a stable single-mother family and those whose mothers repartner have both, by definition, experienced father absence due to the dissolution of their biological parents' union (although this may have occurred prior to their birth) and the accompanying loss of economic, social and parental resources (although the extent to which such resources were lost depends, of course, on the nature of the parents' relationship and the non-resident biological father's continued involvement over time).

reducing economic and social resources (through processes like geographic mobility or loss of social networks or support). Chronic instability is thought to be particularly problematic because it likely impedes children's and families' abilities to adjust to a new family situation (Hetherington 1989). This may be especially true for families experiencing multiple social fathers over time, since children in such families would be faced with the difficulty of forming relationships with more than one new parental figure. As such, multiple transitions may negate or prevent the potentially-positive impacts of close, supportive bonds between a social father and child, which likely require time and some level of stability. Thus, children who enter social-father families after experiencing higher levels of instability (or who experience changes in social fathers over time) are expected to fare less well—both prior to and after entering a given social-father family—than children who experienced less instability.

The particular type(s) of transition(s) a child experiences is also likely to be important, although a priori expectations regarding the effects of specific transitions are often ambiguous. For example, both the formation and dissolution of maternal coresidential relationships with social fathers are likely to be disruptive and stressful, at least temporarily. However, it is unclear whether the formation or dissolution of a social-father family may have a greater influence on children's development. On one hand, the entrance of a partner into the household could provide access to greater parental, economic, and social resources that may counteract some of the negative effects of any initial disruption associated with social-father family formation. On the other hand, exiting a social-father family, particularly if a child has formed a bond with the social father, may engender a significant sense of grief and loss, in addition to any decrease in available resources. Furthermore, a child who experiences the dissolution of a social father family will

have also experienced its formation. Thus, any influences of these multiple transitions may be compounded.

In addition, although we focus primarily on comparisons of children in social-father versus single-mother families, our analyses also include children moving into and out of two-biological-parent families. The association between family structure transitions and children's development may differ depending on whether the partner involved is the child's biological father or a social father, with (in many cases) higher levels of attachment, trust, and engagement between biological fathers and their children leading to potentially better outcomes for children whose biological parents move in together, and potentially worse outcomes for children whose biological parents separate (relative to children experiencing maternal union entrances and exits, respectively, with a social father). At the same time, consistent instability in the biological-parent relationship, such that parents cycle through periods of coresidence and break-up, may also be difficult for children and engender a sense of inconsistency and insecurity with regard to their family situation. Given that none of the mothers in our analytic sample were living with the focal child's biological father at the age 3 interview, union exits involving the child's biological father between the age 3 and age 9 interviews must, by definition, have been preceded by their father moving (back) in with them—thus, the children in our sample who experience the break-up of their biological parents between age 3 and 9 would have been exposed to at least two changes in family structure (their biological father moving in and their biological father moving out). Such instability may have consequences for their well-being.

Finally, the timing of family structure experiences is also likely to matter, both in terms of the temporal proximity of any effects and in terms of child age (developmental stage) when a transition is experienced. Transitions may be more influential for child well-being in the short-

term than in the long-term if, for example, children (and their mothers) are able to successfully adjust to their new family situations over time (Beck et al. 2010; Hetherington 1989). This may be the case when the initial stress and disruption associated with a social or biological father entering or leaving the household eventually result in a new but consistent set of routines and roles. Indeed, previous research suggests that the limited benefits of paternal involvement for child well-being that have been observed in social-father families may reflect the relatively short duration over which social-father families have been observed following their formation (Yuan & Hamilton 2006). As such, as relationships stabilize over time, any adverse effects of transitions may fade.

Alternatively, however, it is possible that maternal repartnering (and other family structure transitions) will have lasting effects on children's developmental trajectories, which do not fade—and may even increase—over time. To begin with, effects may take time to emerge rather than being immediate; it may take considerable time for family interactions and processes to manifest in changes in observable child outcomes. In addition, (positive or negative) effects may escalate over time depending on the quality of family processes, interactions, and relationships. For example, the ongoing provision of parental or financial resources by a social father may result in increased positive effects (or the fading of adverse effects) over time, whereas ongoing competition or disagreements between a social father and child, or struggles over the norms and expectations about the role of the social father in the family may result in escalating adverse effects. There is some prior evidence to suggest that there may be a "sleeper" effect of family instability on young children—Cavanagh & Huston find that the consequences of higher levels of familial instability (measured only as the number of transitions experienced)

during early childhood do not fully appear until near the end of elementary school (Cavanagh & Huston 2008).

The timing of maternal relationship transitions may be important not only in terms of the temporal proximity of the transition to the observation of a given outcome, but also in terms of a child's age or developmental stage at the time a transition is experienced (Hetherington 1999). Children's developmental needs differ by age (Hetherington 1999), and the influence of familial instability and mothers' new partners may depend on the child's age and developmental stage at the time of repartnering, as well as the particular family dynamics and interactions among the mother, social father, and child. Our analyses follow children's developmental trajectories from ages 3 through 9, a period spanning the preschool and early schooling years. The preschool years (around ages 3-5) are a time when children begin to assert themselves, take initiative in directing their own play and social interactions, and develop courage and independence. Frustration over not being able to successfully achieve a goal may manifest itself in negative behaviors, such as aggression. Encouragement and guidance by parents and other important adults may help children in this age group develop initiative and independence, while discouraging or dismissive behaviors by adults may lead to feelings of guilt and incompetence for children (Erikson 1963). Middle childhood (approximately ages 6-11) is a time when children's cognitive skills continue to develop and trajectories of achievement tend to be established (Kowaleski-Jones & Duncan, 1999), and children move beyond just the home and family into the broader social context of school and peer relationships. When this happens, the social comparisons and peer competition that emerge may be linked to children's developing self-esteem and self-confidence (Eccles, 1999; Magnuson & Berger, 2009). At this stage, encouragement by parents and other significant social relations (such as teachers or peers) is important for children's feelings of competence.

Prior empirical evidence suggests that there may be a stronger association between living with a social parent and negative outcomes for adolescents than for younger children (Brown 2004). A potential explanation is that it may be easier for younger children to bond with a social father, and younger children may not recognize the difference between a biological and social father to the same extent as older children. Additionally, older children—particularly adolescents—may be more likely to resist the introduction of a new authority figure into the household, making the development of positive social father-child relationships more difficult (Amato 2005; Amato & Sobolewski 2004). Our analyses provide insights in this area by accounting for the timing of particular transitions as well as whether effects tend to dissipate or persist over time.[4]

METHODS

Data

Our data were drawn from the Fragile Families and Child Wellbeing Study (FFCW). FFCW is a longitudinal birth cohort study of 4,897 children born between 1998 and 2000 in 20 U.S. cities with populations of over 200,000 (see Reichman et al. 2001 for a complete description of the sample and study design). Because nonmarital births were oversampled relative to marital births by a 3-to-1 ratio, families in this sample are, on average, more socioeconomically disadvantaged than would be the case in a nationally representative sample. Of particular relevance to our analyses, these families are disproportionately likely to include a single or social parent and to experience family structure transitions. Focal children's birth parents were interviewed in the hospital shortly after the child's birth and by telephone when the child was approximately 1, 3, 5, and 9 years old. The study also included an in-home child wellbeing module, which was administered following the

[4] Whereas existing studies have not fully established how and when the timing of particular types of family structure transitions may vary, on the whole the research comparing children growing up with two biological parents and those in other family structures has found that differences in well-being are present throughout childhood and adulthood (Amato 2005).

telephone interviews at ages 3, 5, and 9. Through these interviews, parents were asked to provide extensive information about their family's structure, resources, and functioning, as well as their own and their child's wellbeing; the in-home interviews also included direct assessments of the child.

We used multiple imputation techniques to impute values for all variables with missing data for the full FFCW sample of 4,897 children. Specifically, we imputed 25 complete datasets using Stata's ICE program. Retaining children with missing data was important for our analyses because these children and their families are systematically less socioeconomically advantaged than those with complete data (Sinkewicz 2006). We followed the recommendation of Graham (2009) and Johnson and Young (2011) and used all cases—including those with imputed outcome data—in our analyses.[5] After conducting the imputations, we excluded from our sample those children who did not live primarily with their mother at all waves of data collection (approximately 9.7% of the full FFCW sample); we then excluded those children who coresided with both their mother and biological father at the time of the age 3 interview (an additional 48.7% of the original sample). This resulted in an analysis sample of 5,670 to 5,835 child-wave observations (across the 25 imputed datasets) of 1,890 to 1,945 children who were living with their biological mother but not their biological father at the time of the age 3 interview.

