Family Structure and Income During Childhood and Subsequent Prosocial Behavior in Young Adulthood

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Abstract

Models of young adults' prosocial behavior—charitable giving and volunteering—are estimated as functions of family structure and income during the stages of childhood. Estimating a model of any subsequent outcome (prosocial or otherwise) as a function of stage-specific family structure and income imposes a set of restrictions on the underlying dynamic model of the child development process. Such restrictions have been implicitly and unknowingly imposed by the family structure specifications used in past research, and in some cases the past restrictions may not be sensible *a priori*. We consider several specifications used in past research, propose several new specifications with *a priori* sensible restrictions, and use Bayesian model comparison methods to choose among them. The models are estimated using data from the *Panel Study of Income Dynamics* and its new module the *Center on Philanthropy Panel Study*. The results indicate that the development of charitable giving and volunteering behavior is associated with family instability and low income in adolescence.

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1. Introduction

There is extensive research in psychology on the development of prosocial behavior among children (Eisenberg and Fabes 1998), but almost none of this research is about what actually occurs within families and how what actually occurs is associated with children's prosocial development (Grusec 1991a). There is extensive research in demography on the association between what actually occurs within families during childhood—family structure instability and low income—and young adult's achievement outcomes and risky behavior (McLanahan and Sandefur 1994 and Duncan and Brooks-Gunn 1997), but almost none of this research is about children's prosocial development. However, family instability and low income are thought to affect achievement and risk outcomes by disrupting the same developmental processes that are also important in the development of prosocial behavior (Chase-Lansdale et al. 1995). Therefore we ask, Are family structure instability and low income during childhood negatively associated with prosocial behavior in young adulthood?

To answer this question we present evidence from regressions of prosocial behavior on specifications of childhood family structure and income. We examine two domains of young adult prosocial behavior: charitable giving and volunteering. The specifications are based on a conceptual model in which prosocial development occurs in stages; therefore the specifications of family structure and income are allowed to differ according to childhood stage. The regressions are estimated using data from the 1968-2003 waves of the *Panel Study of Income Dynamics* and its new philanthropy module called the *Center on Philanthropy Panel Study*. The estimates indicate that family structure transitions and low income during adolescence are

negatively associated with subsequent charitable giving and that low income during adolescence is negatively associated with subsequent volunteering.

The results are important for three reasons. First, although stage-based theories of prosocial development are central in psychology and have been supported by evidence from young children's laboratory behavior, our results are the first evidence that a stage-based theory is also necessary for understanding policy-relevant prosocial behavior in young adulthood. Moreover, the results point to adolescence as a sensitive stage in the development of charitable giving and volunteering. Second, the results extend the demographic literature about the association between family structure and income and children's personal outcomes (achievement and risky behavior) to include children's prosocial outcomes. Third, charitable giving and volunteering are important aspects of American civil society but are in decline among the post-1965 cohort relative to previous cohorts (Putnam 2000). At the same time it is well-known that the post-1965 cohort experienced increased family instability and incidence of low income. Our results suggest that the decline in charitable giving and volunteering is, at least in part, associated with increased family instability and incidence of low income.

Finally, we make two methodological contributions that will be of general interest to those doing demographic research on the association between family structure and income and children's outcomes. First, we show how family structure specifications typically used in previous research implicitly impose substantive restrictions on the underlying stage-based dynamic model of child development—restrictions that are unintended and unrecognized, but necessary for identification in the regressions. Some restrictions implicitly imposed by typical family structure specifications may be sensible, but others are not. Even among *a prioi* sensible identifying restrictions several sets of restrictions are always available, making it unlikely that

researchers will agree *a priori* about which set of restrictions should be used. A resolution is to use model comparison techniques to *ex post* indicate which set of identifying restrictions best fits the data. Our second methodological contribution is to carry out the model comparison using Bayesian methods.

2. Background

2.1 Prosocial behavior develops in stages and can be increased by parental investments.

Eisenberg and her colleagues (1982, 1983, 1986, 1987, 1989) have studied how children respond to various moral dilemmas, and argue that prosocial moral reasoning develops in stages: primitive empathy (pre-school and early elementary), approval-driven (elementary aged children through high school), empathic orientation (late elementary through high school), and internalized values (high school, and relatively rare even then). Progression through the stages involves both empathic and cognitive development. The progression is invariant (a later stage cannot be reached without first completing the earlier stages), and all stages are judged to be important. For example, the earliest years of childhood are important because empathy as well as prosocial behavior can appear as early as year two (Zahn-Waxler, Radke-Yarrow, Wagner and Chapman 1992); the early years are also important to prosocial development because of cognitive growth during those years. The empathic orientation stage is important because people reaching that stage are inclined to help others even if not rewarded with social approval and even if those being helped are conceptualized in an abstract way. In other words people reaching the empathic orientation stage have the ability to take the perspective of "those in need" rather than only being able to take the perspective of someone they know who is in need; again this requires a combination of both empathic and cognitive development (Hoffman 2000). The internalized

value stage is development beyond empathic orientation so that helping others in need becomes a an internalized value guiding one's actions. There is evidence that internalized values mediate empathy in influencing prosocial behavior (Bekkers and Wilhelm 2007).

Experimental methods have shown that adults can increase the prosocial behavior of children by modeling the desired behavior, by empathy-based verbal exhortations ("other-oriented induction"), and by dispositional praise.[1] These results suggest "investments" a parent can make in her child's prosocial development. In addition to these investments, parental expression of care and warmth to children likely increases children's prosocial development. For example, the development of empathy in the earliest years of childhood is positively correlated with mothers' warmth, sensitivity, and responsiveness (Zahn-Waxler, Radke-Yarrow and King 1979). Indeed, Chase-Lansdale et al. (1995) regard care and warmth as central requirements for the development of caring in children because, they argue, children learn how to care by being the recipient of care (parents modeling prosocial behavior). Evidence backing-up this argument comes from Wuthnow's (1995) study of teenage volunteers and Soenens, Duriez, Vansteenkiste and Goossens' (2007) study of adolescents' perspective-taking. In addition, social learning theory (Bandura 1977) applied to parental prosocial modeling suggests that children will more readily adopt the model if they have a close, warm attachment to the parent-modelers.

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[1]See the reviews by Eisenberg and Fabes (1998) and Grusec (1991b). Most, though not all, experiments have found that empathy-based verbal exhortations have a positive effect on children's donations (see, e.g., Dlugokinski and Firestone 1974, Grusec et al. 1978b and Eisenberg-Berg and Geisheker 1979; cf. Lipscomb et al. 1983). The evidence that dispositional praise (i.e., attributing the child's helpfulness to his or her helpful disposition) produces long term effects and even promotes additional types of helping behavior besides that which was initially praised is in the work of Gelfand et al. (1975), Grusec et al. (1978a), Grusec and Redler (1980), Eisenberg et al. (1987), and Mills and Grusec (1989). The second of these results may obtain only with older children (Grusec and Redler 1980).

A parent also can invest in her children's prosocial development by providing them with opportunities to help others (Eisenberg 1990). In addition, a parent may indirectly encourage prosocial development by assigning chores. For instance, Grusec, Goodnow and Cohen (1996) find evidence that older children (aged 12-14) who are expected to do chores that benefit the entire family, as opposed to just themselves, are more frequent spontaneous helpers, not only in spontaneous situations similar to their chores, but in more general situations of helping family members (also see Eisenberg and Fabes 1998, p. 720).

2.2 Family structure instability and low income are negatively associated with child outcomes.

There is much evidence that non-intact family structures are associated with a wide range of children's negative outcomes: lower achievement test scores, problem behaviors, dropping out of high school, neither being employed or in school, early childbearing, distress, and smoking (e.g., see McLanahan and Sandefur 1994). Similarly, low income during childhood is associated with negative outcomes (e.g., see Duncan and Brooks-Gunn 1997). The controversy is about whether the associations are causal (e.g., see Cherlin et al. 1991 for family structure and Shea 2000 for income).

As for income, Duncan et al. 1998 (see also Levy and Duncan 2002) draw on the child development literature to argue that it is important to specify income during childhood by childhood stage. This suggests that an analysis may not find evidence of an association (much less causality) if it misspecifies childhood income by aggregating income across stages. The same argument applies to family structure—it may important to specify family structure during childhood by childhood stage. However, only a few papers specify family structure or income by childhood stage. Of these papers, our analysis is closest in spirit to the work done by Hill et al.

(2001) and Duncan et al. (1998) in their study of associations between stage-specific family structure and income with completed education and non-marital births.[2]

To the extent that causality is behind the negative associations, the suspected mechanism is stress that family instability and low income create in the lives of children. With divorce, stress is on the custodial parent (usually the mother) because of the trauma of the disintegrated relationship and the need to shoulder all of the economic and parenting responsibility for the children. In addition to the effects children experience via the parent's stress, they directly experience the trauma of divorce through their own emotional upheaval. Stress in children can also be induced when the mother remarries and relationships between all members of the family must adjust to the addition of the new step-father.

Stress induced by having to survive on low income is thought to disrupt effective parenting practices and produce harsh parent-child interactions (see, e.g., Conger and Elder 1994, McLanahan and Sandefur 1994, McLoyd et al. 1990, 1994; cf. Hanson, McLanahan and Thompson 1997). There is evidence that the effects of stress are mediated through a parent's mental health and emotions (Conger et al. 1994; McLoyd et al. 1994) as well as anger and hostility (Conger et al. 1994, 1997). McLoyd et al. (1994) also find evidence that economically-induced stress reduces the quality of the parent-child relationship.

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[2]Ermisch and Francesconi (2001) specify having been in a single parent family by stage and find that most of the negative associations with child outcomes are due to being in a single parent family in early childhood. Fronstin et al. (2001) specify divorce by stage and find negative associations between divorce and educational achievement for divorce in any stage. There are some papers where family structure is studied in a particular stage; for example Painter and Levine (2000) study the association between family structure during adolescence and older teens' education and non-marital fertility.

2.3 Stress induced by family instability and low income can also affect prosocial development.

Stress can affect all the types of investment a parent makes in children's prosocial development. The need to take full economic responsibility for the children after a divorce makes less time available for investment in children's cognitive development and less time available for providing children with opportunities to help others. A parent experiencing stress due to divorce or low income must focus on her own family's cohesion and survival, and understandably may be less attentive to the needs of people outside the family (implying less modeling of charitable giving and volunteering through organizations, less emphasis on helping people outside the family in everyday encounters, and less frequent provision of the opportunities for children to participate in such help). Stress may affect the parent's mental health, anger, and hostility thereby leading to a less nurturing parenting style (implying less use of other-oriented induction and dispositional praise) and a less warm and close parent-child relationship (implying less chance for children to learn how to care by being the recipient of care). Children's own anger about divorce or remarriage may make them less attentive to the needs of others because difficulty in regulating emotion is thought to inhibit empathic responses (Eisenberg 2002).

