

Family Structure Transitions and Child Development: Instability, Type, and Selection

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ABSTRACT

Scholarship on family structure has increasingly paid attention to the importance of family instability in family wellbeing. This change in research focus reflects family change in the United States over the past five decades, epitomized as the prevalence of divorce, nonmarital childbearing and cohabitation. In this paper, we use data from the Fragile Families and Child Wellbeing Study to examine the impacts of family instability on children's cognitive and socioemotional development. Addressing both the quantity and types of transitions in family structure, this study tests the instability hypothesis against the selection hypothesis. In particular, we demonstrate that selection bias can arise not only because of time-constant confounders but also because of time-varying factors that covary with family structure transitions. Employing various analytic approaches, such as growth curve models, child fixed-effects models, and marginal structural models, this study provides a more rigorous assessment of the effects of family instability and its types on children's developmental outcomes.

EXTENDED ABSTRACT

Family Structure Transitions and Child Development: Instability, Type, and Selection

Scholarship on family structure has increasingly paid attention to the importance of family instability in family wellbeing. The interest in the instability of family structure reflects family change in the United States over the past five decades, epitomized as the prevalence of divorce, nonmarital childbearing and cohabitation (Bumpass and Lu 2000; Ellwood and Jencks 2004; McLanahan 2004; U.S. Census Bureau 2006). These profound changes in family behaviors call for the need to reconsider ongoing debates surrounding the effects of family structure that have been concerned with living arrangements, divorce and remarriage (Amato and Keith 1991; Amato 2005; Carlson and Corcoran 2001; McLanahan and Sandefur 1994). Previous research has greatly advanced our understanding of relationships between family structure and child wellbeing; however, a growing body of literature acknowledges that the limited focuses on living arrangements and marriage-based family transitions are insufficient to fully address how changes in family structure matter in child development (McLanahan and Percheski 2008).

In this paper, we use data from the Fragile Families and Child Wellbeing Study (FFCWS) to extend the extant literature on family instability in three ways: (1) this study employs child fixed-effects models to examine how sensitive the effects of multiple family structure transitions on child developmental outcomes are to selection bias; (2) using the similar fixed-effects models, we investigate whether family instability has differential impacts when different types of family structure transitions are taken into account, and whether these impacts are robust to unobserved heterogeneity; and (3) this study identifies time-dependent factors that covary with changes in family structure as another source of selection bias, and uses marginal structural models to assess the extent of bias due to time-varying confounding.

FAMILY INSTABILITY, SELECTION, AND CHILD DEVELOPMENT

Research on family instability posits that children who experience multiple transitions in family structure lag behind developmentally, compared to children who grow up in a stable family structure regardless of whether it is a married-, cohabiting-, or single-parent family (Fomby and Cherlin 2007; Wu 1996). According to the instability hypothesis, this disparity arises because of the stress induced by reconfigurations in family composition. Family disruptions are often accompanied by stressful adjustments for roles and routines by parents and children alike, which are associated with fluctuating parental resources, deteriorating parenting quality, and emotional insecurity. Consistent with this perspective, an emerging body of research has documented the adverse impacts of frequent changes in family structure on a diverse set of child-related outcomes, including parenting quality, cognitive and socioemotional development, delinquent behaviors, and premarital birth (Beck et al. 2010; Cavanagh and Huston 2006; Cooper et al. 2011; Fomby and Cherlin 2007; Wu 1996).

However, many studies also recognize that the instability hypothesis should be tested against the selection hypothesis (Aughinbaugh, Pierret, and Rothstein 2005; Foster and Kalil 2007; Hao and Xie 2002). The observed effects of family instability may result from unobserved factors that affect both family instability and child development. For example, it is possible that parents who have unstable personality traits move in and out of relationships more frequently and also exhibit a lower level of parenting quality. If such traits are unobserved, any estimates of the negative effects of family instability will be biased upward.

We use child fixed-effects models to address this issue. Given the panel design of the FFCWS, these data provide repeated measures of family instability as well as child developmental outcomes. By comparing child outcomes only when children are exposed to the varying degrees of family instability over time, child fixed-effects models make each child serve as his/her own control unit in estimating family instability effects. Therefore, this analytic

strategy effectively differences out any time-constant characteristics of children and their families, thereby alleviating the concern about selection bias.

TYPES OF FAMILY STRUCTURE TRANSITIONS

While earlier research has addressed family instability effects primarily by capturing the quantity of family structure changes (e.g., the number of transitions in family structure), more recent research has further investigated differential family instability effects with focuses on types of family transitions (Magnuson and Berger 2009; Meadows, McLanahan, and Brooks-Gunn 2007; Osborne, Berger, and Magnuson 2012). The consequences of family instability likely differ in terms of whether it occurs due to moving into or out of a coresidential relationship. On the one hand, transitioning into a coresidential union may benefit children as it can bring about more economic resources and social support network. However, it may also do harm to children to the extent that moving in with an adult partner is disruptive and stressful as more adjustments are needed for parents and children.