Outcome Measures

Our outcome measures consisted of assessments of the FFCW focal child's cognitive skills and behavior problems at approximately ages 3, 5, and 9. Cognitive skills were measured by the focal child's score on the Peabody Picture Vocabulary Test (Dunn & Dunn 1997), a widely-used

[5] Von Hippel (2007) argues in favor of excluding observations with imputed outcome variables. As such, we re-estimated our primary models using only observations with complete data on a given outcome. Though there were some differences in the estimates produced by each strategy, excluding cases with imputed outcome variables would not have changed our overall conclusions.

measure of receptive vocabulary. Behavior problems were measured by the aggressive, withdrawn, and anxious/depressed behavior problems subscales of the Child Behavior Checklist (Achenbach & Rescorla 2000), which was completed by the child's mother at each interview.[6] The aggressive behaviors subscale (alpha=.88, .84, and .89 at ages 3, 5, and 9, respectively) included items such as the extent to which the child: is cruel, bullying, or mean to others; physically attacks people; and has temper tantrums or a hot temper. The withdrawn behaviors subscale (alpha=.67, .62, and .70) included items such as the extent to which the child: refuses to talk; is unhappy, sad or depressed; is withdrawn and doesn't get involved with others. The anxious/depressed behaviors subscale (alpha=.64, .70, and .78) included items such as the extent to which the child: cries a lot; feels worthless or inferior; and is nervous, high strung, or tense. Each outcome measure was standardized in three-month child age intervals to have a mean of 0 and a standard deviation of 1.

Family structure states and transitions

Our analyses incorporated a series of indicators of maternal coresidential relationships (either cohabiting or marital) at each survey wave to capture information about the family structure states and transitions experienced by the focal children from birth to age 9. We used family structure experiences between birth and age 3 to predict children's initial (age 3) cognitive skills and behavior problems (the intercept term in our HLM models). Specifically, we predicted initial levels of child outcomes based on: the proportion of time the child spent living with his/her biological father between birth and age 3; the proportion of time the child spent living with a social father between birth and age 3; a dichotomous indicator of whether the child lived with a social father (vs. living with a single mother) at age 3; and the number of family

[6] Note that the specific items included in these three subscales vary depending on the child's age. Those listed here are drawn from the measures when the child was approximately age 5.

structure transitions the child experienced between birth and age 3.[7]

We used two alternative specifications of family structure states and transitions experienced between ages 3 and 9 to predict changes in the children's outcomes during that time period (the slope terms in our HLM models). Our simplest models, which focus on the association between the total number of family structure transitions experienced and child outcomes, included an indicator for whether the child lived with a stable social father (vs. a stably-single mother) from age 3 to 9, and a measure of the number of family structure transitions experienced between ages 3 and 9.

Our more detailed models, which identify associations between particular relationship trajectories and child outcomes, included 5 dichotomous indicators of specific types of family structure states and transitions that a child may have experienced during the 6-year period between ages 3 and 9: ever transitioning into a two-biological-parent family; ever transitioning into a social-father family; residing in a stable social-father family; ever transitioning into a single-mother family; and ever changing social fathers. Residing in a stable single-mother family from age 3 to 9 is the reference category in all models.[8]

Covariates

It is well-known that families that single- and social-parent families and those that experience family structure transitions systematically differ from stable two-biological-parent families on a host of background characteristics. As such, it was important to adjust for potential selection factors in our analyses. Thus, we used an extensive set of covariates (shown in

[7] Children who were observed transitioning directly from one type of two-parent family to another across waves were coded as also having experienced a transition into a single-mother family.

[8] Note that the transitions categories are not mutually exclusive, as children may have experienced more than one type of transition. Children who were observed transitioning directly from one type of two-parent family to another across waves were, again, coded as also having experienced a transition into a single-mother family.

Appendix Table A2) to predict initial levels of the child outcomes at age 3. As discussed below, we also used subsequent family structure trajectories to predict initial levels of the outcomes as an additional adjustment for potential selection bias.

To predict changes in children's outcomes between ages 3 and 9, we used a parsimonious set of covariates rather than the full set used to predict the initial outcome levels. We employed this strategy because we aimed to estimate the full associations between family structure states or transitions and child wellbeing; that is, we wished to avoid controlling for any of the mechanisms (e.g., changes in factors such as employment, income, family size, etc.) through which family structure experiences may influence child wellbeing. Including such factors in our models would likely bias our family structure states and transitions estimates toward zero. For this reason, we controlled only for the following time-invariant covariates when predicting developmental trajectories between ages 3 and 9: child gender, maternal race/ethnicity, maternal education, and maternal age at the time of the focal child's birth.

Analytic Strategy

We used HLM (Bryk & Raudenbush 1992) to simultaneously estimate both children's initial levels of cognitive skills and behavior problems at age 3 (intercepts) and changes over time in these outcomes between ages 3 and 9 (slopes) as a function of the family structure states and transitions they have experienced.[9] Specifically, we estimated several specifications of a conventional HLM model, differentiated by the particular family structure states and transitions variables used to predict the slope and/or intercept, as well as piecewise HLM models which built upon our preferred specification of the conventional model. In the conventional models, the cognitive skills or behavior problems slope between the age 3 and age 9 interviews was estimated as a continuous linear parameter. In contrast, the piecewise models allowed us to

[9] We used the MIM program in Stata to produce the HLM estimates across the 25 imputed datasets.

estimate the slope parameters in two separate age-related segments; this strategy explicitly accounted for variation in the outcomes by the timing and sequencing of particular family structure experiences.

Our conventional level-one HLM models took the form:

$$Y_{ti} = P_{0i} + P_{1i}AGE_{ti} + E_{ti} \quad (1a)$$

where the cognitive skills or behavior problems outcome (Y) experienced by child *i* at interview *t* was estimated as a function of the initial level of the outcome at the age 3 interview (P_{0i}), a slope that varied as a function of time and was measured by the focal child's age (P_{1i}), and an individual error term (E_{ti}). The scaling of the AGE variable was such that the resulting coefficient represents a *per-year* change in the slope. The level two equations were:

$$P_{0i} = B_{00} + B_{01}FS_{0i} + B_{02}ECOVS_{0i} + B_{03}FS_{ti} + E_{0i} \quad (1b)$$

$$P_{1i} = B_{t0} + B_{t1}FS_{ti} + B_{t3}PCOVS_{0i} + E_{1i} \quad (1c)$$

In these equations, the initial level (P_{0i}) of cognitive skills or behavior problems was predicted both by family structure experiences between the focal child's birth and age 3 (FS_{0i}) and by family structure experiences between age 3 and age 9 (FS_{ti}), as well as the extensive set of covariates ($ECOVS_{0i}$), which was inclusive of the parsimonious set of time-invariant covariates used to predict the slope ($PCOVS_{0i}$), and a random error term (E_{0i}); the subsequent linear slope (P_{1i}) of the outcome measure was predicted by family structure experiences between age 3 and age 9 (FS_{ti}), the parsimonious set of time invariant covariates ($PCOVS_{0i}$), and a random error term (E_{1i}).[10]

The key parameter of interest in all of these models was B_{t1}, which represents the per-year

[10] The random error term E_{1i} was omitted when predicting the slopes for the PPVT-R because of problems with model convergence.

difference in the rate of change in the outcome between the age 3 and age 9 interviews that was associated with a given family structure state or transition, relative to the rate of change in the outcome for children who resided in a stable single-mother family throughout this period. We first estimated models using the simpler measure of family stability, which accounted only for the number of transitions a child experienced, (presented in Table 3) and then estimated models using the more detailed measures of specific types of family structure experiences (presented in Table 4). In both cases, we estimated two separate versions of equation (1b). In the first, we used only those family structure experiences that occurred at or prior to the age 3 interview (FS_{0i}) and a rich set of covariates to predict the initial level (intercept) of the outcome. In the second, we also included the (subsequent) family structure states and transitions (FS_{ti}) that occurred between the age 3 and age 9 interviews to predict the intercept. Although these family structure experiences occurred after the initial level of the outcome was measured, this strategy, which is sometimes called a falsification test, allowed us to rigorously adjust for social selection by accounting for whether children who experienced particular family structure states or transitions had poorer cognitive skills or behavior problems prior to these experiences (Magnuson & Berger 2009; Osborne, Berger, & Magnuson in press).

As noted above, our conventional HLM model estimated a continuous slope parameter. This implies that there was a uniform and additive effect of each family structure state or transition on cognitive skills or behavior problems such that any worsening (or improvement) in these factors occurred evenly before, during, and after the family structure experience. Yet it is possible that changes in children's developmental trajectories as a result of family structure experiences are not consistent over time. Rather, such changes may persist or fade over time, and may be immediate or delayed. If so, then estimates from the conventional model may obscure the

extent to which family structure experiences influence child development. Thus, to test whether our results were sensitive to the timing and sequencing of particular family structure experiences, we also employed piecewise HLM models in which we estimated separate slope parameters for each age-related segment of the trajectory in the outcome, rather than a single linear parameter.