In addition to the effect through stress, low income obviously affects the investments parents can make in their children's cognitive development, such as adequate nutrition, health care, and the purchase of stimulating toys, books, and educational experiences (e.g., see Hanson et al. 1997; Smith, Brooks-Gunn and Klebanov 1997, and Brooks-Gunn and Duncan 1997). Reduced cognitive investment may inhibit the development of perspective-taking ability. Similarly aside from any induced stress, low income constrains all kinds of family spending and therefore reduces a parent's ability to model charitable giving.

Although we have described many reasons to suspect how family instability and low

income might have negative affects on prosocial development there are at least three ways in which a positive association might arise. First, a parent dealing with family instability or low income may require children to take on more responsibility for household chores, which in turn might lead to increased helpfulness in other areas. This possibility is supported by Call et al.'s (1995) finding that adolescents in low-income families (though not in single-parent families) do more household chores and spend more time caring for younger children and elderly members of the family. Second, experiencing family instability or low income may increase a child's ability to take the perspective of others experiencing hardship. Third, in some families a divorce relieves the stress experienced by children whose parents are in open marital conflict—the stress relief hypothesis (see, e.g., Amato and Booth 1997, Furstenberg and Cherlin 1991, Musick, Meier and Bumpass 2006). Amato and Booth (1997, p. 220) report that less than one-third of the divorces in their data involved high-conflict marriages, and to the extent that this is also true in our data we expect the divorce we observe will predominantly indicate stress creation rather than stress relief.

Despite the many reasons to suspect that family instability and low income are risk factors for prosocial development, and the recognition of this in the literature (Chase-Lansdale et al. 1995), little is known about whether these risk factors actually are associated with prosocial behavior. Only one previous study estimates the association between family structure and income and prosocial behavior in young adulthood. Brown and Lichter (forthcoming) use the 2002 *NLSY Young Adult Supplement* to estimate the association between volunteering incidence among 18-25 year olds (i.e., whether or not the 18-25 year old does any volunteering) and the years spent in poverty during childhood and whether the young adult was born to a single mother. Both associations are negative, but small and insignificant once current characteristics of the 18-

25 year olds are included in the model.[3]

2.4 Summary and limitations of previous research

The psychology literature has been successful in establishing that a stage-based theory of prosocial development is necessary to explain prosocial behavior in experiments, but there is no research on the necessity of stage-based theory for explaining young adult's charitable giving or volunteering—policy-relevant prosocial behavior of interest to sociologists, economists, and policy-makers. Further, there is no evidence on whether the development of giving and volunteering is especially sensitive to what happens in the lives of children during any particular prosocial developmental stage.

The literature on children's outcomes has established links between what happens in the lives of children (family instability and low income) and several important outcomes, but almost none of this work is about prosocial behavioral outcomes—despite the recognition that prosocial outcomes are important aspects of well-being (Moore et al. 1999, Moore and Halle 1999). Also, the majority of papers about family instability and low income during childhood and children's outcomes do not take the stages of childhood into account.

Because so few papers take the stages of childhood into account, there has been little

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[3]Lichter et al. (2002) conduct a similar study with a focus on volunteering incidence among 14-18 year olds. They report two negative associations: (i) between time spent in a female-headed household and adolescent girls' volunteering for the mentoring of youth and (ii) between time spent in a female-headed household and being born to a teen mother on adolescent boys' church-related volunteering. Time spent in poverty had a significantly positive effect on boys' church-related volunteering.

There is a vast literature on charitable giving (e.g., see Vesterlund 2006) and volunteering (e.g., see Wilson 2000), but none of it deals with family instability and low income during childhood.

work done on how family instability and low income should be specified by stage. For instance, Hill et al. (2001) present some estimates from a specification based on family structure "state" (e.g., in a two-parent family, in a birth mother-only family, in a birth mother-stepfather family, etc.) in each stage and some estimates from a specification based on family structure "events" (a divorce or the arrival of a step-parent through marriage or remarriage) in each stage, but there is no indication about which specification is preferred.

Putting aside how a stage-based family structure should be specified, other questions about family structure specification nevertheless have been long-standing in the literature. The other specification questions have included whether family structure at age 14 is an adequate indication of family structure over longer periods of childhood (the "window" problem; Wolfe et al. 1996), whether different types of family structures can be grouped together and whether structure should be specified by events or by duration in states (Wojtkiewicz 1993; cf. Boggess 1998, p. 218), whether family structure events should be specified differently according to type of transition or can transitions be grouped together regardless of type (Wu and Martinson 1993; Wu 1996), and whether the family structure specification should be child-based or family-based (Ginther and Pollak 2004). These possible choices for family structure specification are non-nested, and a coherent methodology for sorting through the possibilities has not emerged.

3. Conceptual Framework

3.1 A dynamic model of prosocial development

Our model of stage-based prosocial development uses the general framework laid out by Cunha et al. (2005) to model cognitive and non-cognitive skill formation. Prosocial capital (P_t) at a childhood stage (t) is a function of the prosocial capital formed in earlier stages (P_{t-1}) and

present parental investment in the child's prosocial capital (I_t) :

$$P_t = f_t(P_{t-1}, I_t), \qquad t = 1, 2, 3 \tag{1}$$

Prosocial capital consists of skills such as the tendency to respond empathically to the needs of others, the tendency to take another's perspective, the ability to think of the needs of an abstract "other," and adherence to a principle that one should help others in need (P_0 is the child's level of prosocial capital at birth and models a genetic basis for these tendencies). As already discussed, parental investments consist of care and warmth shown to the child, inductive parenting, modeling prosocial behavior, providing opportunities for the child to help others (including chore assignment), and cognitive investments.

Prosocial behavior in young adulthood (y_T) is, in turn, a function of prosocial capital at the end of childhood (P_3), observable young-adult socio-economic characteristics like income, education, race, and religious affiliation (represented by the row-vector $\boldsymbol{x}_T$), and unobservable, random influences (u_T):

$$y_T = P_3 \rho + \boldsymbol{x}_T \boldsymbol{\theta} + u_T \tag{2}$$

where ρ is a scalar and $\boldsymbol{\theta}$ a column-vector of parameters.

The dynamic model (1) and (2) is identical to the framework underlying much demographic research on family structure and income during childhood and outcomes in young adulthood. For example, in demographic research y_T might be high school completion by age 20 and P_3 represents human capital at the end of childhood. Often in demographic research, capital at the end of childhood and earlier parental investments are not directly observable; likewise, we cannot observe P_3 and I_t (t = 1, 2, 3) in our data. The approach is then to argue that family instability and low income reduce parental investment by inducing stress and tightening the

family's budgets of time and money. This leads to a reduced-form model based on (1) and (2):

$$y_T = \boldsymbol{F}\,\boldsymbol{\delta} + \boldsymbol{M}\,\boldsymbol{\lambda} + \boldsymbol{C}\,\boldsymbol{\gamma} + \boldsymbol{x}_T\,\boldsymbol{\theta} + u_T \qquad (3)$$

where $\boldsymbol{F}$ and $\boldsymbol{M}$ are row-vectors describing family structure and income over all three stages of childhood and $\boldsymbol{\delta}$ and $\boldsymbol{\lambda}$ are corresponding column-vectors of parameters to be estimated ($\boldsymbol{C}$ is a vector of other stage-specific childhood events, like residential moves and the mother's labor force participation). In short, prosocial capital P_3 is a complicated function of parental investments throughout childhood and stage-specific family structure instability and low income are markers for disruption in those investments.

3.2 Specifications of $\boldsymbol{F}$ and $\boldsymbol{M}$ impose restrictions on dynamic models of child development.

Although this approach is identical to that used in much previous demographic research, previous research has not recognized that typical specifications of $\boldsymbol{F}$ and $\boldsymbol{M}$ impose restrictions on (3), and thereby on the underlying dynamic model (1) and (2). Using family structure to illustrate, the restrictions are in terms of constraining different family structure histories to have the same association with y_T. To make the illustration tractable assume that all possible family structure histories are such that a child always lives with his birth mother and there are a maximum of two changes in family structure during childhood. This assumption holds for the large majority of children (84 percent of our sample), and later we will discuss how we handle family structure histories that do not fit this assumption. Under this assumption there are 20 possible family structure histories, and these histories are listed in the first column, first 20 rows of Table 1.

Specifying $\boldsymbol{F}$ to be a vector of 20 dummy variables to capture the histories in Table 1

would be a completely flexible specification of family structure, but specifying 20 variables is not feasible because the sample sizes typically available are not large enough. Table 1 column 2 contains the fractions of our sample with each of the 20 family structure histories; because our n = 1,011, some of these fractions imply small cell sizes. Estimating (3) with a more parsimonious specification of $\boldsymbol{F}$ containing less than 20 dummy variables necessarily imposes restrictions on how different family structure histories are associated with y_T.

For instance, an often-used specification of family structure is based on being in a family structure state (in a two-parent family, in a birth mother mother-only family, in a birth mother-stepfather family) during each of three childhood stages (early childhood, middle childhood, and adolescence). This state × stage specification of $\boldsymbol{F}$ contains the nine stage-specific dummy variables listed in headings of columns 3-11 in Table 1. The "1"s in the body of Table 1 show how the 20 family structure histories map to the nine dummy variables.[4] The 20 × 9 matrix in Table 1 has rank 9, implying that the nine stage-specific variables impose 11 restrictions on the complete set of 20 histories. We use Gaussian elimination to uncover the 11 restrictions displayed in Table 2.

Two of the restrictions are:

$$\text{T-D1-S3} - \text{T-D1} = \text{T-D2-S3} - \text{T-D2} = \text{T-D3-S3} - \text{T-D3} \qquad (4)$$

where the initial state "T" indicates that the child started off in a two-parent family, "D1"

[4]Row 21 contains the children whose histories do not follow our assumption: the children do not live with their birth mothers throughout ages 0-16 or they experience three or more family structure transitions. Some of the family structure states these children experience can be mapped to the nine state × stage variables, but the mapping depends on the specifics of the history (and hence cannot be summarized in Table 1). Further, the experience of living without the birth mother has to be mapped to an additional three state × stage variables.

indicates a divorce in stage 1, "S3" indicates a step-father joined in stage 3 (a remarriage), etc. The restriction is that the marginal effect of the stage 3 remarriage on the child's prosocial capital relative to the preceding divorce does not depend on the stage in which the divorce occurred. Restrictions like (4) are "within-initial state but across stages." One restriction in Table 2 is "within-initial state and within stage":

$$\text{B-S3-D3} \quad = \quad \text{B-S3} \tag{5}$$

where the initial state "B" indicates that the child started off in a birth mother-only family. The restriction is that a divorce following a stage 3 marriage has no additional effect on prosocial capital relative to the effect of the marriage. Finally, other restrictions are "across initial states and across stages," for example:

$$\text{T-D2-S3} \; - \; \text{T-D2} \quad = \quad \text{B-S3} \; - \; \text{B.} \tag{6}$$

The restriction is that the marginal effect of a stage 3 remarriage following a stage 2 divorce in a two-parent family is the same as the marginal effect of a stage 3 marriage in a birth mother-only family.

