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

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March 17, 2006

[*] This paper was prepared for the Population Association of America Annual Meeting March 30-April 1, 2006 in Los Angeles. We are grateful for financial support from NICHD Grant Number 1 R01 HD04645633-01. We also appreciate the funding from several agencies to the PSID that supports the data infrastructure necessary to our research. Also, a grant from Atlantic Philanthropies to the Center on Philanthropy at Indiana University made the collection of giving and volunteering data in the PSID possible.

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Abstract

Models of young adults' prosocial behavior (charitable giving, volunteering, and the emphasis placed on helping others as a child-rearing goal) 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 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 sensitive to 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 descriptive regressions of prosocial behavior on specifications of childhood family structure and income. We examine three domains of young adult prosocial behavior: charitable giving, volunteering, and how much emphasis is placed on helping behavior as a child-rearing goal. 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 examining young children's laboratory behavior, our results are the first evidence that a stage-based theory is also relevant for understanding socially significant 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 (Putnum 2000), and 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 empirical 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. One approach to model comparison in our empirical setting (limited dependent variable models with non-nested specifications), is to use a Cox test but this approach has several disadvantages. Our second methodological contribution is to apply an alternative approach: Bayesian model comparison.

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 important because there is evidence that values mediate empathy in influencing prosocial behavior (Bekkers and Wilhelm 2005).

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 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. In addition, social learning theory (Bandura 1977) applied to parental prosocial modeling suggests that children will more readily

[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).

adopt the model if they have a close, warm attachment to the parent-modelers.

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 which 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. See Eisenberg and Fabes (1998, p. 720) for a review of additional evidence.

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 can applied 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 every-day 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 two 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. We think enhanced perspective-taking would be most likely if the family instability or low income hit for the first time in adolescence, after the child has had a chance to progress to the empathic orientation or internalized values stage of prosocial development.

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—see 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 relevant for explaining prosocial behavior in experiments, but there is no research on the relevance of stage-based theory for explaining charitable giving, volunteering, or parental emphasis on the helpfulness of their children—socially significant prosocial behavior of interest to sociologists, economists, and policy-makers. Further, there is no evidence on whether the development of giving, volunteering, and helping emphasis 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 the 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.

Even aside from how stage-based family structure should be specified, questions about family structure specification have been long-standing in the literature. The 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). Because these possible choices for family structure specification are non-nested, 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 through 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). 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 socio-economic characteristics like income, education, race, and religious affiliation (represented by the row-vector $\boldsymbol{x}_T$), and unobservable, random influences (u_T):

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

where ρ is a scalar and θ 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, and estimate a reduced-form for (1) and (2):

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

where $\boldsymbol{F}$ and $\boldsymbol{M}$ are row-vectors describing family structure and income over all three stages of childhood and δ and λ are corresponding column-vectors of parameters to be estimated. In short, prosocial capital P_3 is a complicated function of parental investments throughout childhood (I_t, t = 1, 2, 3) and stage-specific family structure instability and low income are markers for disruption in 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 family structure history; our n = 1,011, implying some very 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-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" 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

[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.

relative to the preceding divorce does not depend on the stage in which the divorce occurred. The 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:

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

making it difficult to discuss whether the restriction is 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 detail 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. By allowing a lot of flexibility to estimate associations between family structure experiences 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; by allowing a lot of flexibility to estimate associations between adolescent family structure experiences and prosocial behavior, this "flexible adolescent event" specification embodies the importance of the empathic orientation 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

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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: $\partial^2 f_t / \partial I_t \partial P_{t-1} > 0$.

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: 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 (to avoid having to re-calculate the family weights for the entire study), so to keep the re-contact young adults in our analysis we assign a weight. 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 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 candidates 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 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, 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).[6]

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 any 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.

[6]Hill et al.'s histories were based on the 1968-1991 files, before the re-contact effort began.

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 forthcoming). 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

[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.

conditional gift (the average among those giving more than zero) is $49. The distribution of giving is skewed: the median gift is $20, 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 2005). 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 volunteering is skewed: the conditional median hours volunteered is 40 per year, much less than the conditional average.

4.4 Helping emphasis in the Child Development Supplement

We construct the helping emphasis variable from responses to questions about the importance of five goals in child-rearing: to obey, to be well-liked, to think for him/herself, to

work hard, and to help others when they need help. The questions are asked of our sample young adults only if they themselves had a child aged 5-18 included in the *Child Development Supplements* 1997 or 2002; hence the sample answering the child-rearing questions is much smaller (n = 306). The average rank among the five goals given to helping others is 2.8 (1 is the top goal), the same as the average ranking fifty years ago in the Detroit Area Survey (Duncan et al. 1973, p. 44).