The piecewise models have several advantages over the conventional models. First, they allowed us to explicitly test whether associations between family structure experiences and child outcomes vary by the age at which a child experienced a particular family structure state or transition. Second, they enabled us to examine whether the effects of family structure states and transitions persisted or faded over time by estimating the influence of family structure experiences between ages 3 and 5 on both concurrent (between ages 3 and 5) and later outcome trajectories (between ages 5 and 9). Finally, they may also provide some insight into whether any associations between family structure experiences and child cognitive skills or behavior problems were immediate or delayed, or, potentially, began to occur prior to a family structure experience. For example, if the models produced larger estimates at age 3 for more proximal (relative to distal) family structure experiences, this might suggest that adjusting for changes in children's developmental trajectories that began prior to the observed family structure experience would serve to underestimate the influence of the experience.[11]

The Level-1 piecewise models took the form:

$$Y_{ti} = P_{0i} + P_{1i}AGE5_{ti} + P_{2i}AGE9_{ti} + E_{ti} \qquad (2a)$$

where the cognitive skills or behavior problems outcome (Y) for child *i* at interview *t* was estimated as a function of the initial level of the outcome at the age 3 interview (P_{0i}) and a series

[11] This does not discount the possibility that there may be initial differences in child cognitive skills and behavior problems for children who subsequently experience particular family structure states and transitions, nor that there may be differences in effects by the age at which particular family structure states and transitions are experienced.

of age-related dummy variables. P_{1i} represents the change in the outcome between the age 3 and age 5 interviews and P_{2i} represents the change in the outcome between the age 5 and age 9 interviews.

The level-2 models took the form:

$$P_{0i} = B_{00} + B_{01}FS_{0i} + B_{02}ECOVS_{0i} + B_{03}FS_{1i} + B_{04}FS_{2i} \quad (2b)$$

$$P_{1i} = B_{10} + B_{11}FS_{1i} + B_{12}PCOVS_{0i} \quad (2c)$$

$$P_{2i} = B_{20} + B_{21}FS_{1i} + B_{22}FS_{2i} + B_{23}PCOVS_{0i} \quad (2d)$$

where (2b) shows that the initial level of each outcome at the age 3 interview was estimated as a function of earlier (prior to age 3) and subsequent (between ages 3 and 9) family structure experiences as well as the extensive set of covariates, and (2c) and (2d) show that the subsequent trajectory in the outcome variable was estimated separately over each of the two age-related intervals as a function of family structure experiences between ages 3 and 9, and the parsimonious set of covariates. The age-related intervals represent changes in the developmental outcomes between the age 3 and age 5 interviews (P_{1i}) and the age 5 and age 9 interviews (P_{2i}). The key coefficients of interest were B_{11}, B_{21}, and B_{22}, which represent the associations of the family structure states and transitions with changes in child outcomes at each child age. Because the inclusion of subsequent family structure states and transitions in the intercept equation (2b) was our most rigorous strategy for adjusting for social selection, we view the model that includes these factors as our preferred model. Thus, we present piecewise estimates only from the specification in which FS_{1i} and FS_{2i} are used to predict prior cognitive skills or behavior problems at age 3.

In both the conventional and the piecewise models, initial levels of the outcomes were differenced out of the equations and both within- and between-child variation were used to

identify associations. Nonetheless, the coefficients estimated in the level-2 models may be biased by the omission of unobserved time-varying characteristics or by persistent characteristics that have time-varying effects. By comparison, estimates of associations of the family structure states and transitions with initial levels of child cognitive skills or behavior problems (i.e., the intercepts) are more susceptible to omitted variable bias than are the slope estimates because, in the former case, only between- (and not within-) child variation is used to identify associations. As such, we are primarily concerned with the associations of family structure states and transitions with trajectories (slopes) in child cognitive skills and behavior problems over time rather than with differences in their levels (at age 3).

RESULTS

Descriptive Statistics

Family structure trajectories. Figures 1 and 2 depict the extent to which families in our sample experienced transitions between child ages 3 and 9 for the full sample and by family experiences between birth and age 3. Note, again, that our analysis sample excluded children whose biological parents were living together at age 3. As such, sample children are highly likely to have experienced transitions both before and after age 3. Indeed, Figure 1 shows that, across the early family structure experiences, between approximately 55% and 90% of children experienced at least one transition and that very few children resided in a stable social-father family between ages 3 and 9. The final two bars in this figure show that around 60% of children living with a single-mother at age 3 and almost 90% of those living with a social father at age 3 experienced one or more transitions between ages 3 and 9. Figure 2[12] shows the types of transitions children experienced, and demonstrates that a very large proportion of children experienced a social-father

[12] Note that the totals for each bar in Figure 2 add up to more than 1.0, because children can experience more than one of the transitions measured here (transitioning to/from a social father, biological father, and single mother family).

family at some point between ages 3 and 9, with many experiencing more than one social father.

Cognitive skills and behavior problems. Appendix Table A1 presents descriptive statistics for cognitive skills and behavior problems at ages 3 and 9 for the full sample as well as by particular family structure experiences. Notably, at both time points there were relatively few differences in any of the measures between children experiencing only a stable single-mother family and those experiencing other family structure states or family structure transitions.

Covariates. Descriptive statistics for the covariates are shown in Appendix Table A2. On the whole, our data reveal that relative to children who experienced a stable single-mother family from age 3 to age 9, those who experienced transitions, though not necessarily stable social father families, were disproportionately white and Hispanic (and less likely to be Black), had less educated parents, and were less likely to having currently working mothers.

Conventional HLM Results

Our basic conventional HLM models allowed us to examine associations between particular types of family structure transitions and children's cognitive skills and behavior problems. These results are shown in Table 1, which presents results from two models for each outcome. The first adjusts only for family structure experiences prior to age 3 in predicting the age 3 intercept; the second also adjusts for subsequent family structure experiences. The coefficients are interpreted as the standard deviation (SD) difference in the intercept or per year SD difference in the slope that is associated with a particular family structure experience relative to having resided in a stable single-mother family between ages 3 and 9.

Table 1 About Here

Our estimates for the intercepts revealed that after accounting for an extensive set of covariates, several differences by family structure experiences between birth and age 3 were at

least marginally significant. Specifically, spending a greater proportion of time in a social-father family between birth and age 3 was associated with more anxious/depressed behavior problems at age 3, whereas experiencing family structure transitions between birth and age 3 was associated with fewer withdrawn and anxious/depressed behavior problems at age 3. The models that controlled for subsequent family structure experiences (Model 2) revealed that relative to children who experienced a stable single-mother family from ages 3-9, children who entered a single-mother family after age 3 had lower initial levels of cognitive scores, and that those who entered a social father family had (marginally) lower initial levels of aggressive behavior problems at age 3. These findings imply that the extensive set of observed covariates included in the model may not fully account for social selection processes, and that the falsification test in Model 2 is an important analytic step in trying to account for social selection.

Our slope estimates reflect per year changes in children's developmental trajectories between ages 3 and 9. We focus our discussion of these (and all subsequent) results on the slope estimates from Model 2 (which includes the falsification test), our most rigorous model. Here, we see that transitioning to a social-father family between ages 3 and 9 was associated with a significant increase of .174 *SDs* (.029 *SD*s per year ×6 years) in aggressive behavior problems and a marginally significant increase of .126 *SDs* in anxious/depressed behavior problems relative to living in a stable single–mother family.

Table 2 presents results from the model with the falsification test (Model 2 in Table 1) for each outcome separated by the child's sex, based on the hypothesis that the association between particular family structure experiences and children's developmental trajectories may be different for boys and girls.

Table 2 About Here

The results in this table provide support for this hypothesis, suggesting that most of the significant associations (particularly those involving social fathers) are limited to boys. For boys (but not girls), the amount of time spent with a social father prior to age three was positively and significantly associated with levels of all three behavioral problems at age 3. And transitioning into a social father family between ages 3 and 9 was associated with significant increases in both aggressive and anxious/depressed behaviors. For both of these behavioral problems, transitioning into a social father family was associated with about one-fifth of a standard deviation increase for boys (but no significant increase for girls).

The other statistically significant results in these models were all limited to initial outcomes at age 3 (rather than the change between ages 3 and 9). Boys who transitioned into a single mother family between ages 3 and 9 started out (at age 3) with significantly lower cognitive test scores than those who remained in single-mother families. Among girls, those who moved into a social father family between ages 3 and 9 had lower initial levels of aggressive behaviors, and more transitions between birth and age 3 were (perhaps unexpectedly) associated with lower levels of anxious/depressed behaviors at age 3.