Opinions will differ according to application and researcher as to whether restrictions (4)-(6) are sensible. If stress is the suspected mechanism and stage 3 developmentally more influential than stage 1, the effect on y_T of the additional stress from T-D3-S3 compared to T-D3 would seem to be more than the additional stress from T-D1-S3 compared to T-D1, but restriction (4) says the marginal effects are the same. Researchers may disagree about the sensibility of this restriction, but once the restriction is listed at least researchers can discuss why they disagree. However, some restrictions implied by the state × stage specification lack any

intuition, such as:

$$\text{B-S3} = \text{B-S1-D1} - \text{B-S1-D2} + \text{B-S2-D3} \qquad (7)$$

making it difficult to discuss whether the restriction is *a priori* sensible.

Another often-used specification of family structure is based on experiencing a family structure event (a divorce or the arrival of a step-parent through marriage or remarriage) during each of three childhood stages. The event × stage specification of $\boldsymbol{F}$ contains six stage-specific dummy variables plus two variables to indicate the T and B initial states. Using eight variables in the specification to describe 20 histories implies the 12 restrictions on the histories listed in Table 3. Some of the restrictions also appeared in the state × stage specification (e.g., (4)), but others do not. Hence, the two sets of restrictions are non-nested.

A third specification is that the sequence of family structure experiences matters, but not the stage in which they occur (e.g., see Wojtkiewicz 1993; Hill et al. 2001). This "sequence-without-stages" specification implies restrictions like: T-D1 = T-D3 and B-S1-D1 = B-S2-D3 (all of the restrictions are within-initial state but across stages). The underlying assumption is that the kind of transition (e.g., divorce) is the primary determinant of stress, with equal effects on prosocial development regardless of the stage in which the transition occurs. A fourth specification is that the number of transitions is the primary determinant of stress, more so than the kind of transition (Wu and Martinson 1993, Wu 1996). A stage-specific version of this specification implies restrictions like: B-S3 = T-D3 and B-S2-D2 = T-D2-S2 (all of the restrictions are across initial states but within-stage).

The psychology literature offers no guidance about which of these four sets of restrictions would be most reasonable in an analysis of prosocial development. The literature is clear that the

developmental stages are invariant, but invariance only implies the dynamic modeled in (1): the current level of prosocial capital at a stage is a function of the prosocial capital formed through earlier stages (children cannot effortlessly leap-frog into an advanced stage). The literature does not designate any one stage as especially "sensitive," in other words a stage in which a disruption of investment would be especially harmful to the formation of prosocial capital.[5] At the same time the specifications from the previous demographic research were not created with the insights from the prosocial development literature in mind. Therefore we consider four additional specifications that embody various insights from the prosocial development literature.

We will give a brief description of the additional specifications, but full details are described in Appendix Tables A.1-A.4; these tables make the restrictions placed on the 20 family structure histories explicit. The first specification places its restrictions on the middle and adolescent stages, but allows a flexible specification of family structure events in early childhood. By allowing a lot of flexibility to estimate associations between family structure events in early childhood and prosocial behavior in young adulthood, this "flexible early event" specification embodies the insight that important milestones in the development of empathy and cognition occur in the first few years of life.

The second specification places its restrictions on the early and middle stages, but allows a flexible specification of family structure events in adolescence. By allowing a lot of flexibility to estimate associations between adolescent family structure events and prosocial behavior, this "flexible adolescent event" specification embodies the importance of the empathic orientation

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[5]The term "sensitive" is used by Cunha et al. (2005) to describe a stage in which $\partial f_t / \partial I_t >> 0$. Cunha et al. also use the term "complementarity" to indicate a positive effect of earlier investment on the productivity of investment in a later stage: $\partial^2 f_t / \partial I_t \partial P_{t-1} > 0$.

and internalized values stages in prosocial development.

The third specification groups family structure histories according to our presumptions about the level of stress the histories create in the lives of children. Events in adolescence are presumed to be most stressful (because parents are less able to shield adolescents from the effects of stress), especially when the family was relatively stable up until adolescence. A single event in early childhood is presumed to be low stress. Two events happening across middle childhood-to-adolescence are presumed to be equivalent in terms of stress, as are two events happening across early-to-middle childhood.

The fourth specification emphasizes complementarity across stages (see footnote 5): an event in a later stage has less effect when it is preceded by an earlier event. In terms of prosocial development, the assumption is that most of the disadvantage was already effected by the earlier event.

4. Data

4.1 Childhood family structure and income in the Panel Study of Income Dynamics

Constructing the variables to describe family structure histories is painstaking work. We give a brief description of the work herein, but a more detailed description as well as the computer programs that construct the variables are available upon request. There are three steps in the construction: construct a complete, year-by-year history of the child's family structure events; map the events to one of the 20 three-stage event histories discussed earlier (the childhood stages are ages 0-5, 6-11, and 12-16); and map the event history to the eight specifications of analysis variables.

In carrying out these three steps we made two decisions to keep the analysis sample as

large as possible. First, we treat missing years in a child's family structure history differently than has been done in previous research (Hill et al. 2001). When there are missing years—for example, the child is in a non-response family unit for some, though not all, years in a stage—we keep the child in the sample despite the incomplete data, and assume that the child's family structure remained unchanged during the missing years. Not surprisingly, children in non-response families have more turbulent family structure histories, so our decision to keep them in the sample whenever feasible creates a sample with more numerous structure transitions than appear in previous research.

Second, we keep young adults in the sample who are part of the re-contact effort the *PSID* initiated in 1992 to bring non-respondents back into the study. The *PSID* assigns a zero family weight to respondents in the re-contact sample, so to keep the re-contact young adults in our analysis we assign a weight.[6] For a young adult in the re-contact sample who originated in the *SRC* nationally-representative sample we assign the average weight among non-recontact *SRC* children; for a re-contact from the *SEO* low-income oversample we assign the average weight among non-recontact *SEO* children. The re-contact young adults make up about 20 percent of our sample.

4.1.1 Step 1: Construct the year-by-year family structure events

We begin by forming the sample of *PSID* respondents who are 25-33 year-old heads or wives of family units in 2001, and who were born into the study (the 1968-1976 birth cohort). We require at least 25 years of age to avoid complications with the transition out of college, no

[6] Recalculation of the weights to adjust for the re-contact sample is underway at Michigan's Survey Research Center.

more than 33 years of age so that we can observe all the years of childhood, and heads and wives because the prosocial behavior measures are available for them. There are 1,121 respondents satisfying these conditions, but we drop eight who were not asked the philanthropy questions, 97 who were in family units non-responding in all of the years in one of the childhood stages, and five who have missing data. The analysis sample is n = 1,011.

Then we determine each child's birth year using the 1968-2001 *Individual File*, the 1985-2001 *Marriage History File*, and the *Ego-Alter File*. When more than one birth year is reported we choose the most frequently reported year. If the most frequently reported year differs from the year reported in either the *Marriage History File*, *Ego-Alter File*, or Lillard (2001), we manually check all the available candidate years and choose the year that makes the most sense given the conflicting reports. Usually the most frequently reported year makes most sense.

We next determine with whom the child was residing at the time of the interview in the calendar year during which the child was born, in the calendar year during which the child turned age 1, . . ., through the interview in the calendar year during which the child turned 17. For each age the possibilities are {birth mother, step-mother, no mother} × {birth father, step-father, no father}. We identify the child's mother and father from the 2001 *Parent Identification File* (we treat adoptive parents as birth parents). If both mother and father identification numbers appear in the family listing we are done. If only the mother appears we check for the presence of a step-father. If the mother is a head or wife we check for a step-father using the relationship-to-head codes; if a partner (married or cohabiting) is found we designate him to be a step-father. If a partner is not found through relationship-to-head codes (perhaps because the mother was living with her parents and therefore not a head or wife), we continue to search for partners by checking the marital pairs indicator from the 1968-2001 *Individual File*, the pairwise relationships from

the 1968-1985 *Relationship File*, and indicators of marriages since 1985 using the 1985-2001 *Marriage History File*. When we find a step-father we back track through previous interviews to locate the year he first moved into the family. We also check all subsequent corrections to move-in and move-out dates in the *Individual File* so that the determination of the years the step-father spends in the child's family unit are as accurate as possible. When the child lives with his father we search in the same way for step-mothers.

From the year-by-year history we can infer the sequence of family structure events. A family structure event is a change in any of the parent/step-parents the child resides with. At each interview, there are four kinds of events that might have happened since the last interview: the birth mother moved in or out, the birth father moved in or out, a step-mother moved in or out, or a step-father moved in or out.

4.1.2 Step 2: Map the sequence of family structure events to one of 20 event histories

To create a parsimonious, three-stage description of family structure events we sort children into three groups. The first group is children who always reside with their birth mothers and who experience two or fewer family structure events—the "few event" group. Each child in the few-event group is assigned one of the 20 event histories described in Section 3. The second group is children who always reside with their birth mothers but experience three or more family structure events—the "many event" group (there are 54 children in this group). We assign each child an initial "anchoring" sequence capturing the first two events. We create a set of three "additional event" variables (one for each childhood stage) to indicate the number of events not captured by the anchoring sequence. We also assign each child a terminal anchoring sequence capturing the last two events, and a corresponding set of additional event variables. In step 3 we

will use the initial anchoring sequence to create the "flexible early event" specification and the terminal anchoring sequence to create the "flexible adolescent event" specification.

The third group is children who spend time in family units without their birth mothers. These children have four different types of event histories. In the first type, the birth mother and father separate and the child stays with the birth father; we assign this child one of the 20 event histories just described, but also use three "not-with-birth-mother" dummy variables (one for each stage) to indicate time spent without the birth mother. In the second type, the birth mother and father separate and the child moves between the residences of the mother and father. The second type can be handled just like the first type. In the third type the child appears to spend some of his first few years of life away from his birth mother. This type arises because we have not relied on the first year the child appears in a family listing to establish his birth year when there is much other evidence to the contrary. We assume the third type of child was really with his birth mother from birth. In the fourth type the child spends time away from both birth parents. We assign these children a history variable "N" (time spent with neither parent) and treat these children differently according to which of the eight specifications we are constructing. One exception is when the child himself moves out from his parents while still 16 years old, but in the year he turns 17 (n = 27); we ignore this event because we assume that the anchoring event defined before the move is a better description of the child's family structure history than grouping the 16 year-old mover out with the more complicated histories of children who live with neither parent earlier in their lives.