In this preliminary work we analyze a helping emphasis dummy variable set to 1 if the young adult ranks helping others as the most important or second most important child-rearing goal. Table 5 shows that 34 percent of the young adults rank helping others as the top 1 or 2 goal.

4.5 Other independent variables

Table 5 also lists the independent variables we use in the models. The first two 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

[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).

category), race, southern residence, female headship, and age.

5. Estimation Methods

Our models have limited dependent variables (giving and volunteering are tobits; helping emphasis is a probit), 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: high computational burden (part of the test statistic must be calculated by simulation and the sampling distribution of the test statistic must, in turn, be bootstrapped), little knowledge of the finite-sample properties of the bootstrapped test statistic, cumbersome testing when there are more than two specifications, and most importantly, 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 for more details). In the Bayesian approach the "β parameters" (our short-hand term for all the parameters δ, λ, and θ 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:

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

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

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

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: $p_0(\beta, h) = p_0(\beta) \; p_0(h)$ where $p_0(\beta)$ 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 1/9. However, we give the prior density very little weight relative to the data by setting the prior's degrees of freedom to only ten (compared to the data's n = 1,011).

The posterior density $p(\beta, h \mid y_T)$ cannot be analytically solved, but can be simulated. We use the Gibbs sampler with data augmentation to simulate the posterior density of the parameters. We take 55,000 burn-in draws from the posterior density to allow the effect of the initial draw to dissipate. We then take 100,000 additional draws, but to mitigate autocorrelation among successive draws we thin the chain of draws by using only one out of every ten draws, leaving us with 10,000 draws from the parameters' 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). We also conduct the simulation so that it is robust against heteroskedastic errors (Lancaster 2004, pp. 159-161).

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):

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

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: a prediction can be a probability-weighted average of the predictions 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 $p(M_i \mid y_T)$.

This paper is preliminary in part because we have used 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, early results based on maximum likelihood methods provide an indication that the income estimates in the present paper will likely be robust to functional form (Bandy and Wilhelm 2003). The present paper is also preliminary because we have not used Bayesian methods to estimate the helping emphasis probits. In this paper the helping emphasis probits are estimated by maximum likelihood.

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 smaller ($30 versus $57), but the median is not ($18 versus $20). 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). There is essentially no difference in helping emphasis as a child-rearing goal between the two groups of young adults.

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. Again, there is essentially no difference in helping emphasis between the two groups.

In short, the impressions from Table 5 are:

1. ever having been in a non-intact family and ever having been in a low-income family both have negative associations with charitable giving,

2. ever having been in a low-income family has a negative association with volunteering, and

3. there is no association between family structure and income with helping emphasis.

These impressions 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. The helping emphasis results are as in Table 5: there is no association between ranking helping emphasis as the most or second most important child-rearing goal and having been in a non-intact or low-income family.

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 indicates that the number of transitions family structure is the best specification by far: its posterior probability is .873 and the next highest probability (the specification based on our presumptions about stress induced by transitions) is only .04. All of the other family structure specifications have posterior probabilities less than .03.

Next, we summarize information about the posterior density for the β parameters in the number of transitions specification. Figure 1 shows a kernel density estimate of the posterior density for the parameter experiencing (exactly) one 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 one-transition-in-Stage 3 parameter to be –.63 and the standard deviation is .39. Ninety-five percent of the posterior probability lies to the left of zero. Ninety-five percent of the probability is between the two horizontal lines at –1.40 and .13 (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 5. The final column in row 5 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 one-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 .012 is strong evidence that the one-transition-in-Stage 3 parameter belongs in the model.[9]

The other rows in Table 8 summarize the posterior density for the other β parameters as was just described for the one-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.

Row 6 of the table indicates that the posterior density of two-plus-transitions-in-Stage 3 is similar to the posterior of the one-transition-in-Stage 3 parameter. Because the one- and two-plus transitions results indicate a similar negative association between family structure transitions in adolescence and giving in young adulthood we estimated a model constraining the one-transition and two-plus transitions to have the same association with giving (not shown in Table 8): the constrained posterior has mean −.76 (std. dev. = .34) and the one-sided probability is .99. The posterior odds ratio is .339, indicating some evidence against the constraint.