Piecewise HLM Results

A summary of our piecewise results is shown in Table 3 (coefficients and standard errors from the models are presented in Appendix Table A3). Each of the 12 panels represents a particular family structure trajectory from ages 3-9 (such as moving from a single mother to a social father between ages 3-5 and then remaining in that social-father family from ages 5-9 in Panel C, for example). In all cases, the comparison category is children living in a stable single-mother family from ages 3-9. The summarized results from the piecewise models shed light on the overall influence of a variety of family structure trajectories on child cognitive skills and

behavior problems by age 9. By explicitly accounting for the timing of particular family structure experiences and their influences, these models also allow us to compare the associations between earlier (between ages 3 and 5) and later (between ages 5 and 9) family structure experiences with children's wellbeing trajectories. Finally, these models enable us to assess whether any observed effects of early transitions between ages 3 and 5 persisted or faded between ages 5 and 9.

Table 3 About Here

Overall, after rigorously accounting for initial differences between groups, we found very few total differences in cognitive skills or behavior problems at age 9 between children living in stable single-mother families and those experiencing a wide variety of other family structure trajectories. We found no significant differences, for example, between children living with a single mother who transitioned into a biological-father family and those whose mother remained single throughout the period. In a few panels, children experiencing transitions involving social fathers had significantly larger increases in cognitive test scores over time than did children living with stably-single mothers from ages 3-9. In most cases, however, this larger increase was in a sense "making up" for lower initial (age 3) PPVT scores, on average, for the children who experienced family structure transitions between ages 3 and 9 versus those with stably-single mothers.

Although the total difference in aggressive behavior problems at age 9 were not statistically significant, we also found some evidence of larger increases in aggressive behavior problems for children who moved in with (and especially changed) social fathers between ages 3 and 9 than for those who remained with single mothers throughout the period.

To examine whether the associations between family structure trajectories and children's

outcomes differed depending on the timing of any family structure transitions, we compared the results from panels A and B, C and D, and E and F (see Figure 3).[13] Each comparison represents the same type of transition occurring at a different time point. Panel A represents moving from a single-mother to a biological-father family between ages 3 and 5 and then remaining in that family between ages 5 and 9, whereas Panel B represents moving from a single-mother to a biological-father family between ages 5 and 9. Similarly, Panels C and D compare the effects of transitioning from single-mother to social-father family at different times, and Panels E and F compare the effects of transitioning from social-father to single-mother families at different times. Overall, these comparisons yielded little evidence that family experiences between ages 3 and 5 had a systematically different influence on child cognitive skills or behavior problems than those occurring between ages 5 and 9. The results in panels A, C, E, and K are also useful for assessing whether any effects of early family structure experiences between ages 3 and 5 persisted or faded between ages 5 and 9 (see Figure 4). Here, we found no evidence that the effects of early experiences either faded or grew over time.

DISCUSSION

Previous research often compares the well-being of children living in a stable (married) two-biological-parent family with the well-being of children in other family types. Such research finds that, on average, children in stable, two-biological-parent families tend to fare better on a wide range of outcomes (see, e.g., Amato, 2005). In this paper, we focused exclusively on children who were living with their biological mother, but not their biological father, at age 3 and compared trajectories in cognitive skills and behavior problems between those who resided in a stable single-mother family from age 3 through 9 and those who experienced maternal coresidential relationship transitions during those years. Whereas much of the existing literature

has focused either on particular family structure states or family instability in general, our HLM analyses allowed us to estimate the independent influences of particular types of family structure states and transitions and to account for the timing of such family experiences. We were also able to investigate the extent to which effects persisted or faded over time.

Overall, we identified relatively few significant differences in cognitive skills and behavior problems between children living in stable single-mother families and those experiencing maternal residential relationship transitions between ages 3 and 9. We found no significant differences in either cognitive or behavioral well-being between children living in stable single-mother families and those whose biological parents moved in together (in the form of cohabitation or marriage) between the age 3 and age 9 interviews. In contrast, we found that moving in with a social father was associated with a significant increase in aggressive behavior problems and also with marginally significant increases in anxious/depressed behavior problems.

Sensitivity analyses comparing results for boys and girls indicated that these associations were limited to boys, confirming findings from previous literature suggesting that children's gender is an important component to consider when investigating the influence of family structure experiences for child well-being.

We also examined the timing of mothers' relationship transitions. Doing so allowed us to explicitly examine whether any associations with child cognitive skills or behavior problems varied by the child's age at the time of the transition(s), the timing at which the effects of a particular type of transition began to appear (immediately or with a delay), and whether any effects persisted or faded over time. We found relatively little evidence of ultimate (age 9) differences in child well-being based on the timing of mothers' relationship transitions, and little evidence that associations faded or grew over time. Future research using a longer time horizon

should further examine whether a are likely to fade, persist, or grow over time, and whether patterns vary by the age at which children experience maternal re-partnering.

Our analyses have several limitations that should be considered when interpreting our results. First, because the information about mothers' relationship status was gathered at the time of each interview rather than continuously between interviews, we may be missing some relationship transitions occurring between survey years and, as a result, may have underestimated the instability children experienced. Coding all children whose mothers transitioned directly from a social-father family to a biological-father family (or vice-versa) between survey waves as also having transitioned to a single-mother family partially adjusted for this possibility. In addition, at the age 5 interview, mothers were asked to provide information about their romantic relationships that had formed and dissolved between the age 3 and age 5 interviews; these data suggest that very few mothers lived with more than one partner between those survey waves (Bzostek et al. 2012). Nonetheless, it is likely that our analyses underestimated the number of transitions that some children experienced.

Second, as is always the case in this line of research, our results are potentially subject to selection bias in the types of mothers and children who experienced relationship transitions, which limits our ability to draw causal conclusions about the associations identified between maternal relationship transitions and child well-being. We employed a number of analytic strategies to try to minimize such bias. These included using an extensive array of control variables in predicting initial (age 3) levels of child well-being (intercepts), focusing our analyses specifically on within-child changes in well-being over time (thus controlling for time-invariant selection factors), and employing a falsification test to predict initial levels of well-being using the subsequent family structure trajectories children experienced. Focusing on the results from

the model including the falsification test is, we believe, a significant improvement over studies that fail to account for pre-transition differences in child well-being. Yet the possibility remains that the associations we identified are not causal in nature.

Third, our measures of family structure states and transitions as well as children's behavior problems were drawn from mothers' reports. To the extent that there may be systematic differences in mothers' reporting of their relationship status or their children's behavior problems by family structure, our results will be biased.

Finally, the statistical power to detect potentially significant effects was limited for some of our analyses given that relatively few children experienced a few of the maternal relationship trajectories. This is of particular concern because several of the estimates from the piecewise models were quite large in magnitude (and consistent in direction), but did not attain statistical significance. We cannot say for certain whether this was due to their being imprecisely estimated, but it is possible.

Despite these limitations, our results constitute an important step toward better understanding the consequences of maternal repartnering and relationship transitions for the well-being of children whose biological parents are no longer romantically involved. Our finding that transitioning to a social father family is related to greater aggressive behavior problems and increased anxious/depressed behavior problems for boys but not for girls may be a point of departure for future research in this area. Previous research, also using FFCW data (but focused exclusively on the sample of nonmarital births), has found that mothers tend to repartner with men who have *higher* levels of economic capabilities than their children's biological fathers, that these men tend to be highly involved with the mothers' children, and that involvement among these men is associated (cross-sectionally, at least) with higher levels of child well-being (Berger

et al 2008, Bzostek 2008, Bzostek et al. 2012). It has also found maternal repartnering to be associated with declines in maternal depression and material hardship (Osborne et al in press). Yet we find that, on average, despite these potentially positive factors, child behavior problems tend to increase for boys after a mother moves in with a new partner. It will be important for future research to identify potential mechanisms through which these associations operate. Two likely possibilities are maternal parenting behaviors and the quality of mothers' unions, given that previous research has documented both that maternal well-being and parenting are affected by relationship instability (Osborne et al., Beck et al. 2010), and that poor union quality is associated with higher levels of aggressive behaviors among younger children, regardless of union instability (Fomby & Osborne 2010). In addition to exploring these possibilities, future analyses we plan to conduct will further explore the differences between effects for boys and girls, and also incorporate children who were living with their biological fathers at the initial (age 3) time point.