4.1.3 Step 3: Map the family structure events to eight specifications for analysis

In step three we map the 20 event histories (and the histories involving time spent with

neither parent) into the eight specifications: state × stage, event × stage, sequence without stages, number of transitions × stage, flexible early event, flexible adolescent event, presumed stress level, and complementarity across stages.

Table 4 compares our sequence without stages specification to the corresponding specification in Hill et al. (2001) to understand the differences in the construction of event histories. In short, the table indicates that differences in the construction of the histories are mostly due to our finding more histories with three-plus events, our inclusion of young adults from the re-contact (Hill et al.'s histories were based on the 1968-1991 files, before the re-contact effort began), our treatment of missing years in a child's family structure history (Hill et al. exclude children with any missing years), and our treatment of the last years of childhood (our last year is age 16; Hill et al.'s last year is age 15 for the construction of histories, but they also require that the child continue to be in a response family every year through age 20).

Table 4 column 1 contains the fractions in Hill et al.'s sample experiencing each of the indicated histories. Column 2 contains our specification, but we drop children who resided in a non-response family unit in <u>any</u> childhood year and who lived apart from both parents at any time during stage 3; this approximates Hill et al.'s sample selection requirements that children be response in every wave from birth through age 20. Also, for the moment, we classify a child in a two-parent family whose father leaves but then returns (a "leave-returner") as "T" and we ignore the additional events (ignoring additional events reduces the fraction in the "other sequences" category). Although the fractions in columns 1 and 2 are not precisely equal, they are fairly close. In column 3 we re-classify children with leave-returner fathers from the "T" category to "other." In column 4 we stop ignoring the additional events, and doing so moves many more children into the "other" category (primarily from the two categories with two transitions, as

expected). In column 5 we bring the children from the recontact sample back in, and in column 6 we bring back in the children who resided in a non-response family for some childhood years or who moved away from their parents in stage 3. In both cases the fraction in two-parent families drops and the fraction in the "other" category increases.

4.2 Family income during childhood

We create stage-specific family income by averaging total family income across the years in each childhood stage. If total family income is missing (because the child was in a non-response family during some of the years in a stage) we average the available years.

4.3 Charitable giving and volunteering in the Center on Philanthropy Panel Study

The 2001 charitable giving data from the *Center on Philanthropy Panel Study* have several advantages relative to other recent giving surveys: high response rate, extremely low occurrence of missing data on giving, and a close match to the percentiles of charitable deductions from the Internal Revenue Service data up to the ninetieth percentile (Wilhelm 2006a). We use the *Center Panel* data to estimate models of secular giving. Secular giving combines responses from five questions about annual charitable giving for purposes of poverty relief, health, education, combined purposes such as the United Way, Catholic Charities, the United Jewish Appeal, etc., and a catch-all "other" category that includes giving to the arts, environmental protection, neighborhood and community organizations, international relief, etc. Gifts to organizations engaged in these purposes are counted as "secular" even if the organization has a religious affiliation. Our secular giving variable does not include giving to churches,

synagogues, mosques, TV or radio ministries.[7]

Table 5 column 1 presents descriptive statistics for all young adults in the sample. The table shows that 43 percent of the young adults give to secular organizations, and that the average conditional gift (the average among those giving more than zero) is $493. The distribution of giving is skewed: the median gift is $200, much lower than the average.

The 2003 volunteering questions in the *Center Panel* were more extensive than in 2001, therefore we use the 2003 data (Wilhelm 2006b). The 2003 *Center Panel* estimate of volunteering incidence for 25-34 year olds is very close to the estimate from the Bureau of Labor Statistics' (2003) estimate based on the *Current Population Survey* September supplement (27.1 versus 26.5 percent), but the *Center Panel* estimate of median hours per year conditional on volunteering is higher (53 versus 36). The higher reported hours is most likely due to the more extensive memory recall prompts in the *Center Panel*; extensive recall prompts may also explain why the *Center Panel* has much less missing data on hours volunteered than the *CPS*. The sample size drops to $n = 954$ when estimating the volunteering models because we lose 57 young adults who were heads or wives in 2001 but not in 2003.

We estimate models of secular volunteering. Secular volunteering combines responses from six questions about annual volunteering through organizations that serve youth, seniors, people in poor health, people in need, organizations seeking to bring about social change, and an open-ended other category. Table 5 column 1 shows that 25 percent of the young adults do some volunteering. Among those who volunteer the average hours per year is 123. The distribution of

[7]A respondent is first asked about "donations specifically for religious purposes or spiritual development, for example to a church, synagogue, mosque, TV or radio ministry" and directed to "not include donations to schools, hospitals, and other charities run by religious organizations" because donations for these other purposes will be asked about later.

volunteering is skewed: the conditional median hours volunteered is 40 per year, much less than the conditional average.

4.4 Other independent variables

Table 5 also lists the independent variables we use in the models. The first two variables show that 38 percent of the young adults spent some childhood years in a non-intact family and 29 percent had at least one stage of childhood in which their family's average income was less than $29,000.[8] Eighty-four percent of the young adults had at least one residential move during childhood, and 67 percent had at least one stage of childhood in which their mother on average worked 1,000 or more hours per year. Average current income for the young adults is $40,135 (exp(10.6)). Average past income is income averaged over the last five years (or as many of the last five as are available). Just over 50 percent of the young adults have education beyond high school. The rest of the variables describe religious affiliation (no affiliation is the omitted category), race, southern residence, female headship, and age.

5. Estimation Methods

Our models have limited dependent variables (giving and volunteering are tobits), and our eight alternative specifications of family structure are non-nested. In this setting one estimation approach is to use maximum likelihood to estimate the models and then use a Cox likelihood test to do model comparison (Davidson and MacKinnon 2004, pp. 665-675). However, the Cox test has several disadvantages: little knowledge of the finite-sample properties of the bootstrapped

[8]We use $29,000 as a cut-off for low-income to match in 2000 dollars the income category in Duncan et al. (1998).

test statistic, cumbersome testing when there are more than two specifications, and most unsettling, the possibility for ambiguous test results. Ambiguous test results are not uncommon in applied work, and when they occur it is not clear how to interpret the predictions from the various models under consideration.

Our motivation to use a Bayesian approach is that it allows our model comparison problem to be handled in a more straightforward manner. Because many readers may be less accustomed to Bayesian methods, we provide a brief overview (see Koop 2003 and Geweke 2005 for more details). In the Bayesian approach the "β parameters" (our short-hand term for all the parameters $\boldsymbol{\delta}$, $\boldsymbol{\lambda}$, and $\boldsymbol{\theta}$ in (3)) are assumed to be random variables. Estimation proceeds by selecting a prior density for the β parameters, selecting a likelihood function for the y_T (e.g, assume the u_T are normal), and writing down the posterior density of the β parameters using Bayes' Theorem:

$$p(\boldsymbol{\beta}, h \mid y_T) \quad \propto \quad p(y_T \mid \boldsymbol{\beta}, h) \quad p_0(\boldsymbol{\beta}, h) \tag{8}$$

where $p(y_T \mid \boldsymbol{\beta}, h)$ is the likelihood, $p_0(\boldsymbol{\beta}, h)$ is the prior density, and $h \equiv 1/\sigma^2$. Once the posterior density $p(\boldsymbol{\beta}, h \mid y_T)$ is known, it can be used to estimate or predict any quantity of interest. For example, the mean $\boldsymbol{\beta}$—analogous to the point estimate of the slope parameters in ordinary least squares—is:

$$\mathrm{E}[\boldsymbol{\beta}] \quad = \quad \int \boldsymbol{\beta} \; p(\boldsymbol{\beta}, h \mid y_T) \, \mathrm{d}\boldsymbol{\beta}. \tag{9}$$

In our models y_T is either log charitable giving or log volunteer hours. We assume the u_T are normal, hence the likelihood function of the data y_T is normal conditional on the β parameters and h. For the parameters' prior density we use the independent normal-gamma

prior: $p_0(\boldsymbol{\beta}, h) = p_0(\boldsymbol{\beta})\ p_0(h)$ where $p_0(\boldsymbol{\beta})$ is normal and $p_0(h)$ is Gamma. For most of the β parameters we set the mean of the prior density equal to zero and the standard deviation to .75. In a few cases we have good prior information about a parameter and set the prior accordingly (e.g., we set the mean elasticity of giving with respect to current young adult income at 1.0 and the standard deviation at .5). We set the prior mean of h to be $1/\hat{\sigma}^2$ where $\hat{\sigma}^2$ comes from maximum likelihood estimation of the model. We understand that some may question these settings, so acccordingly we give the prior density very little weight relative to the data by setting the prior's degrees of freedom to only five (compared to the data's n = 1,011).

The posterior density $p(\boldsymbol{\beta}, h \mid y_T)$ cannot be analytically solved, but can be simulated. We use the Gibbs sampler with data augmentation to simulate the posterior density of the parameters (see Koop 2003 and Geweke 2005; the algorithm was developed by Chib 1992). We take 1,000 burn-in draws from the posterior density to allow the effect of the initial draw to dissipate. We then take 50,000 additional draws, but to mitigate autocorrelation among successive draws we thin the chain of draws by using only one out of every five draws, leaving us with 10,000 draws from each parameter's posterior density. We check convergence of the thinned chain by making sure that the 10,000 draws are not autocorrelated and by checking Geweke's convergence diagnostic (a test of the equality of two means, where the first mean is calculated using the first 1,000 draws and the second using the last 4,000; see Koop 2003, p. 66). In the future we plan to conduct the simulation so that it is robust against heteroskedastic errors (Lancaster 2004, pp. 159-161).[9]

[9] Computations were done in part using the Bayesian Analysis, Computation, and Communication software (http://www.econ.umn.edu/~bacc) and in part using our own software.

The starting point for Bayesian model comparison is to re-write equation (8) to show explicit dependence on the particular specification of family structure being used (M_i):

$$p(\boldsymbol{\beta}, h \mid y_T, M_i) = \frac{p(y_T \mid \boldsymbol{\beta}, h, M_i) \quad p_0(\boldsymbol{\beta}, h \mid M_i)}{p(y_T \mid M_i)} \tag{8'}$$

where $p(y_T \mid M_i)$ is called the "marginal likelihood." If we had an estimate of the marginal likelihood and a prior belief about the probability ($p(M_i)$) that M_i is the correct model we could use Bayes Theorem again to calculate the posterior model probability $p(M_i \mid y_T)$—the posterior probability that M_i is the correct model. More accurately, we can calculate a posterior odds ratio between two models—$p(M_2 \mid y_T)/p(M_1 \mid y_T)$—along with an assumption that our set of models is exhaustive ($p(M_1 \mid y_T) + p(M_2 \mid y_T) = 1$) to calculate the posterior model probabilities $p(M_1 \mid y_T)$ and $p(M_2 \mid y_T)$. Extending the procedure to compare more than two models is straightforward.