Stage 3 log family income (row 9) is positively associated with giving in young

[9]Although the summary information about the posterior density changes very little when simulations are re-done the posterior odds ratio does change a little. For example, re-doing the simulations generated posterior odds for the one-transition-in-Stage 3 parameter of .000, .010, .059, .118 and .277.

adulthood; the evidence is even stronger than for adolescent family structure transitions: the one-sided probability is one, the 95 percent highest posterior density interval does not include zero, and most importantly the posterior odds ratio is very small (.0002). Obviously, this implies that low-income during adolescence is negatively associated with young adult giving.

There is some evidence that residential moves during Stage 3 (row 12) are negatively associated with giving. The one-sided probability is .88 (high, but less than .90), the highest posterior density interval is mostly negative (but does include zero), and the posterior odds ratio is .007. The odds ratio indicates that the residential-moves-Stage 3 variable belongs in the model.

One counter-intuitive result emerges from Table 8: Stage 2 log family income (row 8) is negatively associated with giving in young adulthood. Note that the model contains a dummy variable control for when mothers work more than 1,000 hours per year in Stage 2 (averaged across all the years where the child is aged 6-11), reducing the possibility that an increase in mothers' work in middle childhood is driving the counter-intuitive Stage 2 income result. This is the only specification of mothers' work during childhood that we have estimated, so we plan to estimate several alternative specifications of mothers' work during childhood to further check the robustness of the Stage 2 income result.

We re-estimated the posterior densities by using different starting values (to make sure the Gibbs sampler generated the same posterior), removing the robustness to heteroskedasticity, and dropping the top two givers.[10] In each case, the results were very close to those in Table 8.

The posterior information summarized in Table 8 describes the association between the β

[10]We dropped the top two givers based on a break in the data: the top two gifts are $600 and $2,100 and the next largest gifts are five gifts around $250.

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, and who experienced no family structure transitions and had average income in childhood) 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 observable quantities such as the probability of giving or the amount given conditional on making a gift.

For instance, compare the women with the characteristics just listed to a second woman with identical characteristics except the second woman had experienced one family structure transition in Stage 3: the Stage 3 transition woman's probability of giving is estimated to be .45 lower, a fairly large difference. A similar comparison between two white men also shows a large drop in the probability of giving (.54). The drop is not as large for black women and men experiencing one Stage 3 transition (.20 and .11), but still notable. Conditional on making a gift, the amount given by white women, white men, black women, and black men who experienced one Stage 3 transition is estimated to be 20, 12, three, and one percent less than their counterparts who did not experience a Stage 3 transition.

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 adults who had the characteristics listed above except that the first had average family income throughout childhood and 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). For white women, white men, black women, and black men who experienced one Stage 3 transition the probability of

giving is .17, .26, .14, and .09 less. The conditional amount given is 15, 13, six, and three percent less.

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—flexible early events—has a posterior model probability of only .508. This means that if we were to describe the posterior density of the flexible early events specification there would be a good chance (.492) that we would be describing a specification that did not generate the data. The flexible adolescent events specification has a .213 posterior model probability, and three other specifications have posterior model probabilities just under .10.

Moreover, no clear results about the association between childhood family structure and volunteering in young adulthood emerge from looking at the parameters' posterior densities. Three of the specifications suggest no strong association (flexible early events, sequence without stages, and number of transitions), two suggest some negative associations (stage × stage and event × stage), two suggest some counter-intuitive positive associations (flexible adolescent events and complementary across stages), and one suggests a mixed association (presumptions about stress). Given this pattern of results we see little point in conducting Bayesian model averaging for family structure. The family structure–volunteering association is weak in the Bayesian analysis as it was in Table 6's simple least squares regressions.

However, one result does emerge: a strong 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 eight family structure specifications. The Bayesian model average of the eight posterior densities (weighted by the probabilities in Table 9) indicate a mean association of .72 (std. dev. = .26) and a one-sided probability of 1.00.
The Stage 2 income association is negative (counter-intuitive again), but very small in magnitude.

6.4 Preliminary analysis of helping emphasis

In our work thus far we have not carried out a Bayesian analysis of the emphasis placed on helping others compared to other child-rearing goals. However, as a preliminary look at helping emphasis Table 10 presents estimates from a linear probability model (OLS) in which the dependent variable is 1 if the young adult ranked helping others as the most important or second most important child-rearing goal. We estimate three specifications of family structure: number of transitions, flexible early events, and flexible adolescent events. We choose these specifications because of their high posterior model probabilities in the Bayesian analyses of charitable giving and volunteering, but of course this is no guarantee that these specifications will have high posterior model probabilities in our eventual Bayesian analysis of helping emphasis.