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Table 1: Summary of HLM Models for Types of Family Structure Transitions

	PPVT		Aggressive		Withdrawn		Anxious/Depressed	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Intercept at 3:								
Social father at 3	-0.103	0.034	-0.059	-0.038	-0.135	-0.147	-0.109	-0.147
	(0.102)	(0.112)	(0.108)	(0.121)	(0.099)	(0.110)	(0.102)	(0.111)
% time with biological father birth-3	-0.024	0.003	-0.038	-0.029	0.098	0.095	0.125	0.125
	(0.095)	(0.096)	(0.110)	(0.111)	(0.100)	(0.101)	(0.096)	(0.097)
% time with social father birth-3	-0.015	-0.027	0.346	0.345	0.393	0.387	0.493*	0.484*
	(0.239)	(0.237)	(0.264)	(0.264)	(0.235)	(0.235)	(0.240)	(0.242)
Number of transitions birth-3	0.010	0.014	-0.047	-0.046	-0.065*	-0.064+	-0.069*	-0.068*
	(0.031)	(0.031)	(0.036)	(0.036)	(0.032)	(0.032)	(0.033)	(0.033)
Ever to biological father 3-9		-0.050		-0.089		-0.009		-0.048
		(0.065)		(0.076)		(0.070)		(0.068)
Ever to social father 3-9		0.029		-0.114+		-0.037		-0.080
		(0.051)		(0.058)		(0.056)		(0.052)
Stable social father 3-9		-0.266		-0.026		-0.031		0.158
		(0.199)		(0.211)		(0.195)		(0.195)
Ever to single mother 3-9		-0.188**		-0.025		-0.006		0.034
		(0.071)		(0.071)		(0.071)		(0.070)
Ever changed social fathers 3-9		-0.137		-0.152		0.036		-0.020
		(0.092)		(0.099)		(0.097)		(0.091)
Slope 3-9:								
Ever to biological father 3-9	0.004	0.012	0.008	0.019	0.008	0.009	0.015	0.021
	(0.012)	(0.014)	(0.012)	(0.016)	(0.012)	(0.016)	(0.012)	(0.016)
Ever to social father 3-9	0.015	0.015	0.015	0.029*	-0.001	0.004	0.011	0.021+
	(0.009)	(0.011)	(0.010)	(0.012)	(0.011)	(0.013)	(0.010)	(0.013)
Stable social father 3-9	0.019	0.038	-0.011	-0.010	0.003	0.009	0.004	-0.015
	(0.030)	(0.041)	(0.030)	(0.039)	(0.031)	(0.041)	(0.032)	(0.043)
Ever to single mother 3-9	0.003	0.019	-0.005	-0.003	-0.003	-0.001	-0.010	-0.012
	(0.010)	(0.012)	(0.011)	(0.013)	(0.011)	(0.014)	(0.012)	(0.014)
Ever changed social fathers 3-9	0.012	0.021	0.006	0.023	0.001	-0.003	-0.001	0.005
	(0.015)	(0.018)	(0.017)	(0.019)	(0.018)	(0.022)	(0.017)	(0.020)

Note: 5667 to 5826 child-wave observations per dataset across 25 imputed datasets. Coefficients and standard errors from HLM models are presented. Outcome variables have been age standardized in 3-month intervals to have a mean of 0 and a standard deviation of 1. All of the controls listed in Table 1 are used to predict mothers' initial levels of the outcomes when the focal child was approximately 3-years old. Controls for child age, race/ethnicity, child gender, maternal education, and maternal age at the focal child's birth are used to predict the slopes. The reference group for the estimates predicting the intercepts is "Always single-mother family between birth and 3 years"; the reference group for the estimates predicting the slopes is "Always single-mother family between 3 and 9

years." *** p<0.001, ** p<0.01, * p<0.05, + p<0.10.

Table 2. Summary of HLM Models for Types of Family Structure Transitions by Sex

	Boys				Girls			
	PPVT	Aggressive	Withdrawn	A/D	PPVT	Aggressive	Withdrawn	A/D
Intercept at 3:								
Social father at 3	0.206	-0.165	-0.293+	-0.232	-0.192	0.120	0.036	-0.051
	(0.149)	(0.170)	(0.157)	(0.157)	(0.158)	(0.171)	(0.158)	(0.161)
% time with biological father birth-3	-0.004	0.054	0.206	0.211	-0.029	-0.044	0.037	0.098
	(0.136)	(0.158)	(0.143)	(0.139)	(0.137)	(0.155)	(0.138)	(0.136)
% time with social father birth-3	-0.403	0.777*	0.879*	0.708*	0.502	-0.183	-0.206	0.168
	(0.322)	(0.380)	(0.343)	(0.348)	(0.333)	(0.377)	(0.330)	(0.344)
Number of transitions birth-3	0.035	-0.031	-0.070	-0.025	0.001	-0.082	-0.068	-0.115*
	(0.043)	(0.051)	(0.046)	(0.046)	(0.045)	(0.051)	(0.046)	(0.046)
Ever to biological father 3-9	-0.106	-0.090	-0.063	-0.080	0.009	-0.097	0.043	-0.043
	(0.094)	(0.103)	(0.101)	(0.093)	(0.093)	(0.104)	(0.092)	(0.097)
Ever to social father 3-9	0.059	-0.109	-0.028	-0.122	-0.016	-0.135+	-0.056	-0.045
	(0.074)	(0.080)	(0.077)	(0.075)	(0.073)	(0.080)	(0.076)	(0.075)
Stable social father 3-9	-0.255	0.099	0.079	0.363	-0.293	-0.129	-0.084	-0.008
	(0.272)	(0.311)	(0.307)	(0.293)	(0.268)	(0.251)	(0.247)	(0.243)
Ever to single mother 3-9	-0.256*	-0.077	0.026	0.029	-0.098	0.026	-0.074	0.027
	(0.102)	(0.102)	(0.101)	(0.096)	(0.094)	(0.100)	(0.095)	(0.104)
Ever changed social fathers 3-9	-0.142	-0.203	-0.057	-0.092	-0.140	-0.125	0.104	0.044
	(0.130)	(0.143)	(0.136)	(0.139)	(0.123)	(0.129)	(0.132)	(0.126)
Slope 3-9:								
Ever to biological father 3-9	0.023	0.022	0.027	0.015	-0.000	0.015	-0.012	0.027
	(0.019)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.022)
Ever to social father 3-9	0.011	0.034*	0.012	0.035*	0.021	0.025	-0.005	0.007
	(0.015)	(0.017)	(0.018)	(0.016)	(0.016)	(0.016)	(0.018)	(0.018)
Stable social father 3-9	0.027	-0.049	0.018	-0.037	0.043	0.022	0.005	0.012
	(0.059)	(0.058)	(0.064)	(0.062)	(0.050)	(0.047)	(0.050)	(0.052)
Ever to single mother 3-9	0.018	0.002	-0.023	-0.009	0.018	-0.008	0.026	-0.015
	(0.017)	(0.017)	(0.020)	(0.019)	(0.017)	(0.018)	(0.018)	(0.020)
Ever changed social fathers 3-9	0.009	0.014	-0.002	-0.004	0.033	0.035	-0.003	0.017
	(0.025)	(0.027)	(0.031)	(0.028)	(0.026)	(0.026)	(0.028)	(0.027)

Note: 5667 to 5826 child-wave observations per dataset across 25 imputed datasets. Coefficients and standard errors from HLM models are presented. Outcome variables have been age standardized in 3-month intervals to have a mean of 0 and a standard deviation of 1. All of the controls listed in Table 2 are used to predict mothers' initial levels of the outcomes when the focal child was approximately 3-years old. Controls for child age, race/ethnicity, child gender, maternal education, and maternal age at the focal child's birth are used to predict the slopes. The reference group for the estimates predicting the intercepts is "Always single-mother family between birth and 3 years"; the reference group for the estimates predicting the slopes is "Always single-mother family between 3 and 9 years." *** p<0.001, ** p<0.01, * p<0.05, + p<0.10.

Table 3. Summary of selected results from piecewise HLM models with falsification test