Ambiguity can still arise when more than one specification has a non-negligible probability (e.g., if there are two specifications and the posterior model probabilities of both are .5), but the ambiguity can be handled in an intuitively appealing way: the posterior of any quantity of interest is a posterior model probability-weighted average of the densities from the models with a non-negligible probability—Bayesian model averaging.

We estimate the marginal likelihood in the following way. After simulating the parameters' posterior densities for each of the eight model specifications (denoted M_i, $i = 1,...,8$) we estimate the eight marginal likelihoods $p(y_T \mid M_i)$ using the Gelfand-Dey method (Koop pp. 104-106). Using the marginal likelihoods and assuming equal prior probability on each model we calculate seven posterior odds ratios. Assuming our eight model specifications are exhaustive we can solve for the eight $p(M_i \mid y_T)$.

We use these methods to compare different specifications of family structure, but we have not yet used the methods to compare different specifications of income during childhood. However, results based on maximum likelihood methods indicate that stage-specific income estimates are robust to functional form (Bandy and Wilhelm 2003).

6. Results

6.1 A first look at the association between prosocial behavior and childhood family structure and income.

Before conducting the Bayesian analysis we take a first look at the association between prosocial behavior and childhood family structure and income using simple methods. Table 5 columns 2–5 split the sample first by ever having been in a non-intact family (columns 2 and 3) and then by ever having been in a low-income family (columns 4 and 5). Young adults who were ever in a non-intact family are much less likely to make a charitable gift (33 percent versus 49 percent). The average gift of those who give is also substantially smaller ($305 versus $573), while the difference in medians is not as great ($175 versus $200). The descriptive statistics are different for volunteering: the differences between young adults who experienced non-intact families and those who always experienced intact families are small, and the conditional median among young adults who experienced non-intact families is higher (52 hours versus 36).

Comparing young adults who lived in a low-income family during at least one childhood stage with those whose families were always middle or high income shows a charitable giving pattern similar to the non-intact–intact pattern. However, the low-income volunteering pattern is not the same as the non-intact–intact volunteering pattern: those whose families had low income during a childhood stage volunteer noticeably less (17 percent versus 28 percent), but when they

do volunteer they volunteer more hours.

The impressions from Table 5 are reinforced by the ordinary least-squares estimates in Table 6. For each of the three prosocial behaviors we estimate a model with a single dummy variable indicating that the young adult was in a non-intact family sometime during childhood, and then a model adding a dummy variable that the young adult was in a family where average income in any stage was less than $29,000. The estimates from the log charitable giving model indicate a large negative association with having been in a non-intact family. The association drops in magnitude but remains large when the low-income dummy variable is added. Log giving also has a large negative association with having been in a low-income family.

The log volunteering estimates are different: there is a weak association with having been in a non-intact family and the association flips sign when the low-income dummy is added. The low-income dummy itself has a large negative association with volunteering.

6.2 Bayesian analysis of charitable giving

Bayesian analysis of the log charitable giving model begins by simulating the posterior parameter density for each of the eight family structure specifications, and calculating the eight posterior model probabilities $p(M_i \mid y_T)$ listed in Table 7 (the β parameters now include the other independent variables listed in Table 5). Table 7, column 1 indicates that the number of transitions family structure has the highest posterior model probability:.47, just over twice the next highest probability of .22 for the specification based on complimentarity across stages. All of the other family structure specifications have posterior probabilities.13 or less.

When we look at the number of transitions specification, the posterior density for the parameter describing one Stage 3 transition is very similar to the posterior density for the

parameter describing two or more Stage 3 transitions. Therefore we estimate a specification with a single dummy variable indicating any transition in Stage 3: the posterior model probability is 2.5 times the posterior model probability of the number of transitions specification, suggesting that the any transition specification is much more likely to be the correct specification. We extend the specification to include any-transition dummies in Stages 1 and 2 and re-calculate the posterior model probabilities shown in Table 7, column 2: the any transition specification is the best specification by far—the posterior model probability is .66.

Next, we summarize information about the posterior density for the β parameters in the any transitions specification. Figure 1 shows a kernel density estimate of the posterior density for the parameter any-transition-in-Stage 3; the posterior density is normal (the dashed line is a normal density for comparison). Figure 1 shows the mean of the any-transition-in-Stage 3 parameter to be −.76 and the standard deviation .31. Almost all of the posterior probability (.994) lies to the left of zero. Ninety-five percent of the probability is between the two horizontal lines at −1.37 and −.17—this is the 95 percent highest posterior density interval, analogous to a confidence interval in classical statistics. The same information about the posterior is summarized in the Table 8 row 3. The final column in row 3 contains the posterior odds ratio: $p(M_{zero} \mid y_T) / p(M_{Full} \mid y_T)$ where M_{zero} is a model where the any-transition-in-Stage 3 parameter is constrained to be zero and M_{Full} is the full (unconstrained) model. A small odds ratio is evidence against M_{zero} and in favor of the parameter's belonging in the model; the .11 is strong evidence that the any-transition-in-Stage 3 parameter belongs in the model.

The other rows in Table 8 describe features of the posterior densities for the other β parameters as was just described for the any-transition-in-Stage 3 parameter. To make reading the table easier, we use bold font for the row when the one-sided probability (column 3) is .90 or

greater. However, it should be remembered that while the one-sided probability and highest posterior density interval (columns 4 and 5) provide intuition about a parameter's belonging in the model, the final judgment should be based on the posterior odds ratio in column 6.

Stage 3 log family income (row 6) is positively associated with giving in young adulthood. The one-sided probability is one and the 95 percent highest posterior density interval does not include zero. Most importantly, the posterior odds ratio is very small (.05)—hence the evidence that adolescent family income is positively associated with giving in young adulthood is even stronger than the evidence that an adolescent family structure transition is negatively associated with subsequent giving. Obviously, this implies that low-income during adolescence is negatively associated with subsequent young adult giving.

There is some counter-intuitive evidence in Table 8 that a Stage 2 family structure transition is positively associated with subsequent giving (row 2). The one-sided probability is .96, but the 95 percent highest posterior density interval includes zero and the posterior odds ratio while less than one, is not very close to zero (.57). In short, there is some evidence of a positive association, but the magnitude of the association is likely small. The strength of the evidence does not approach that of the evidence concerning an adolescent family structure transition.

The posterior information summarized in Table 8 describes the association between the β parameters and the latent log giving. For a given set of young adult characteristics—e.g., a white, college-educated Protestant woman, aged 30, currently heading a family with average income ($40,000), and who experienced no family structure transitions and had average income in childhood ($45,000)—the posterior density of the β parameters generates a posterior density of latent log giving (calculated from equation 3). Changing the characteristics (e.g., adding one family structure transition in Stage 3) generates a second posterior density of latent log giving,

and the difference between the first and second posterior densities can be used to generate differences in estimates of quantities of interest such as the probability of giving or the amount given conditional on making a gift.

For instance, compare the woman with the characteristics just listed to a second woman with identical characteristics except the second woman had experienced a family structure transition in Stage 3: the Stage 3 transition woman's probability of giving is estimated to be ten points lower (.50 versus .60). Conditional on making a gift, the Stage 3 transition woman's giving is 30 percent less.

We estimated differences in the probability of giving and the conditional amount given associated with differences in Stage 3 family income. We compare two young women who had the characteristics listed above except that the first had average family income throughout childhood while the second was in a family averaging $10,000 per year less in Stage 3 (and neither young adult had any family structure transitions during childhood). The $10,000 less income in Stage 3 is associated with a two point drop in the probability of giving, and conditional on giving the amount given is seven percent less. If the second woman was in a family whose income was poverty level in Stage 3—$20,000 per year, compared to the first woman in a family whose income was at the average of $50,000—the probability of giving is estimated to be ten points lower and the conditional amount given 28 percent less. The charitable giving of the second woman is similar to the woman described earlier, who in adolescence lived in a family with average income but experienced a family structure transition.

6.3 Bayesian analysis of volunteering

Table 9 lists the eight posterior model probabilities from our analysis of log volunteering.

Unlike the giving analysis, no one family structure specification is clearly a better fit over the others. The most likely specification—state × stage—has a posterior model probability of only .28. This means that if we were to describe the posterior density of the state × stage specification there would be a good chance (.72) that we would be describing a specification that did not generate the data. The event × stage specification is nearly as likely: the posterior model probability is .23, and two other specifications have posterior model probabilities not much less (flexible adolescent event and complementarity across stages).

With no one specification providing a clearly better fit over the others, one must look across the posterior densities from all eight specifications to see if any systematic pattern emerges. Across five of the specifications (state × stage, flexible early event, flexible adolescent event, presumptions about stress, and complementarity across stages) there is a negative association between being in a birth mother only family and subsequent volunteering. Therefore we calculated the Bayesian model average (weighted by the probabilities in Table 9) across the eight specifications of predicted (latent) log volunteering for a young adult in a birth mother-only family throughout childhood to compare to a young adult in a two-parent family throughout childhood. The difference between the two densities (two-parent minus birth mother-only) of log volunteering has mean .56 (s.d. = .29). The probability is .97 that the difference is positive and the 95 percent highest posterior density interval is .00 to 1.13. Hence, there is some evidence that growing up in a birth mother-only family is negatively associated with subsequent volunteering.

Also across five specifications (state × stage, event × stage, number of transitions, flexible adolescent event, and complementarity across stages) there is a positive association between a marriage during middle childhood and subsequent volunteering. We use Bayesian

model averaging again to compare a young adult born into a birth mother-only family but whose mother married in middle childhood to another young adult who lived in a birth mother-only family throughout childhood. The difference between the two densities of log volunteering has mean 1.58 (s.d. = .37). The probability is one that the difference is positive and the 95 percent highest posterior density interval is .84 to 2.31. Compared to growing up in a birth mother-only family, a young adult whose mother married in middle childhood is predicted to do much more volunteering.