That said, two intriguing results appear in Table 10: living apart from the birth mother at any time in stages 1 and 2 and having low income in stage 1 are negatively associated with the young adult's ranking helping emphasis in their own child-rearing as the most or second most important goal. Both associations are precisely estimated—the *p*-value for living apart from the birth mother is .014. The magnitude of the association is sizable: living apart from the birth mother in early or middle childhood is associated with a .35 to .37 lower probability of ranking helping others as the most or second most important child-rearing goal. A $10,000 per year

lower income in early childhood (about 28 percent less than average) is associated with a .08 (.28*.29) lower probability of ranking helping others as the most or second most important child-rearing goal.

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 relevant for prosocial behavior in the laboratory are also relevant for socially significant 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.

The results extend the 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 outcome that, while certainly important, can be classified as personal outcomes. The present results indicate that the negative associations extend to prosocial outcomes as well.

Finally, the paper's use of Bayesian model comparison methods suggests a coherent way to choose among possible family structure specifications. When a clearly better specification emerges (as the number of transitions specification did in the analysis of charitable giving) more confidence can be placed on the results. 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.

Some of the results are preliminary. We have not subjected the various possible income specifications to the Bayesian model comparison methods. Though we intend to do this, our early work indicates that the income results are robust to income specification; furthermore this early work indicates that the income result is primarily due to low income (Bandy and Wilhelm 2003). Also, we have not done a Bayesian analysis of helping emphasis. Because the helping emphasis results from linear probability models are consistent with the importance the psychology literature places on the development of empathy in the first years of life, we are especially curious to see if similar results emerge from a Bayesian analysis.

There is one unexpected result: low income during the middle childhood years is positively associated with later charitable giving. While there are two mechanisms that could explain this result (see p. 8), there is not enough evidence in the previous literature to be fully comfortable with either explanation.[11] Another explanation is that the positive association between low income in middle childhood and later giving is an artifact of a mis-specification of mothers' working. We have only checked one specification of mothers' work, but plan to check additional specifications.

Other than the preliminary nature of some of the results there are several limitations of the work. First, while the paper has taken a large step toward the coherent evaluation of several possible family structure specifications, it has not evaluated every specification that may be of

[11]For example, although there is some evidence that time spent doing most chores declines between ages 14 and 18 (Call 1996), to our knowledge there is no evidence that more time is spent doing chores in middle childhood compared to adolescence.

interest. Second, the evidence of family instability and low-income associations with subsequent prosocial behavior is just that—evidence of association not causality. Although the timing of the associations makes conjectures about causality reasonable—it is family instability and low-income at the time of the empathic orientation and internalized values stages that is negatively associated with the prosocial behaviors that require successful completion of those stages—more work needs to be done to see if family instability and low-income during adolescence has a negative causal effect on subsequent prosocial behavior.