	PPVT	Aggressive	Withdrawn	Anxious/Depressed
*Panel A: Single mother at 3, to biological father 3-5, stable biological father 5-9 (*285 - 381 *observations)*				
Initial difference at 3	-0.171+	-0.056	0.032	0.047
Change 3-5	0.093	-0.002	0.072	-0.034
Change 5-9	0.179	0.099	0.048	0.051
Total change 3-9	0.272	0.096	0.120	0.017
Total difference at 9	0.101	0.040	0.152	0.064
*Panel B: Single mother at 3, stable single mother 3-5, to biological father 5-9 (*348 - 438 *observations)*				
Initial difference at 3	-0.015	-0.022	0.080	0.004
Change 3-5	0.000	0.000	0.000	0.000
Change 5-9	0.082	0.055	-0.075	0.0.118
Total change 3-9	0.082	0.055	-0.075	0.118
Total difference at 9	0.067	0.033	0.005	0.122
*Panel C: Single mother at 3, to social father 3-5, stable social father 5-9 (*312 - 366 *observations)*				
Initial difference at 3	0.028	-0.152	-0.131	-0.100
Change 3-5	-0.038	0.115	0.175+	0.130
Change 5-9	0.059	0.165	0.131	0.140
Total change 3-9	0.021	0.280+	0.306	0.270
Total difference at 9	0.049	0.128	0.175	0.170
*Panel D: Single mother at 3, stable single mother 3-5, to social father 5-9 (*1116 - 1206 *observations)*				
Initial difference at 3	0.017	-0.076	0.021	-0.083
Change 3-5	0.000	0.000	0.000	0.000
Change 5-9	0.130+	0.136+	-0.072	0.136
Total change 3-9	0.130+	0.136+	-0.072	0.136
Total difference at 9	0.147+	0.060	-0.050	0.052
*Panel E: Social father at 3, to single mother 3-5, stable single mother 5-9 (*372 - 420 *observations)*				
Initial difference at 3	-0.216	-0.004	-0.148	-0.090
Change 3-5	0.214+	0.002	-0.046	0.020
Change 5-9	0.267*	-0.082	-0.024	-0.047
Total change 3-9	0.480*	-0.080	-0.070	-0.028
Total difference at 9	0.265	-0.085	-0.218	-0.118
*Panel F: Social father at 3, stable social father 3-5, to single mother 5-9 (*87 - 111 *observations)*				
Initial difference at 3	-0.502**	-0.133	-0.130	-0.059
Change 3-5	0.298+	0.060	0.231	0.127
Change 5-9	0.350+	0.017	-0.083	-0.010
Total change 3-9	0.647*	0.077	0.148	0.032
Total difference at 9	0.145	-0.056	0.045	-0.027
*Panel G: Single mother at 3 years, to social father 3-5, changed social fathers 5-9 (*165 - 228 *observations)*				
Initial difference at 3	0.000	-0.225+	-0.112	-0.024

Change 3-5	-0.038	0.115	0.175+	0.130
Change 5-9	0.135	0.376*	0.101	0.134
Total change 3-9	0.097	0.491*	0.276	0.265
Total difference at 9	0.097	0.267	0.164	0.240
*Panel H: Social father at 3, stable social father 3-5, stable social father 5-9 (*117 - 141 *observations)*				
Initial difference at 3	-0.343+	-0.119	-0.177	-0.102
Change 3-5	0.298+	0.060	0.231	0.127
Change 5-9	0.273	-0.028	0.006	-0.013
Total change 3-9	0.571+	0.032	0.237	0.114
Total difference at 9	0.228	-0.087	0.059	0.012
*Panel I: Social father at 3, stable social father 3-5, changed social fathers 5-9 (*45 - 72 *observations)*				
Initial difference at 3	-0.370+	-0.192	-0.158	-0.027
Change 3-5	0.298+	0.060	0.231	0.127
Change 5-9	0.349	0.183	-0.024	-0.018
Total change 3-9	0.646+	0.243	0.207	0.109
Total difference at 9	0.276	0.051	0.048	0.082
*Panel J: Social father at 3, to single mother 3-5, to social father 5-9 (*174 - 198 *observations)*				
Initial difference at 3	-0.198	-0.081	-0.127	-0.173
Change 3-5	0.214+	0.002	-0.046	0.020
Change 5-9	0.397**	0.055	-0.095	0.088
Total change 3-9	0.611**	0.056	-0.142	0.108
Total difference at 9	0.412*	-0.245	-0.269	-0.065
*Panel K: Social father at 3, changed social fathers 3-5, stable social father 5-9 (*162 - 195 *observations)*				
Initial difference at 3	-0.125	-0.129	-0.110	-0.258+
Change 3-5	-0.009	-0.050	0.029	0.043
Change 5-9	0.139	0.006	-0.047	0.062
Total change 3-9	0.130	-0.044	-0.018	0.106
Total difference at 9	0.005	-0.173	-0.128	-0.152
*Panel L: Social father at 3, changed social fathers 3-5, changed social fathers 5-9 (*60 - 96 *observations)*				
Initial difference at 3	-0.152	-0.202	-0.091	-0.182
Change 3-5	-0.009	-0.050	0.029	0.043
Change 5-9	0.214	0.217	-0.077	0.057
Total change 3-9	0.206	0.168	-0.048	0.101
Total difference at 9	0.053	-0.035	-0.139	-0.081

Note: 5667 to 5826 child-wave observations per dataset across 25 imputed datasets. Estimates based on coefficients from piecewise HLM models (results shown in the Appendix). The reference group for all estimates is "Always single-mother family between 3 and 9 years." Figures may not sum perfectly due to rounding. +p<.10; *p<.05;**p<.01; ***p<.001.

Appendix Table A1. Descriptive statistics for child wellbeing measures

Panel A: Full sample, stable families, and any transitions, age 3 to 9

	Full Sample		Always Single Mother		Always Social Father		Any Transitions	
	Age 3	Age 9	Age 3	Age 9	Age 3	Age 9	Age 3	Age 9
PPVT	-0.104	-0.135	-0.027	-0.177	-0.372	-0.205	-0.134*	-0.112
	(1.029)	(0.967)	(0.954)	(1.012)	(1.561)	(0.984)	(1.040)	(0.942)
Aggressive	0.093	0.091	0.133	0.047	0.231	0.039	0.069	0.115
	(1.094)	(1.077)	(1.124)	(0.982)	(1.163)	(0.970)	(1.076)	(1.124)
Withdrawn	0.086	0.038	0.107	0.055	-0.050	-0.051	0.080	0.032
	(1.117)	(1.089)	(1.130)	(1.024)	(0.977)	(0.968)	(1.114)	(1.123)
Anxious/depressed	0.113	0.022	0.140	-0.020	0.286	0.015	0.093	0.044
	(1.073)	(1.105)	(1.104)	(0.978)	(1.235)	(0.996)	(1.050)	(1.166)
Obs. per imputed dataset	1889 – 1942		614 - 643		39 – 47		1223 – 1272	
Percent of imputed sample	100.0		32.7		2.2		65.1	

Panel B: Transition types, age 3 to 9

	To Biological Father		To Social Father		To Single		Changed Social Fathers	
	Age 3	Age 9	Age 3	Age 9	Age 3	Age 9	Age 3	Age 9
PPVT	-0.161*	-0.146	-0.087	-0.072+	-0.279***	-0.223	-0.158	-0.114
	(0.936)	(0.798)	(0.996)	(1.009)	(1.103)	(0.881)	(1.221)	(0.909)
Aggressive	0.025	0.055	0.048	0.129	0.089	0.105	0.078	0.140
	(0.935)	(1.069)	(1.104)	(1.183)	(1.116)	(1.119)	(1.083)	(1.086)
Withdrawn	0.049	0.067	0.081	0.032	0.082	0.023	0.104	0.021
	(0.996)	(1.167)	(1.156)	(1.172)	(1.150)	(1.065)	(1.099)	(1.093)
Anxious/depressed	0.092	0.074	0.086	0.049	0.144	-0.017	0.084	0.015
	(0.916)	(1.189)	(1.056)	(1.215)	(1.100)	(1.095)	(1.091)	(1.083)
Obs. per imputed dataset	326 – 363		679 – 748		460 493		196 – 227	
Percent of imputed sample	18.1		37.5		24.9		10.9	

Note: 5667 to 5826 child-wave observations per dataset across 25 imputed datasets. Means and standard deviations presented. Variables have been age standardized in 3-month intervals to have a mean of 0 and a standard deviation of 1. ***p<.001; **p<.01; *p<.05; +p<.10 indicate that the mean is significantly different from that of "Always single" at the relevant age.