Finally, there is a clear positive association between Stage 3 log family income and volunteering in young adulthood. The eight posterior densities for the Stage 3 income parameter are similar across the family structure specifications. The Bayesian model average of the eight posterior densities indicate a mean association of .73 (std. dev. = .20). The probability that the Stage 3 income effect is positive is one. The 95 percent highest posterior density interval is .35 to 1.11. Finally, compare two women with the characteristics described in Section 6.2, except that both women lived in a two-parent family throughout childhood, one woman's family had income at the poverty level in Stage 3 ($20,000 per year), while the other woman's family had income at the average in Stage 3 ($50,000). For the woman with poverty level income in Stage 3, the probability of volunteering is estimated to be four points lower and the conditional number of hours volunteered 19 percent less.

7. Discussion and Conclusions

There are two main results. First, both family instability and low income in adolescence are negatively associated with subsequent charitable giving in young adulthood. Second, low income in adolescence is negatively associated with volunteering in young adulthood. That the

associations involve family instability and low-income in adolescence but not in other stages of childhood indicates that stage-based theories of development constructed to explain prosocial behavior in the laboratory are also necessary to explain policy-relevant prosocial behavior. Furthermore, the associations involving adolescence point to the empathic orientation and internalized values stages of development as important stages in the development of socially significant prosocial behavior.

A third result is that young adults who grew up in birth mother-only families do less volunteering than young adults who grew up in two-parent families or than young adults who started off in a birth mother-only family but whose mother married in middle childhood.

The results extend the demographic literature on children's outcomes. Up until now, the children's outcomes literature had established that family instability and low income are negatively associated with a range of children's outcomes that can be classified as important personal outcomes. The present results indicate that the negative associations extend to important prosocial outcomes as well.

The paper's use of Bayesian model comparison methods suggests a coherent approach to choose among *a priori* reasonable family structure specifications. When a clearly better specification emerges (as the any transition specification did in the analysis of charitable giving) more confidence can be placed on the results from that specification. When a clearly better specification does not emerge (as in the analysis of volunteering) quantities of interest can still be estimated by averaging the results from the possible specifications. Although the paper considered eight family structure specifications, those eight are, of course, not exhaustive. However, the approach in the paper can be used to evaluate additional family structure specifications that might be of interest.

Does the evidence of an association between family instability and low-income in adolescence with subsequent prosocial behavior indicate causality? That the family instability and low-income in adolescence is measured at least nine years prior to the giving and volunteering measurements rules out simultaneity, thereby suggesting some degree of causality. The counter-argument would have to be that there is an omitted variable correlated both with young adult giving and volunteering and earlier family instability and low-income. Further the omitted variable would have to be correlated with family instability and low-income in adolescence only, or else we would have seen the effects of the omitted variable in the early/middle childhood family instability and low-income estimates as well. Hence, we think an omitted variable argument is more likely to undercut a causal explanation of the lower volunteering done by young adults raised in birth mother-only families than it is to undercut a causal explanation of the lower giving done by young adults who experienced family instability and low-income in adolescence and the lower volunteering done by young adults who experienced low-income in adolescence. In addition, it is family instability and low-income at the time of the empathic orientation and internalized values stages that we find to be negatively associated with the giving and volunteering, prosocial behaviors that other work has found to be positively correlated with successful completion of those stages (Bekkers and Wilhelm 2007). While the adolescent timing of the associations we find makes conjectures about causality reasonable, work evaluating causality using sibling fixed-effects is needed. We are planning this work.

Finally, even if one suspects causality behind the present evidence, the evidence does not indicate which parental investments in children's prosocial behavior—role modeling, other-oriented induction, expression of care and warmth, praise, providing opportunities to help,

cognitive development—might be disrupted by family instability and low income in adolescence. Data on adolescents' charitable giving and volunteering, and helping others in the *CDS* have the potential to reveal which parental investments in children's prosocial behavior are disrupted by family instability and low income.

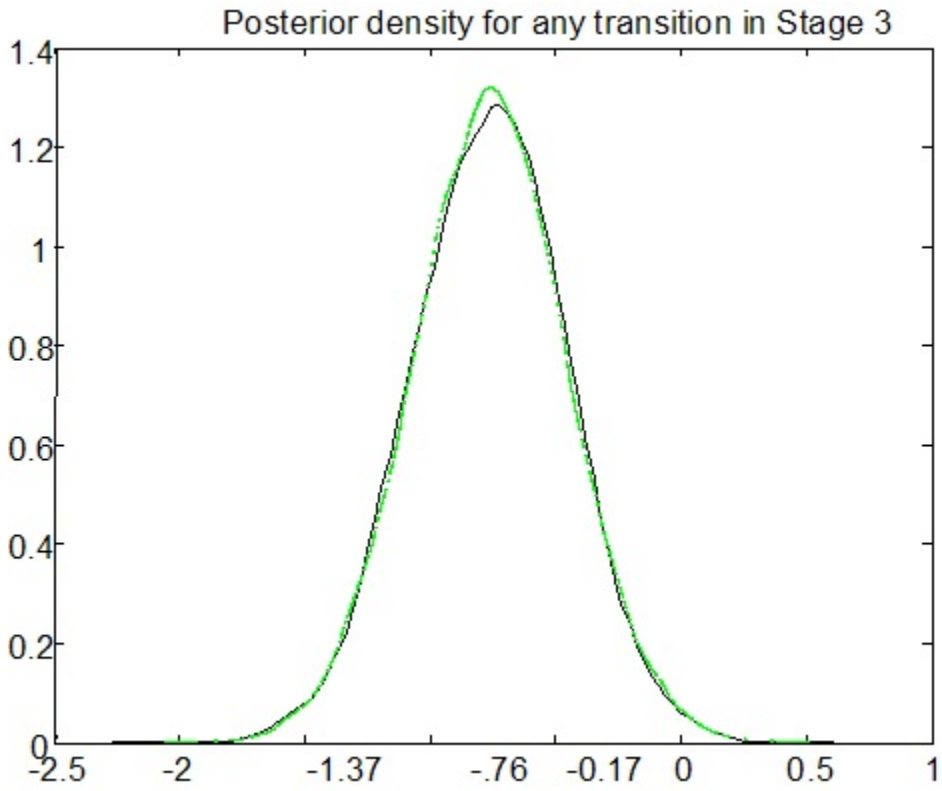
Posterior density for any transition in Stage 3
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-2.5
-2
-1.37
-.76
-0.17
0
0.5
1

Table 1. Family Structure Histories and a State × Stage Specification.

		Stage 1			Stage 2			Stage 3		
State: Two biological parents Biological mother only Biological mother and step-father		TP	BM	SF	TP	BM	SF	TP	BM	SF
Family Structure History	Sample fraction									
1. Two-parent family, always (T)	.613	1	.	.	1	.	.	1	.	.
2. Two parent, divorce stage 1 (T - D1)	.032	1	1	.	.	1	.	.	1	.
3. Two parent, divorce stage 1, stepfather stage 1 (T - D1 - S1)	.004	1	1	1	.	.	1	.	.	1
4. Two parent, divorce stage 1, stepfather stage 2 (T - D1 - S2)	.015	1	1	.	.	1	1	.	.	1
5. Two parent, divorce stage 1, stepfather stage 3 (T - D1 - S3)	.003	1	1	.	.	1	.	.	1	1
6. Two parent, divorce stage 2 (T - D2)	.034	1	.	.	1	1	.	.	1	.
7. Two parent, divorce stage 2, stepfather stage 2 (T - D2 - S2)	.016	1	.	.	1	1	1	.	.	1
8. Two parent, divorce stage 2, stepfather stage 3 (T - D2 - S3)	.011	1	.	.	1	1	.	.	1	1
9. Two parent, divorce stage 3 (T - D3)	.037	1	.	.	1	.	.	1	1	.
10. Two parent, divorce stage 3, stepfather stage 3 (T - D3 - S3)	.008	1	.	.	1	.	.	1	1	1

Family Structure History (continued)		TP	BM	SF	TP	BM	SF	TP	BM	SF
11. Birth mother only, always (B)	.024	.	1	.	.	1	.	.	1	.
12. Birth mother, stepfather stage 1 (B - S1)	.020	.	1	1	.	.	1	.	.	1
13. Birth mother, stepfather stage 1, divorce stage 1 (B - S1 - D1)	.001	.	1	1	.	1	.	.	1	.
14. Birth mother, stepfather stage 1, divorce stage 2 (B - S1 - D2)	.007	.	1	1	.	1	1	.	1	.
15. Birth mother, stepfather stage 1, divorce stage 3 (B - S1 - D3)	.003	.	1	1	.	.	1	.	1	1
16. Birth mother, stepfather stage 2 (B - S2)	.003	.	1	.	.	1	1	.	.	1
17. Birth mother, stepfather stage 2, divorce stage 2 (B - S2 - D2)	.003	.	1	.	.	1	1	.	1	.
18. Birth mother, stepfather stage 2, divorce stage 3 (B - S2 - D3)	.003	.	1	.	.	1	1	.	1	1
19. Birth mother, stepfather stage 3 (B - S3)	.0004	.	1	.	.	1	.	.	1	1
20. Birth mother, stepfather stage 3, divorce stage 3 (B - S3 - D3)	.003	.	1	.	.	1	.	.	1	1
21. None of the above	.159	–	–	–	–	–	–	–	–	–
Fraction experiencing the state	1.000	.944	.204	.057	.892	.253	.124	.816	.258	.139

Notes: The sample fraction in column 2 is based on the weighted data. Columns 3 - 11 show the map between the 20 family histories and the nine state × stage variables (“.” indicates the variable is set to “zero,” but using “.” makes the table easier to read). In any one stage a child can spend time in more than one state (hence the within-state fractions in the last row do not add to one).

Children in row 21 are those who do not live with their birth mothers throughout ages 0-16 or who experience three or more family structure transitions. The nine state × stage variables in the column do not cover situations in which the child spends time away from the birth mother; an additional variable per stage captures these situations (the fractions experiencing this state × stage are .026, .057, and .107).

Table 2. Restrictions Imposed by a State × Stage Specification of Family Structure.

State × stage = {ever with two-parent family, ever with birth mother only, ever with step-father}
× { stage 1, stage 2, stage 3 }

There are 20 possible family histories where the child is always with the birth mother and experiences two or fewer transitions. The state × stage specification contains nine variables, hence there are 11 implicit restrictions:

T-D1-S2 – T-D1 = T-D2-S2 – T-D2

T-D1-S3 – T-D1 = T-D2-S3 – T-D2

T-D1-S3 – T-D1 = T-D3-S3 – T-D3

B-S2-D3 – B-S2 = B-S1-D3 – B-S1

B-S3-D3 = B-S3

B-S3 = B-S1-D1 – B-S1-D2 + B-S2-D3

B-S3 – B = B-S2-D3 – B-S2-D2

T-D2-S3 – T-D2 = B-S3 – B

T-D2-S2 – T-D2 = B-S2 – B

T-D3 – T = B-S2-D3 – B-S2

T-D1-S2 – T-D1-S1 = B-S2 – B-S1

Table 3. Restrictions Imposed by an Event × Stage Specification of Family Structure.