Figure 1. Posterior density for one transition in stage 3

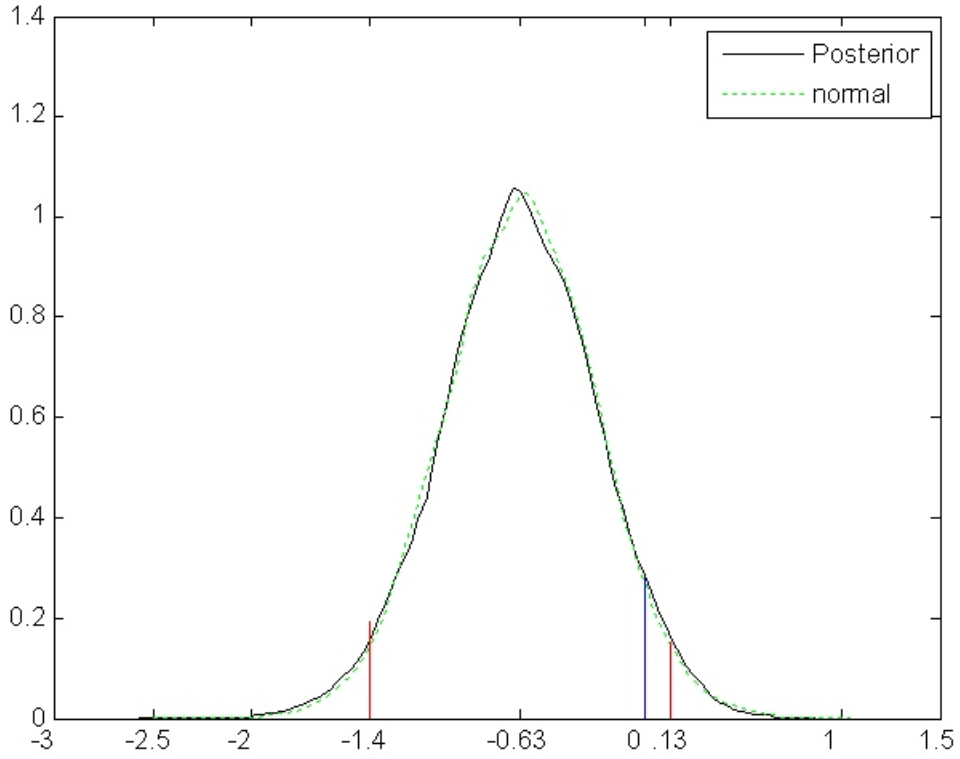

Table 1. Family Structure Histories and a State × Stage Specification.

		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)	Sample and classification in the present paper				
		Sample close to Hill et al.	Reclassify leaver-returners as "other"	Reclassify 3+ events as "other"	Include children from re-contact sample	Include children from non-response families and stage 3 movers out
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	Always intact	Ever non-intact	Always middle- or high-income	Ever low-income
Charitable giving					
Fraction giving	.43	.49	.33	.48	.30
Mean gift (conditional)	49 (180)	57 (212)	30 (41)	54 (200)	33 (54)
Median gift (conditional)	20 (1.6)	20 (2.2)	18 (2.4)	20 (2.0)	15 (2.4)
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 (6.1)	36 (7.5)	52 (12.0)	40 (7.5)	48 (20.2)
Helping emphasis ranked 1 or 2	.34	.34	.35	.35	.33
Childhood family structure and income					
Ever non-intact	.38	0	1	.27	.66
Ever low-income	.29	.16	.50	0	1
Other variables					
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

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
Helping emphasis	306	133	173	129	177

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		Helping ranked 1 or 2	
Variable						
Ever non-intact	−.55	−.39	−.08	.04	.01	.02
	(.13)	(.14)	(.15)	(.16)	(.07)	(.08)
Ever low-income	–	−.47	–	−.35	–	−.03
		(.14)		(.15)		(.08)
constant	1.53	1.61	.96	1.02	.34	.35
	(.09)	(.10)	(.10)	(.10)	(.05)	(.05)
n	1,011		954		306	

Notes: The estimates are ordinary least-squares.

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

Specification of family structure	Posterior model probability
State × stage	.001
Event × stage	.025
Sequence without stages	.021
Number of transitions	.873
Flexible early event	.003
Flexible adolescent event	.010
Presumptions about stress	.040
Complementary across stages	.028

Notes: The dependent variable is the log of charitable giving.

Table 8. Charitable Giving Model: Posterior Distribution for the Number of Transitions Specification.

β parameters	Mean	Std. dev.	Prob. $\beta_j > 0$ or $\beta_j < 0$	95 percent highest posterior density interval		Posterior odds for $\beta_j = 0$
Stage 1 one transition	−.29	.38	.79	−1.02	.44	.020
Stage 1 two or more transitions	.48	.49	.84	−.47	1.44	.046
Stage 2 one transition	.37	.37	.85	−.35	1.08	.451
Stage 2 two or more transitions	.26	.40	.74	−.53	1.05	3.688
Stage 3 one transition	**−.63**	**.39**	**.95**	**−1.40**	**.13**	**.012**
Stage 3 two or more transitions	**−.64**	**.45**	**.92**	**−1.52**	**.24**	**.026**
Stage 1 log family income	−.25	.34	.77	−.91	.42	1.012
Stage 2 log family income	**−.70**	**.37**	**.97**	**−1.42**	**.02**	**.000**
Stage 3 log family income	**.83**	**.28**	**1.00**	**.28**	**1.39**	**.000**
Stage 1 family move	.16	.27	.72	−.38	.70	.100
Stage 2 family move	.03	.25	.54	−.46	.51	.633
Stage 3 family move	−.31	.26	.88	−.81	.20	.007
Stage 1 mother averages 1,000+ hours	.08	.30	.61	−.51	.67	1.499
Stage 2 mother averages 1,000+ hours	−.12	.29	.65	−.69	.46	.007
Stage 3 mother averages 1,000+ hours	−.11	.27	.65	−.64	.43	.021
Log young adult current income	**1.16**	**.25**	**1.00**	**.66**	**1.65**	**.000**
Log young adult average past income	**.72**	**.30**	**.99**	**.14**	**1.30**	**.007**
Any post-high school education	**1.00**	**.19**	**1.00**	**.64**	**1.37**	**.000**
Catholic	−.21	.31	.76	−.81	.39	.000