Appendix Table A2: Descriptive statistics for covariates

	Family structure states and transitions, age 3 to 9						
	Always Single Mother	Always Social Father	Any Transitions	To Biological Father	To Social Father	To Single Mother	Changed Social Fathers
Family structure states and transitions							
Single mother at 3	1.000	0.000	0.733**	0.884***	0.906***	0.517***	0.310***
Social Father at 3	0.000	1.000	0.267***	0.116***	0.094***	0.483***	0.690***
% time with biological father birth-3	0.216	0.111***	0.256***	0.405***	0.209	0.279***	0.217***
	(0.257)	(0.192)	(0.263)	(0.257)	(0.248)	(0.267)	(0.255)
% time with social father birth-3	0.015	0.430***	0.117***	0.040**	0.054***	0.194***	0.292***
	(0.070)	(0.151)	(0.193)	(0.109)	(0.136)	(0.207)	(0.221)
% time with single mother birth-3	0.769	0.459***	0.627***	0.555***	0.737**	0.527***	0.491***
	(0.256)	(0.226)	(0.306)	(0.287)	(0.271)	(0.307)	(0.328)
Number of transitions birth-3	0.695	1.303***	1.022***	1.191***	0.775**	1.291***	1.275***
	(0.778)	(0.509)	(0.833)	(0.781)	(0.806)	(0.848)	(0.797)
Sociodemographic characteristics							
Child is female	0.473	0.557	0.465	0.452	0.473	0.466	0.492
Child born low/very low birthweight	0.128	0.049*	0.116	0.114	0.120	0.121	0.109
Mom's race/ethnicity							
White non-Hispanic	0.086	0.086	0.145***	0.134**	0.137***	0.108+	0.176***
Black non-Hispanic	0.730	0.646+	0.598***	0.565***	0.609***	0.668**	0.529***
Hispanic	0.161	0.200	0.230***	0.268***	0.228***	0.194+	0.260***
Other	0.024	0.067+	0.026	0.033	0.025	0.030	0.035
Mom's education at child's birth							
Less than high school	0.313	0.393	0.403***	0.411***	0.401***	0.432***	0.406**
High school	0.375	0.311	0.335**	0.307**	0.333*	0.354	0.346
More than high school	0.311	0.295	0.263***	0.282	0.266**	0.214***	0.248*
Mother native-born	0.939	0.898	0.903	0.849***	0.911**	0.906*	0.900*
Mother lived with both parents at age 15	0.315	0.406+	0.330	0.395***	0.322	0.288	0.303
Mother's age at child's birth	24.870	21.789***	23.416***	24.609	23.218***	23.227***	22.088***
	(5.972)	(3.301)	(5.351)	(5.669)	(5.273)	(5.367)	(4.198)
Child is mother's first birth	0.595	0.571	0.592	0.652*	0.559+	0.630+	0.550
Mother used illicit substances during pregnancy	0.272	0.302	0.287	0.295	0.275	0.293	0.293
Mother attended religious services (child's birth)	2.947	3.271*	3.071**	3.097*	3.051*	3.076*	3.177**
	(1.395)	(1.115)	(1.378)	(1.356)	(1.379)	(1.403)	(1.415)
Mother worked last year (child's birth)	0.796	0.739	0.774	0.755	0.781	0.772	0.762
Mother currently working (12 months)	0.570	0.632	0.533*	0.524	0.534*	0.493***	0.565
Mother received TANF last year (child's birth)	0.440	0.353+	0.451	0.436	0.455	0.486*	0.419

Mother received TANF last year (12 months)	0.378	0.363	0.338	0.287***	0.346+	0.375	0.369
Mother's logged annual income (child's birth)	9.725	9.960	9.692	9.693	9.711	9.632	9.681
	(1.361)	(1.025)	(1.398)	(1.534)	(1.404)	(1.288)	(1.158)
Mother's Logged annual income (12 months)	9.450	9.761+	9.468	9.598	9.412	9.330	9.394
	(1.544)	(1.204)	(1.645)	(1.493)	(1.739)	(1.651)	(1.875)
Mother owned home (child's birth)	0.295	0.402*	0.310	0.292	0.315	0.264+	0.309
Number of kids in household (child's birth)	1.303	1.273	1.343	1.330	1.320	1.487**	1.318
	(1.352)	(1.144)	(1.340)	(1.401)	(1.320)	(1.371)	(1.293)
Number of adults in household (child's birth)	2.146	2.429**	2.292***	2.289*	2.303***	2.234*	2.335**
	(1.014)	(0.859)	(1.069)	(1.094)	(1.049)	(0.998)	(1.137)
Biological father's education at child's birth							
Less than high school	0.251	0.357*	0.336***	0.335**	0.315***	0.366***	0.354***
High school	0.540	0.384**	0.463***	0.428***	0.491**	0.468***	0.455**
More than high school	0.209	0.259	0.201***	0.238	0.194	0.167**	0.192
Biological father's age at child's birth	27.484	23.966***	26.141	27.264	25.900***	25.867***	25.439***
	(7.476)	(4.880)	(6.767)	(7.264)	(6.603)	(6.631)	(6.633)
Biological father working at child's birth	0.752	0.651*	0.758	0.752	0.774	0.721	0.732
How long parents knew each other before pregnancy	49.157	41.574	46.474+	54.443*	44.461*	45.514+	38.581***
	(48.859)	(39.130)	(51.003)	(55.799)	(49.681)	(48.510)	(38.024)
Either parent considered abortion	0.439	0.601***	0.408+	0.392+	0.409	0.418	0.399
Grandparent lives in household (12 months)	0.250	0.269	0.253	0.178***	0.290*	0.218+	0.291
Observations per imputed dataset	614 - 643	39 – 47	1223 – 1272	326 – 363	679 – 748	460 493	196 – 227
Percent of imputed sample	32.7	2.2	65.1	18.1	37.5	24.9	10.9

Note: 5667 to 5826 child-wave observations per dataset across 25 imputed datasets. Means (and standard deviations) presented for continuous variables; proportions presented for dichotomous variables. ***p<.001; **p<.01; *p<.05; +p<.10 indicate significantly different from "Always single."

Appendix Table A3. Summary of Piecewise HLM Models for Types of Family Structure Transitions with Falsification Test

	PPVT	Aggressive	Withdrawn	Anxious/Depressed
Intercept at 3 years:				
Social father at 3	0.068	-0.081	-0.267	-0.165
	(0.199)	(0.232)	(0.205)	(0.206)
% time with biological father birth-3	0.011	-0.017	0.092	0.125
	(0.096)	(0.111)	(0.102)	(0.097)
% time with social father birth-3	0.002	0.363	0.379	0.473+
	(0.238)	(0.266)	(0.237)	(0.242)
Number of transitions birth-3	0.009	-0.052	-0.063+	-0.066*
	(0.031)	(0.036)	(0.033)	(0.033)
Stable social father 3-5	-0.615*	-0.185	-0.026	0.017
	(0.280)	(0.285)	(0.297)	(0.289)
To biological father 3-5	-0.247+	-0.217	-0.209	-0.123
	(0.148)	(0.160)	(0.157)	(0.148)
To social father 3-5	-0.176	-0.299+	-0.246	-0.145
	(0.160)	(0.168)	(0.161)	(0.166)
To single mother 3-5	-0.283	0.077	0.118	0.074
	(0.210)	(0.251)	(0.223)	(0.224)
Changed social fathers 3-5	-0.397	-0.195	0.041	-0.138
	(0.269)	(0.283)	(0.276)	(0.276)
Stable biological father 5-9	0.076	0.161	0.241	0.170
	(0.161)	(0.179)	(0.167)	(0.169)
Stable social father 5 -9	0.204	0.147	0.116	0.046
	(0.184)	(0.183)	(0.176)	(0.180)
To biological father 5-9	-0.015	-0.022	0.080	0.004
	(0.089)	(0.096)	(0.090)	(0.091)
To social father 5-9	0.017	-0.076	0.021	-0.083
	(0.054)	(0.062)	(0.057)	(0.056)
To single mother 5-9	0.044	0.133	0.190	0.089
	(0.156)	(0.168)	(0.155)	(0.162)
Changed social fathers 5-9	0.176	0.074	0.135	0.121
	(0.189)	(0.197)	(0.195)	(0.199)
Slope between 3 and 9 years:				
Stable social father 3-5, at 5	0.298+	0.060	0.231	0.127
	(0.177)	(0.153)	(0.170)	(0.171)
To biological father 3-5, at 5	0.093	-0.002	0.072	-0.034
	(0.098)	(0.101)	(0.110)	(0.106)
To social father 3-5, at 5	-0.038	0.115	0.175	0.130
	(0.096)	(0.087)	(0.104)	(0.096)
To single mother 3-5, at 5	0.214+	0.002	-0.046	0.020
	(0.122)	(0.130)	(0.139)	(0.135)
Changed social fathers 3-5, at 5	-0.009	-0.050	0.029	0.043
	(0.143)	(0.134)	(0.151)	(0.144)
Stable social father 3-5, at 9	0.413	0.068	0.165	-0.067
	(0.250)	(0.262)	(0.254)	(0.261)
To biological father 3-5, at 9	0.135	0.176	0.254	0.120
	(0.181)	(0.207)	(0.206)	(0.201)
To social father 3-5, at 9	0.199	0.261	0.290	0.086
	(0.204)	(0.234)	(0.221)	(0.218)
To single mother 3-5, at 9	0.267*	-0.082	-0.024	-0.047
	(0.131)	(0.126)	(0.139)	(0.142)
Changed social fathers 3-5, at 9	0.278	0.102	0.112	0.009
	(0.241)	(0.255)	(0.247)	(0.252)
Stable biological father 5-9, at 9	0.044	-0.077	-0.206	-0.069

	(0.203)	(0.231)	(0.238)	(0.239)
Stable social father 5-9, at 9	-0.140	-0.096	-0.159	0.054
	(0.222)	(0.241)	(0.233)	(0.234)
To biological father 5-9, at 9	0.082	0.055	-0.075	0.118
	(0.115)	(0.113)	(0.124)	(0.124)
To social father 5-9, at 9	0.130+	0.136+	-0.072	0.136
	(0.077)	(0.081)	(0.083)	(0.084)
To single mother 5-9, at 9	-0.063	-0.051	-0.248	-0.028
	(0.204)	(0.230)	(0.213)	(0.216)
Changed social fathers 5-9, at 9	-0.064	0.115	-0.189	0.049
	(0.240)	(0.270)	(0.278)	(0.261)

Note: 5667 to 5826 child-wave observations per dataset across 25 imputed datasets. Coefficients and standard errors from HLM models are presented. Outcome variables have been age standardized in 3-month intervals to have a mean of 0 and a standard deviation of 1. All of the controls listed in Table 2 are used to predict mothers' initial levels of the outcomes when the focal child was approximately 3-years old. Controls for child age, race/ethnicity, child gender, maternal education, and maternal age at the focal child's birth are used to predict the slopes. The reference group for the estimates predicting the intercepts is "Always single-mother family between birth and 3 years"; the reference group for the estimates predicting the slopes is "Always single-mother family between 3 and 9 years." *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.10$.