Event × Stage = { divorce, step-parent arrives } × { stage 1, stage 2, stage 3 }

There are 20 possible family histories where the child is always with the birth mother and experiences two or fewer transitions. The specification contains six event × stage variables plus two variables to describe the child's initial state: born into a mother-only or two parent family. Hence there are 12 implicit restrictions:

T-D1-S1 – T-D1 = B-S1

B-S1-D1 – T-D1 = B-S1

B-S1-D2 – B-S1 = T-D2

T-D1-S2 – T-D1 = B-S2

T-D1-S2 – T-D1 = B-S2-D2 – T-D2

B-S1-D3 – B-S1 = T-D3

B-S2-D3 – (T-D1-S2 – T-D1) = T-D3

T-D2-S2 – T-D2 = T-D1-S2 – T-D1

T-D1-S3 – T-D1 = T-D2-S3 – T-D2

T-D1-S3 – T-D1 = T-D3-S3 – T-D3

T-D1-S3 – T-D1 = B-S3-D3 – T-D3

T-D1-S3 – T-D1 = B-S3

Table 4. Sequences Without Stages Specifications: Comparing Two Samples.

Sequence	Sample in Hill et al. (2001) (1)	Sample and classification in the present paper: Sample close to Hill et al. (2)	Reclassify leaver-returners as "other" (3)	Reclassify 3+ events as "other" (4)	Include children from re-contact sample (5)	Include children from non-response families and stage 3 movers out (6)
Mother-only all years	.030	.018	.018	.018	.024	.024
Mother-only to two-parent and remain two-parent	.035	.024	.024	.022	.022	.020
Mother-only to two-parent and back to mother-only	.025	.028	.028	.015	.018	.016
Two-parent all years	.685	.672	.660	.660	.640	.602
Two-parent to mother-only	.085	.092	.092	.087	.092	.095
Two-parent to mother-only and back to two-parent	.080	.092	.092	.063	.061	.057
Other sequences	.060	.074	.086	.134	.144	.185
Inclusion and classification decisions:						
Include children from re-contact sample	No	No	No	No	Yes	Yes

Include children ever in a non-response family or who moved from parents during stage 3	No	No	No	No	No	Yes
Classify "leave-returners" as "other"	No (probably)	No	Yes	Yes	Yes	Yes
Classify 3+ events as "other"	Yes	No	No	Yes	Yes	Yes
n	1,325	800	800	800	915	1,011

Table 5. Descriptive Statistics.

Variable / Sample:	All (1)	Always intact (2)	Ever non-intact (3)	Always middle- or high-income (4)	Ever low-income (5)
Charitable giving					
Fraction giving	.43	.49	.33	.48	.30
Mean gift (conditional)	493 (1798)	573 (2125)	305 (416)	536 (1997)	327 (540)
Median gift (conditional)	200	200	175	200	152
Volunteering					
Fraction volunteering	.25	.26	.22	.28	.17
Mean hours (conditional)	123 (261)	125 (293)	119 (189)	118 (268)	145 (232)
Median hours (conditional)	40	36	52	40	48
Childhood family structure and income					
Ever non-intact	.38	0	1	.27	.66
Ever low-income	.29	.16	.50	0	1
Other childhood events					
Ever moved during childhood (ages 0 - 16)	.84	.78	.94	.80	.93
Mother ever averaged 1,000+ work during childhood (ages 0 - 16)	.67	.63	.73	.68	.64

Young adult characteristics					
Log young adult current income[a]	10.6 (.81)	10.7 (.75)	10.3 (.84)	10.7 (.78)	10.3 (.84)
Log young adult average past income	10.4 (.68)	10.6 (.63)	10.2 (.89)	10.6 (.64)	10.2 (.69)
Any post-high school education	.52	.61	.39	.60	.33
Catholic	.21	.23	.17	.24	.17
Protestant	.43	.43	.42	.41	.46
Jewish or other religious affiliation	.13	.14	.11	.13	.12
African-American	.15	.07	.27	.05	.37
Resides in the south	.39	.38	.42	.34	.52
Female household head	.27	.22	.34	.24	.33
Age of household head	29	29	29	29	29
Sample sizes					
Charitable giving	1,011	584	427	604	407
Volunteering	954	555	399	577	377

Notes:

[a] The 10.7 versus 10.3 difference in log incomes is $44,356 versus $29,733 in levels.

Table 6. Prosocial Behavior Regressed on Ever in a Non-intact Family and Ever Low-income.

Dependent variable:	Log charitable giving		Log volunteering	
Variable				
Ever non-intact	−.55	−.39	−.08	.04
	(.13)	(.14)	(.15)	(.16)
Ever low-income	−	−.47	−	−.35
		(.14)		(.15)
constant	1.53	1.61	.96	1.02
	(.09)	(.10)	(.10)	(.10)
n	1,011		954	

Notes: The estimates are ordinary least-squares.

Table 7. Charitable Giving Models: Posterior Model Probabilities for Eight Specifications.

	Posterior model probability	
Specification of family structure	(1)	(2)
State × stage	.02	.01
Event × stage	.08	.05
Sequence without stages	.03	.02
Transitions		
Number of transitions	.47	–
Any transition	–	.66
Flexible early event	.01	.00
Flexible adolescent event	.05	.04
Presumptions about stress	.13	.08
Complementarity across stages	.22	.14

Notes: The dependent variable is the log of charitable giving. Column 1 contains the probabilities using the number of transitions specification of family structure as one of the eight models. In column 2, the number of transitions specification is replaced with the any transition specification.

Table 8. Charitable Giving Model: Posterior Distribution for the Any Transition Specification.

β parameters	Mean (1)	Std. dev. (2)	Prob. $\beta_j > 0$ or $\beta_j < 0$ (3)	95 percent highest posterior density interval (4)		Posterior odds for $\beta_j = 0$ (5)
Stage 1 any transition	.01	.31	.51	−.61	.62	2.55
Stage 2 any transition	**.50**	**.29**	**.96**	**−.07**	**1.08**	**.57**
Stage 3 any transition	**−.76**	**.31**	**.99**	**−1.37**	**−.17**	**.11**
Stage 1 log family income	−.10	.32	.62	−.73	.54	2.21
Stage 2 log family income	−.37	.36	.85	−1.07	.33	1.23
Stage 3 log family income	**.78**	**.28**	**1.00**	**.23**	**1.35**	**.05**
Stage 1 family move	.00	.25	.50	−.49	.49	3.11
Stage 2 family move	−.04	.23	.57	−.49	.40	3.26
Stage 3 family move	−.26	.24	.85	−.73	.21	1.81
Stage 1 mother averages 1,000+ hours	.11	.28	.66	−.43	.66	2.54
Stage 2 mother averages 1,000+ hours	−.14	.26	.71	−.66	.36	2.52
Stage 3 mother averages 1,000+ hours	−.02	.25	.43	−.53	.46	2.98
Log young adult current income	**.94**	**.24**	**1.00**	**.48**	**1.43**	**.01**
Log young adult average past income	**.38**	**.27**	**.92**	**−.16**	**.91**	**5.31**
Any post-high school education	**.82**	**.17**	**1.00**	**.49**	**1.15**	**.00**
Catholic	−.12	.28	.66	−.67	.42	1.65
Protestant	**.34**	**.24**	**.92**	**−.13**	**.81**	**.75**
Jewish or other religious affiliation	**.74**	**.30**	**.99**	**.15**	**1.34**	**.08**

African-American	**−1.91**	**.35**	**1.00**	**−2.59**	**−1.23**	**.00**
Resides in the south	**.34**	**.22**	**.94**	**−.10**	**.77**	**1.15**
Female	−.04	.21	.57	−.46	.38	3.53
Age	**.07**	**.05**	**.94**	**−.02**	**.16**	**5.15**
constant	−19.9	2.7	1.00	−25.4	−14.7	0.00

Notes: The table summaries the posterior density for the $\boldsymbol{\delta}$, $\boldsymbol{\lambda}$, $\boldsymbol{\beta}$ parameters of a log charitable giving model specifying family structure with the number of transitions by stage (to ease discussion we will refer to all of these parameters as "β parameters"). Dummy variables indicating missing data for education, religious affiliation, and race are included in the model but not displayed.

Column 1: Mean of the posterior density.
Column 2: Standard deviation of the posterior density.
Column 3: One-sided posterior probability: P[$\beta_j > 0$] when the mean of β_j is positive;
P[$\beta_j < 0$] when the mean of β_j is negative.
Columns 4 and 5: 95 percent highest posterior density interval—an interval centered at the mean of β_j and capturing .95 of the posterior density.
Column 6: Posterior model probability odds ratio: $p(M_{zero} \mid y_T) / p(M_{Full} \mid y_T)$ where M_{zero} is a model where the row variable is constrained to have zero effect on log giving and M_{Full} is the full (unconstrained) model. A small odds ratio is evidence against M_{zero}.

To ease finding the more important results, variables with one-sided probabilities greater than .90 are printed in bold.

Table 9. Volunteering Models: Posterior Model Probabilities for Eight Specifications.

Specification of family structure	Posterior model probability
State × stage	.28
Event × stage	.23
Sequence without stages	.02
Number of transitions	.03
Flexible early event	.05
Flexible adolescent event	.16
Presumptions about stress	.09
Complementarity across stages	.14

Notes: The dependent variable is the log of volunteering hours.

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Appendix Tables

Table A.1. Family Structure Histories and a Flexible Early Event Specification.