On the other hand, transitioning out of a coresidential union may benefit children if parental relationships involve heightened family conflict and a mother living with the children can seek social support from her extended families. Still, it may have deleterious consequences because exiting transitions likely lead to decreases in socioeconomic resources and create another form of stressful adjustments. Although the relative impacts of different types of family instability are ambiguous, a limited number of studies report that moving out of a coresidential relationship has more adverse impacts than moving in with an adult partner.

Again, these theoretical perspectives on different types of family transitions are needed to put to test against the selection hypothesis. Even if single, mothers whose levels of perseverance and grit are high may be more likely to enter a coresidential union and to make better investments in children. Meanwhile, even if living with an adult partner, mothers who experienced childhood abuse may be more likely to dissolve their coresidential union and to have a difficulty investing

in children. To the extent that these characteristics and early life experiences go unmeasured, the observed effects of moving into and out of relationships will be sensitive to unobserved heterogeneity. This study therefore examines the impacts of different types of family transitions by estimating the child fixed-effects models described above.

DYNAMIC RELATIONSHIPS BETWEEN FAMILY INSTABILITY AND OTHER TIME-VARYING FACTORS

Most studies in this literature have treated family instability as a sole time-varying factor affecting child wellbeing. From a life course perspective, however, this specification is questionable because sequences of transitions and events define multiple, interlocking trajectories that vary in synchronization (Elder 1985, 1998; Elder, Johnson, and Crosnoe 2003; Mortimer and Shanahan 2003). The life course perspective strongly suggests that the impacts of time-varying changes in family transitions cannot be viewed in isolation but in contexts of other time-varying factors. For example, a mother's prior employment status may affect a change in family structure, which in turn may affect her future employment status. It is therefore possible that family structure transitions both affect, and be affected by, time-varying covariates. Indeed, many scholars recognize the possibility that the effects of changes in family structure can be confounded by other time-varying factors that also influence child development.

Yet most analytic approaches taken so far have faced a dilemma in the presence of time-varying covariates (Elwert and Winship 2010). Conditioning on them may result in overcontrolling if time-varying covariates function primarily as mediators of family instability, thereby understating family instability effects. Not conditioning on time-varying covariates may overstate family instability effects, as far as they function primarily as confounders of family instability. Even child fixed-effects models are not immune to time-varying confounding, given the fact that they are designed to reduce selection bias due only to time-constant covariates. Lack of attention to dynamic relationships between family instability and its time-varying covariates is

thus not only a theoretical issue, but it also creates methodological challenges for estimating family instability effects on child development.

In this study, we address time-varying confounding by employing marginal structural models (MSMs). Developed by Robins and his colleagues (Hernán, Brumback, and Robins 2000; Robins 1999), MSMs allow us to use an inverse probability of treatment (IPT) weighting estimator by which children experiencing different exposures to family instability at each time point are balanced on prior histories of family instability and observed time-constant and time-varying covariates. Because time-varying confounding is adjusted for in the IPT weights, it is unnecessary to condition on time-varying covariates when models predicting child developmental outcomes are fit to the weighted data. In this way, MSMs account for time-varying confounding while minimizing the concern about over-controlling.

DATA AND METHODS

Data

The Fragile Families and Child Wellbeing Study (FFCWS) is a longitudinal birth cohort study of 4,898 children, 1,186 of whom were born to married parents and 3,712 of whom were born to unmarried parents (Reichman et al. 2001). When weighted, the data are representative of U.S. children born in cities with populations greater than 200,000 between 1998 and 2000. Baseline interviews were conducted shortly after the birth, with mothers interviewed in the hospital and fathers interviewed either in the hospital or wherever they could be located as soon as possible. Response rates for the baseline survey were 82% for married mothers, 87% for unmarried mothers, 89% for married fathers, and 75% for unmarried fathers. Follow-up surveys were conducted when the focal child was one, three, five, and nine years of age. Response rates for the Years 1, 3, 5, 9 surveys were 91%, 88%, 87%, and 76%, respectively, for mothers who completed the baseline interview. Of the 4,898 parents, 3,392 participated in the Year 9 in-home survey.