Protestant	**.37**	**.26**	**.92**	**−.14**	**.87**	**.179**
Jewish or other religious affiliation	**.70**	**.32**	**.98**	**.08**	**1.38**	**.007**
African-American	**−.84**	**.34**	**.99**	**−1.51**	**−.17**	**.315**
Resides in the south	**.35**	**.25**	**.92**	**−.14**	**.84**	**5.096**
Female household head	.20	.30	.76	−.39	.79	2.900
Age of household head	.01	.03	.61	−.06	.08	101.398
constant	−19.8	2.8	1.00	−25.4	−14.3	–

Notes: The table summaries the posterior density for the δ, λ, β 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	.080
Event × stage	.070
Sequence without stages	.012
Number of transitions	.093
Flexible early event	.508
Flexible adolescent event	.213
Presumptions about stress	.000
Complementary across stages	.026

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

Table 10. Helping Emphasis: Estimates from a Linear Probability Model.

Family structure specification: β_j parameters	Number of transitions	Flexible early event	Flexible adolescent event
Number of transitions			
Stage 1 one transition	.00	–	–
Stage 1 two or more transitions	.11	–	–
Stage 2 one transition	−.10	–	–
Stage 2 two or more transitions	−.20*	–	–
Stage 3 one transition	.11	–	–
Stage 3 two or more transitions	.12	–	–
Flexible early event			
Birth mother only (all stages)	–	−.05	–
Birth mother absent sometime during stage 1 or 2	–	−.37**	–
Birth mother absent sometime during stage 3	–	.12	–
Leaves stage 1 with one parent	–	.03	–
Leaves stage 1 with two parents (one step-parent)	–	.11	–
Stage 1 divorce	–	.05	–
Stage 1 marriage	–	−.02	–
Stage 1 marriage and divorce	–	.07	–
Any additional stage 1 transitions	–	.03	–
Any additional stage 2 or 3 transitions	–	.09	–

Flexible adolescent event			
Birth mother only (all stages)	–	–	−.08
Birth mother absent sometime during stage 1 or 2	–	–	−.35**
Birth mother absent sometime during stage 3	–	–	.11
Leaves stage 2 with one parent	–	–	−.04
Leaves stage 2 with two parents (one step-parent)	–	–	.08
Stage 3 divorce	–	–	.01
Stage 3 marriage	–	–	.20
Stage 3 marriage and divorce	–	–	.15
Any additional stage 1 or 2 transitions	–	–	.07
Any additional stage 3 transitions	–	–	.06
Other variables[a]			
Stage 1 log family income		–.29***	
Stage 2 log family income		.13	
Stage 3 log family income		.05	
Stage 1 family move		.02	
Stage 2 family move		.07	
Stage 3 family move		–.07	
Stage 1 mother averages 1,000+ hours		–.07	
Stage 2 mother averages 1,000+ hours		.10	
Stage 3 mother averages 1,000+ hours		–.10	
Log young adult current income		.07*	
Log young adult average past income		–.14	

Any post-high school education		.04	
Catholic		.11	
Protestant		.05	
Jewish or other religious affiliation		.02	
African-American		–.12	
Resides in the south		.01	
Female household head		–.06	
Age of household head		–.01*	
constant		2.56	
R^2	.132	.144	.154

Notes: The dependent variable is a dummy variable equal to one if the young adult listed helping others when they need help" as the most important or second most important child-rearing goal. The estimates are from linear probability models (OLS). Standard errors are in parentheses and robust to heteroskedasticity. $n = 306$.

[a] The coefficient estimates for the other variables are nearly identical despite the different specifications of family structure. We present only the coefficients from the number of transitions family structure specification.

* - significant at 10 percent. ** - significant at 5 percent. *** - significant at 1 percent.

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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).