Family Structure History	Sample fraction	Specification of variables: Stage 1 marriage	Stage 1 divorce	Stage 1 marriage and divorce	Leaves stage 1 with one parent	Leaves stage 1 with two parents
1. Two-parent family, always (T)	.613	.	.	.	.	.
2. Two parent, divorce stage 1 (T - D1)	.032	.	1	.	.	.
3. Two parent, divorce stage 1, stepfather stage 1 (T - D1 - S1)	.004	.		1	.	.
4. Two parent, divorce stage 1, stepfather stage 2 (T - D1 - S2)	.015	.	1	.	.	.
5. Two parent, divorce stage 1, stepfather stage 3 (T - D1 - S3)	.003	.	1	.	.	.
6. Two parent, divorce stage 2 (T - D2)	.034	.	.	.	.	1
7. Two parent, divorce stage 2, stepfather stage 2 (T - D2 - S2)	.016	.	.	.	.	1
8. Two parent, divorce stage 2, stepfather stage 3 (T - D2 - S3)	.011	.	.	.	.	1
9. Two parent, divorce stage 3 (T - D3)	.037	.	.	.	.	1
10. Two parent, divorce stage 3, stepfather stage 3 (T - D3 - S3)	.008	.	.	.	.	1

Family Structure History (continued)	Sample fraction	Stage 1 marriage	Stage 1 divorce	Stage 1 marriage and divorce	Leaves stage 1 with one parent	Leaves stage 1 with two parents
11. Birth mother only, always (B)	.024	.	.	.	.	.
12. Birth mother, stepfather stage 1 (B - S1)	.020	1	.	.	.	.
13. Birth mother, stepfather stage 1, divorce stage 1 (B - S1 - D1)	.001	.	.	1	.	.
14. Birth mother, stepfather stage 1, divorce stage 2 (B - S1 - D2)	.007	1	.	.	.	.
15. Birth mother, stepfather stage 1, divorce stage 3 (B - S1 - D3)	.003	1	.	.	.	.
16. Birth mother, stepfather stage 2 (B - S2)	.003	.	.	.	1	.
17. Birth mother, stepfather stage 2, divorce stage 2 (B - S2 - D2)	.003	.	.	.	1	.
18. Birth mother, stepfather stage 2, divorce stage 3 (B - S2 - D3)	.003	.	.	.	1	.
19. Birth mother, stepfather stage 3 (B - S3)	.0004	.	.	.	1	.
20. Birth mother, stepfather stage 3, divorce stage 3 (B - S3 - D3)	.003	.	.	.	1	.
21. None of the above	.159	–	–	–	–	–
Fraction	1.000	.037	.088	.026	.021	.176

Notes: “Leaves stage 1 with one parent” means that the child experienced no family structure events in stage 1, left stage 1 with one parent, and experienced at least one family structure event in either stage 2 or 3; that is, the child was in a mother-only family at birth, nothing happened through the end of stage 1, but something happened afterwards. “Leaves stage 1 with two parents” means that the child was in a two-parent family at birth, nothing happened through the end of stage 1, but something happened afterwards. The other variables in the specification are two-parent family throughout childhood (.616) and birth mother-only throughout childhood (.036).

Table A.2. Family Structure Histories and a Flexible Adolescent Event Specification.

Family Structure History	Sample fraction	Specification of variables: Leaves stage 2 with one parent	Leaves stage 2 with two parents	Stage 3 marriage	Stage 3 divorce	Stage 3 marriage and divorce
1. Two-parent family, always (T)	.613	.	.	.	.	.
2. Two parent, divorce stage 1 (T - D1)	.032	1	.	.	.	.
3. Two parent, divorce stage 1, stepfather stage 1 (T - D1 - S1)	.004	.	1	.	.	.
4. Two parent, divorce stage 1, stepfather stage 2 (T - D1 - S2)	.015	.	1	.	.	.
5. Two parent, divorce stage 1, stepfather stage 3 (T - D1 - S3)	.003	.	.	1	.	.
6. Two parent, divorce stage 2 (T - D2)	.034	1	.	.	.	.
7. Two parent, divorce stage 2, stepfather stage 2 (T - D2 - S2)	.016	.	1	.	.	.
8. Two parent, divorce stage 2, stepfather stage 3 (T - D2 - S3)	.011	.	.	1	.	.
9. Two parent, divorce stage 3 (T - D3)	.037	.	.	.	1	.
10. Two parent, divorce stage 3, stepfather stage 3 (T - D3 - S3)	.008	.	.	.	.	1

Family Structure History (continued)	Sample fraction	Leaves stage 2 with one parent	Leaves stage 2 with two parents	Stage 3 marriage	Stage 3 divorce	Stage 3 marriage and divorce
11. Birth mother only, always (B)	.024	.	.	.	.	.
12. Birth mother, stepfather stage 1 (B - S1)	.020	.	1	.	.	.
13. Birth mother, stepfather stage 1, divorce stage 1 (B - S1 - D1)	.001	1	.	.	.	.
14. Birth mother, stepfather stage 1, divorce stage 2 (B - S1 - D2)	.007	1	.	.	.	.
15. Birth mother, stepfather stage 1, divorce stage 3 (B - S1 - D3)	.003	.	.	.	1	.
16. Birth mother, stepfather stage 2 (B - S2)	.003	.	1	.	.	.
17. Birth mother, stepfather stage 2, divorce stage 2 (B - S2 - D2)	.003	1	.	.	.	.
18. Birth mother, stepfather stage 2, divorce stage 3 (B - S2 - D3)	.003	.	.	.	1	.
19. Birth mother, stepfather stage 3 (B - S3)	.0004	.	.	1	.	.
20. Birth mother, stepfather stage 3, divorce stage 3 (B - S3 - D3)	.003	.	.	.	.	1
21. None of the above	.159	–	–	–	–	–
Fraction	1.000	.118	.068	.027	.096	.039

Notes: “Leaves stage 2 with one parent” means that the child experienced at least one family structure event in stage 1 or 2, and left stage 2 with one only parent (e.g., was not in a birth mother-stepfather family). “Leaves stage 2 with two parents” that the child experienced at least one family structure event in stage 1 or 2, but left stage 2 with two parent (e.g., in a birth mother-stepfather family). The other variables in the specification are two-parent family throughout childhood (.616) and birth mother-only throughout childhood (.036).

Table A.3. Family Structure Histories and Our Presumptions about Stress Specification.

Family Structure History	Sample fraction	Specification of variables: Relatively stable birth mother only	Two events in stages 1 and 2	Two events in stages 2 and 3	Rel. stable then one stage 3 event	Stage 1 and stage 3 event or two stage 3 events
1. Two-parent family, always (T)	.613	.	.	.	.	.
2. Two parent, divorce stage 1 (T - D1)	.032	1	.	.	.	.
3. Two parent, divorce stage 1, stepfather stage 1 (T - D1 - S1)	.004	.	1	.	.	.
4. Two parent, divorce stage 1, stepfather stage 2 (T - D1 - S2)	.015	.	1	.	.	.
5. Two parent, divorce stage 1, stepfather stage 3 (T - D1 - S3)	.003	.	.	.	.	1
6. Two parent, divorce stage 2 (T - D2)	.034	.	.	.	.	.
7. Two parent, divorce stage 2, stepfather stage 2 (T - D2 - S2)	.016	.	.	1	.	.
8. Two parent, divorce stage 2, stepfather stage 3 (T - D2 - S3)	.011	.	.	1	.	.
9. Two parent, divorce stage 3 (T - D3)	.037	.	.	.	1	.
10. Two parent, divorce stage 3, stepfather stage 3 (T - D3 - S3)	.008	.	.	.	.	1

Family Structure History (continued)	Sample fraction	Relatively stable birth mother only	Two events in stages 1 and 2	Two events in stages 2 and 3	Rel. stable then one stage 3 event	Stage 1 and stage 3 event or two stage 3 events
11. Birth mother only, always (B)	.024	1	.	.	.	.
12. Birth mother, stepfather stage 1 (B - S1)	.020	.	.	.	.	.
13. Birth mother, stepfather stage 1, divorce stage 1 (B - S1 - D1)	.001	.	1	.	.	.
14. Birth mother, stepfather stage 1, divorce stage 2 (B - S1 - D2)	.007	.	1	.	.	.
15. Birth mother, stepfather stage 1, divorce stage 3 (B - S1 - D3)	.003	.	.	.	.	1
16. Birth mother, stepfather stage 2 (B - S2)	.003	.	.	.	.	.
17. Birth mother, stepfather stage 2, divorce stage 2 (B - S2 - D2)	.003	.	.	1	.	.
18. Birth mother, stepfather stage 2, divorce stage 3 (B - S2 - D3)	.003	.	.	1	.	.
19. Birth mother, stepfather stage 3 (B - S3)	.0004	.	.	.	1	.
20. Birth mother, stepfather stage 3, divorce stage 3 (B - S3 - D3)	.003	.	.	.	.	1
21. None of the above	.159	–	–	–	–	–
Fraction	1.000	.069	.043	.085	.046	.037

Notes: The specification also includes variables for relatively stable two-parent family (i.e., T and B-S1; .637), one event in stage 2 (i.e., T-D2 and B-S2; .035), and other (anything falling outside the categories; .048).

Table A.4. Family Structure Histories and a Complementarity Across Stages Specification.

Family Structure History	Sample fraction	One or more transitions in stage(s): 1	2	3	1 and 2	1 and 3 or 2 and 3
1. Two-parent family, always (T)	.613	.	.	.	.	.
2. Two parent, divorce stage 1 (T - D1)	.032	1	.	.	.	.
3. Two parent, divorce stage 1, stepfather stage 1 (T - D1 - S1)	.004	1	.	.	.	.
4. Two parent, divorce stage 1, stepfather stage 2 (T - D1 - S2)	.015	.	.	.	1	.
5. Two parent, divorce stage 1, stepfather stage 3 (T - D1 - S3)	.003	.	.	.	.	1
6. Two parent, divorce stage 2 (T - D2)	.034	.	1	.	.	.
7. Two parent, divorce stage 2, stepfather stage 2 (T - D2 - S2)	.016	.	1	.	.	.
8. Two parent, divorce stage 2, stepfather stage 3 (T - D2 - S3)	.011	.	.	.	.	1
9. Two parent, divorce stage 3 (T - D3)	.037	.	.	1	.	.
10. Two parent, divorce stage 3, stepfather stage 3 (T - D3 - S3)	.008	.	.	1	.	.

Family Structure History (continued)	Sample fraction	One or more transitions in stage(s): 1	2	3	1 and 2	1 and 3 or 2 and 3
11. Birth mother only, always (B)	.024	.	.	.	.	.
12. Birth mother, stepfather stage 1 (B - S1)	.020	1	.	.	.	.
13. Birth mother, stepfather stage 1, divorce stage 1 (B - S1 - D1)	.001	1	.	.	.	.
14. Birth mother, stepfather stage 1, divorce stage 2 (B - S1 - D2)	.007	.	.	.	1	.
15. Birth mother, stepfather stage 1, divorce stage 3 (B - S1 - D3)	.003	.	.	.	.	1
16. Birth mother, stepfather stage 2 (B - S2)	.003	.	1	.	.	.
17. Birth mother, stepfather stage 2, divorce stage 2 (B - S2 - D2)	.003	.	1	.	.	.
18. Birth mother, stepfather stage 2, divorce stage 3 (B - S2 - D3)	.003	.	.	.	.	1
19. Birth mother, stepfather stage 3 (B - S3)	.0004	.	.	1	.	.
20. Birth mother, stepfather stage 3, divorce stage 3 (B - S3 - D3)	.003	.	.	1	.	.
21. None of the above	.159	–	–	–	–	–
Fraction	1.000	.075	.070	.082	.051	.062

Notes: The specification also includes variables for no transitions (.626) and at least one transition in each of the three stages (.035).