The FFCWS data are well suited for this study, given that the public policy concerns about family settings are concentrated on couples experiencing higher rates of family instability and socioeconomic disadvantage. The data also contain a representative sample of married mothers who gave birth in large U.S. cities between 1998 and 2000. The FFCWS includes detailed measures of family structure history since birth, a number of covariates, and a variety of child outcomes. We restrict our study sample to mothers who participated in the baseline and at least one of the Years 3, 5, and 9 follow-up surveys, who lived with the focal child at least half time, and who reported their family structure transitions. For missing observations on covariates due to item-nonresponse, we employ a multiple imputation (MI) procedure (Allison 2002). MI uses observed data to replace missing values with multiple imputed data and then obtains estimates averaged over these complete data with appropriate standard errors that take the uncertainty about sampling and imputation model into account. It has been shown that MI relies on weaker assumptions than do listwise deletion and other standard procedures for handling missing data (Little and Rubin 2002). Our analysis is based on ten imputed data sets created with the MI option in STATA (Royston 2004).

Measures

Dependent variables. We use three measures of child cognitive and socioemotional development, assessed at Years 3, 5, and 9. Children's cognitive ability is measured by computing age-standardized scores on the Peabody Picture Vocabulary Test-Revised (PPVT-R), which assesses the size and range of words that children understand. Two measures of children's socioemotional development are derived from the Child Behavioral Checklist (Achenbach and Rescorla 2000). Mothers responded to a series of items that pertain to their child's externalizing and internalizing problem behaviors. Each item consists of a 3-point Likert scale on which mothers reported whether their child's behavior is not true (0), sometimes or somewhat true (1), or often or very true (2).

Externalizing problem behavior is measured by the sum of the aggressive and rule-breaking behavior subscales ($\alpha \approx .84$ across waves). The aggression subscale includes six items on being disobedient at home or at school, getting in many fights, attacking people, screaming, and being usually loud. The rule-breaking subscale is comprised of nine items that assess whether children hang around with others who get in trouble, cheat, prefer being with older children, run away from home, set fires, steal at or outside of home, swear, and vandalize.

Internalizing problem behavior is measured by the sum of the anxious/depressive and withdrawn behavior subscales ($\alpha \approx .68$ across waves). The anxious/depressive subscale consists of six items that ask whether children fear they might think or do something bad, worry that they have to be perfect, complain no one loves them, feel guilty, are easily embarrassed, and worry in general. The withdrawn subscale contains six items on being alone rather than with others, uninvolved in social activities, secretive, shy, underactive, and refusing to talk.

Explanatory variables. This study constructs two measures of family instability. First, we measure the number of transitions in family structure (0, 1, and 2+) that a focal child's mother experiences between birth and Year 3, between Years 3 and 5, and between Years 5 and 9. This measure has been one of the most common approaches to gauging family instability. Second, because the first measure treats moving into or out of a coresidential union as experiencing one transition, it is not possible to examine if family instability has differential impacts on children by types of family structure transitions over time. We therefore create indicators of whether the mother experiences no transitions, whether she transitions into a coresidential relationship, whether she transitions out of a coresidential relationship, and whether she experiences both transitions between waves.

Covariates. Time-constant covariates consist of maternal characteristics such as age, race/ethnicity (white/black/Hispanic/others), immigration status, educational attainment (less than high school/high school (or GED)/some college/college or more), cognitive ability, and impulsivity. We also include in our models an indicator of whether at least one of her parents

suffered from depression or anxiety, in order to account for possible genetic transmission. Child characteristics include gender and low birth weight status. For time-varying covariates, we construct repeated measures of maternal characteristics: employment status, poverty status, living arrangement (married/cohabiting/single), physical and mental health status, substance use, and domestic violence. We also include a child’s age (in month) as a time-varying covariate.

Analysis Plan

This study builds on four models to estimate the effects of family instability—the number and type of family structure transitions—on child developmental outcomes. The first two models are estimated by piecewise growth curve models with random intercept and slopes to obtain conventional estimates of the effects of family instability. Our growth curve model takes the form:

$$\begin{aligned}
 Y_{ti} = & \beta_0 + \beta_1 Year5_{ti} + \beta_2 Year9_{ti} + \beta_3 FI_{ti} + \mathbf{TC}_i \gamma + u_{oi} \\
 & + u_{1i} Year5_{ti} + u_{2i} Year9_{ti} + u_{3i} FI_{ti} + \varepsilon_{ti},
 \end{aligned} \tag{1}$$

where a vector of child developmental outcome at time t for child i (Y) is a function of wave ($Year5$ and $Year9$ with $Year3$ as reference), a measure of family instability (FI), and a vector of time-constant covariates (TC). The model allows the intercept and slopes of time and family instability to have random component (u). Model 1 omits TC to serve as the baseline model, whereas Model 2 includes them. The parameter estimate of interest is β_3 , and our growth curve model produces an unbiased estimate under the assumption that FI is uncorrelated with the random effects and idiosyncratic error (ε_{ij}).