Figure 1: Family Structure States and Any Transitions between Ages 3 and 9, by Early Family Experiences

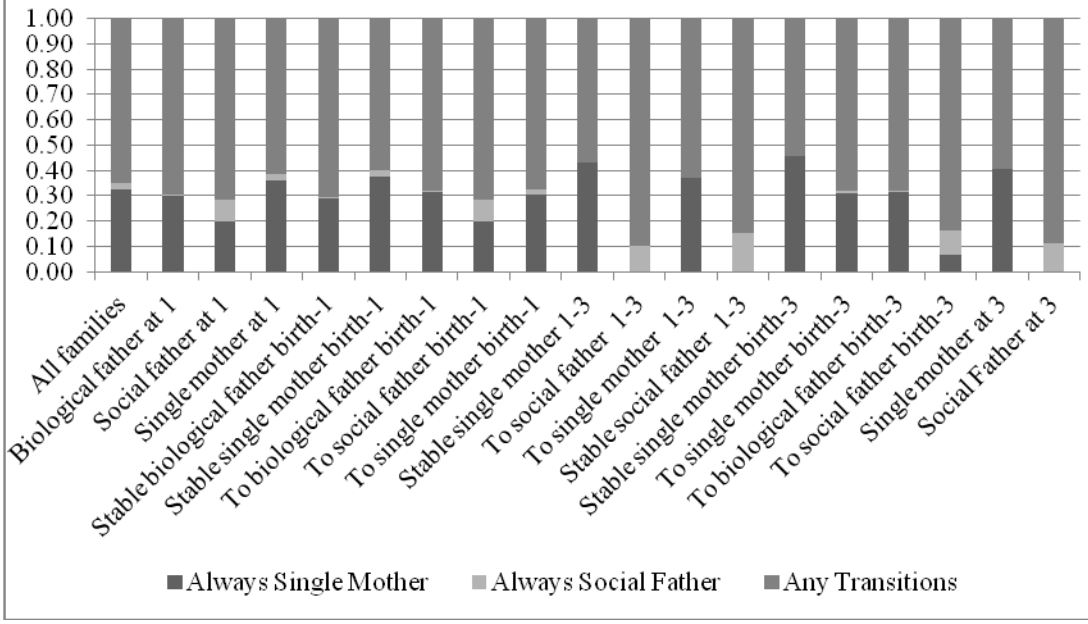

Figure 2: Family Structure States and Types of Transitions between Ages 3 and 9, by Early Family Experiences

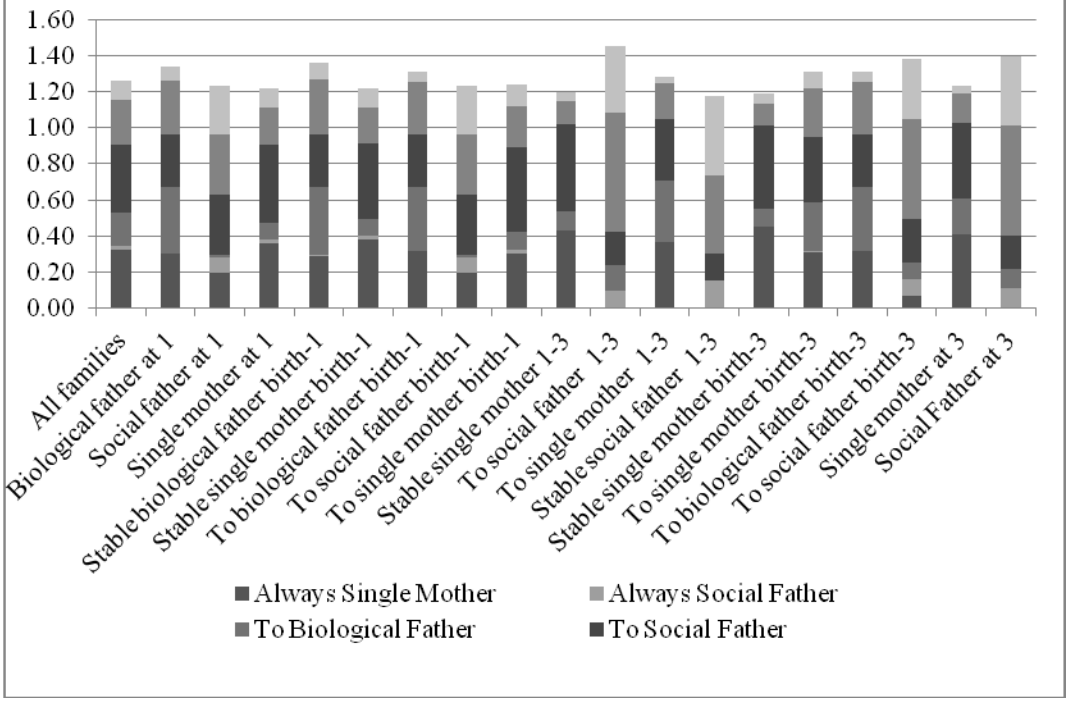

Figure 3: Timing of Transitions and Aggressive Behavior Problems

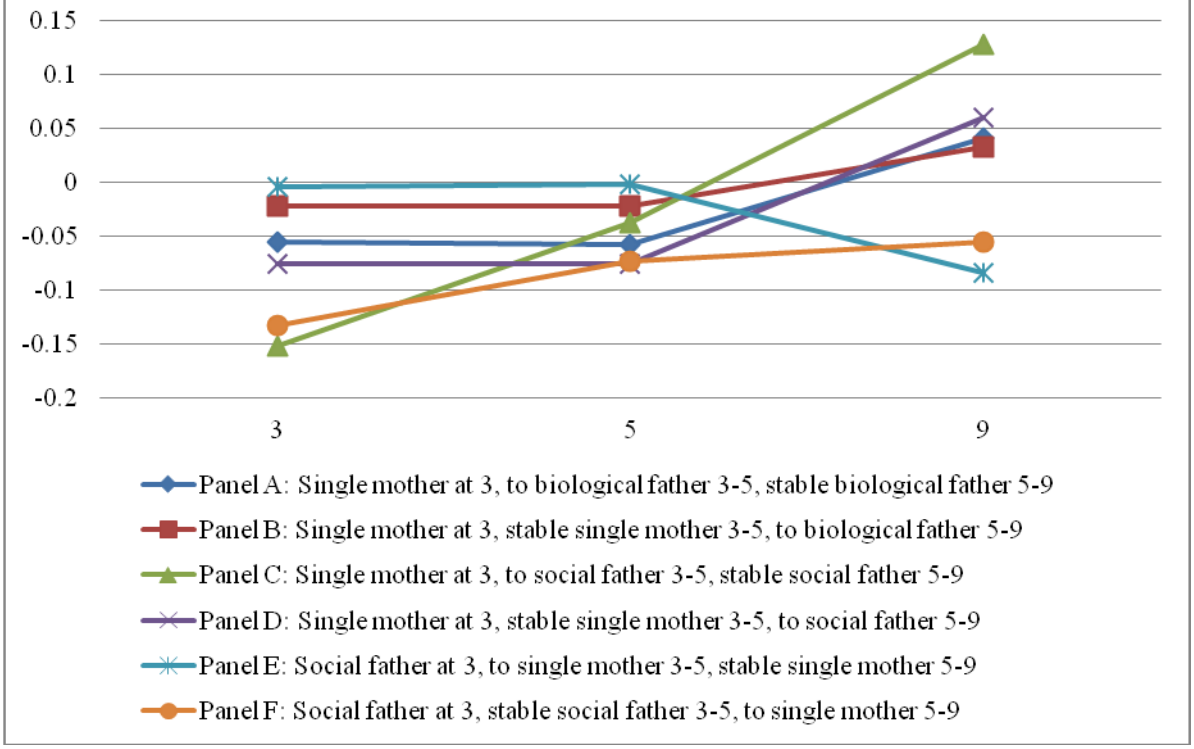

Figure 4: Persistence and Fade-Out of Aggressive Behavior Problems