The problem with growth curve modeling is that one cannot be certain if this assumption holds. If mothers experience varying degree of family instability due to omitted variables in TC , these omitted variables are subsumed into the random effects, which are then correlated with FI . As a result, the parameter estimates from the growth curve model will be biased. In Model 3, we estimate family instability effects with a child fixed-effects specification to account for selection

bias on time-constant characteristics of families and children. The child fixed-effects model is given by

$$Y_{ti} = \beta_0 + \beta_1 Year5_{ti} + \beta_2 Year9_{ti} + \beta_3 FI_{ti} + \alpha_i + \varepsilon_{ti}. \quad (2)$$

In this model, the child-specific intercept (α_i) denotes the deviation of each child's intercept from the mean intercept (β_0), representing all characteristics that are stable over time, whether they are observed or not. α_i is often estimated either by including all of the indicators representing each child or demeaning both the outcome and explanatory variables by the child's overall mean. As shown in Equation 2, TC is automatically removed from the equation because it has no within-child variation. The child-fixed effects models thus identify parameter estimates only by exploiting within-child variations in family structure transitions and child developmental outcomes.

Both the growth curve and child fixed-effects models, however, may be sensitive to time-varying confounding. As discussed earlier, time-varying covariates can function as not only confounders but also mediators of changes in family structure. The analysis estimates Model 4 using an MSM to address selection bias on observed time-varying covariates. First, this approach constructs inverse probability of treatment (IPT) weights to make children experiencing varying degree of family structure transitions sequentially similar to one another. $FI_k = fi$ denotes child i 's treatment status, the value of family instability that s/he actually receives at time k , and T_k indexes wave. For time-varying covariates, we use overbars to denote covariate history up to time k : $\overline{TV}_k = \{TV_0, TV_1, \dots, TV_k\}$. We follow standard practice that computes stabilized weights that are known to have less variance than non-stabilized weights (Hernán, Brumback, and Robins 2002):

$$IPTW_{ti} = \prod_{k=0}^t \frac{Pr(FI_k = fi | \overline{FI}_{k-1}, T_k, \mathbf{TC})}{Pr(FI_k = fi | \overline{FI}_{k-1}, T_k, \mathbf{TC}, \overline{TV}_{k-1})}, \quad (3)$$

where Π is the product operator; the denominator is the probability that child i received his/her actual exposure to family instability at time k , conditional on prior family instability history,

wave, and time-constant and time-varying covariates; and the numerator is the probability that child i received his/her actual exposure to family instability at time k , conditional on prior family instability history, wave, and time-constant covariates. We compute the IPT weights for the number of family structure transitions by fitting pooled ordinal regression models. For types of family structure transitions, we fit a series of logistic regressions in which moving into, moving out of, and moving in and out of a coresidential union are contrasted with no family structure transitions.

As with any longitudinal analysis, sample attrition is inevitable in our data. Nonrandom attrition may yield biased results. We address this issue by constructing weights for time-varying exposure to censoring (Robins, Hernán, and Brumback 2000). Let $L_k = 1$ if child i was lost to follow-up by time k and $L_k = 0$ otherwise, and $\bar{L}_{k-1} = 0$ indicate that child i was not lost to follow-up by time $k-1$. The stabilized censoring weights are given by

$$CW_{ti} = \prod_{k=0}^t \frac{Pr(L_k = 0 | \bar{L}_{k-1} = 0, \bar{FI}_{k-1}, T_k, \mathbf{TC})}{Pr(L_k = 0 | \bar{L}_{k-1} = 0, \bar{FI}_{k-1}, T_k, \mathbf{TC}, \bar{TV}_{k-1})}, \quad (4)$$

Our MSM (Model 4) estimates family instability effects with the product of the IPT and censoring weights ($IPTW_{ij} \times CW_{ij}$), fitting the growth curve model specified in Equation 1. We compute robust standard errors to correct for within-individual correlation in the weighted data (Robins et al. 2000).

The IPT-weighted estimation identifies treatment effect under the assumptions that there is no unobserved heterogeneity and that time-varying treatment assignment is independent of time-varying outcomes conditional on prior treatment history and observed covariates. While these assumptions are untestable, the MSM enables us to evaluate the role of time-varying confounding in estimating family instability effects.

We note that in estimating the effects of types of family transitions, both the growth curve and marginal structural models proposed above contrast mothers experiencing any changes in family structure with mothers experiencing no transitions who consist of coresidential as well as

single mothers. Therefore, our analysis further examines differential effects of family transition types by interacting them with mothers' time-varying living arrangements.

Taken together, we expect our approach to fill important gaps in the literature on family instability and child development. By addressing selection bias on both time-constant and time-varying factors, this study provides a more rigorous assessment of the effects of family instability and its types on children's developmental outcomes.

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