J Popul Econ 20:55–71 (2007)
DOI 10.1007/s00148-005-0019-x

ORIGINAL PAPER

Heather Antecol · Kelly Bedard

Does single parenthood increase the probability of teenage promiscuity, substance use, and crime?

Received: 8 November 2002 / Accepted: 5 November 2004 / Published online: 12 October 2005

Abstract There is longstanding evidence that youths raised by single parents are more likely to perform poorly in school and partake in "deviant" behaviors such as smoking, sex, substance use, and crime. However, there is not widespread agreement as to whether the timing of the marital disruption differentially impacts youth outcomes. Using the National Longitudinal Survey of Youth and its Young Adult Supplement, we find that an additional 5 years with the biological father decreases the probability of smoking, drinking, engaging in sexual activity, marijuana use, and conviction by approximately 5.3, 1.2, 3.4, 2.2 and 0.3 percentage points, respectively.

Keywords Family structure · Marital dissolution · Youth outcomes

JEL Classification J12 · J13

1 Introduction

The evolving structure of the family over the past 40 years is one of the fundamental changes in American society. In 1960, only 12% of children spent all, or part, of their childhood apart from one or more of their biological parents. By 1995, this number had increased to approximately 40% (McLanahan 1997). The decline of the "traditional" family has spawned a large literature attempting to measure the

Responsible editor: Alessandro Cigno

H. Antecol (✉)
Department of Economics, Claremont McKenna College, 500 E. Ninth Street,
Claremont, CA 91711, USA
Fax: +1-909-6218249, E-mail: heather.antecol@mckenna.edu

K. Bedard
Department of Economics, University of California, Santa Barbara, CA 93106, USA
Fax: +1-805-8938830, E-mail: kelly@econ.ucsb.edu

importance of family structure in determining child/youth outcomes. These studies generally find that children raised in single-parent homes perform more poorly in school[1] and are more likely to become sexually active, commit illegal acts, and use illegal drugs at young ages.[2]

Researchers in this area have become increasingly aware of the importance of the timing of family disruption. While family stress and instability surrounding marital breakdown suggests that a disruption during adolescence may have a bigger impact on youth outcomes than a disruption during early childhood, lower supervision and/or parental interaction in single-parent homes may mean that early disruption is in fact more detrimental [see Harper and McLanahan (1999) for a detailed discussion of these issues].

Unfortunately, the empirical findings on this matter are mixed and therefore do not resolve the theoretical ambiguity. For example, Krein and Beller (1988) find that family dissolution during the preschool years has a larger negative effect on educational attainment than family dissolution during the elementary or high school years. Fronstin et al. (2001) similarly find that family disruptions prior to the middle teenage years have a somewhat more negative impact on educational attainment, while later disruptions have a somewhat worse impact on labor market outcomes, such as employment and earnings. Furthermore, Ermisch and Francesconi (2001) find that youths whose fathers left the household during early childhood have lower educational attainment and are more likely to be economically inactive and smoke cigarettes.

In contrast, Ginther and Pollak (2003) find little to no evidence that youths who spend more years in single-parent and/or stepparent households have worse educational outcomes than youths from intact households. McLanahan and Bumpass (1988) similarly find no evidence that the timing of family breakdown explains the subsequent family formation decisions of the affected children. This does not mean that childhood family structure has no impact on marital decisions later in life, only that it is exposure to marital dissolution and not the timing of dissolution that increases the probability that youths experience marital instability later in life. Finally, Harper and McLanahan (1999) similarly find that the timing of the disruption plays no role in explaining the incarceration of youths from single-parent households, but that children with never-married mothers are more likely to be convicted of a crime.

The explanation for the wide range of results reported in the literature may lie in the wide range of data sources used, or it may lie in the differential implications of the timing of family breakdown for different types of youth behavior. In other words, parental instability occurring at different points in the life course of a child/adolescent may manifest itself very differently. For example, a youth whose father was never present may be more likely to engage in criminal activity, while a youth whose father leaves the household during his teenage years may be more likely to use illegal drugs. Since previous studies generally focused on a single outcome, it is

[1] Examples include Painter and Levine (2000), Biblarz and Raftery (1999), Jonsson and Gahler (1997), Garasky (1995), Wojtkiewicz (1993), Manski et al. (1992), Sandefur et al. (1992), and Astone and McLanahan (1991).

[2] Examples include Painter and Levine (2000), Harper and McLanahan (1999), Comanor and Phillips (2002), Cherlin et al. (1995), Flewelling and Bauman (1990), McLanahan and Bumpass (1988), and Matsueda and Heimer (1987).

difficult to determine which of the two explanations is correct, or at least more important.

Interpreting the existing empirical findings is made still more difficult by the absence of a clear understanding of the link between family structure and youth outcomes. To a large extent, the problem lies in the fact that unobserved parental characteristics (such as parental supervision/interaction and family stress) and household characteristics (such as family income and maternal employment) may be associated with both poor parenting and family structure. As Painter and Levine (2000) point out, this problem is particularly challenging from a policy standpoint. If parental and socioeconomic characteristics are the driving force behind poor youth outcomes, then policies that attempt to keep families intact will have little effect on youth outcomes. On the other hand, if it is the absence of the father that leads to poor youth outcomes, then such policies might have a positive impact. These issues are economically important because the early adoption of deviant behaviors has long-run impacts on educational, labor market, and health outcomes (see Gruber 2001 and the references therein). For example, girls who become sexually active at young ages are at an elevated risk of teenage pregnancy and thus a greater risk of leaving high school and a higher risk of welfare dependency (see Moffitt 1992).

The purpose of this paper is to add to the current debate about the impact of family structure on youth outcomes by exploring the relationship between the timing of the disruption and a broad range of youth outcomes—smoking, drinking, sexual activity, marijuana use, and conviction—using the National Longitudinal Survey of Youth (NLSY) linked with the NLSY Young Adult Supplement (NLSY-YAS). By exploring the relationship between the timing of family dissolution and a wide range of youth outcomes in a single data source, we are able to identify the differential impact of the timing of family breakdown across youth behaviors. In an attempt to reduce the bias due to unobserved heterogeneity, we include a comprehensive set of controls for maternal, household, and youth characteristics. A similar approach is used by Painter and Levine (2000), Waldfogel et al. (2002), and Ruhm (2004).[3]

Measuring paternal presence as a continuous variable, we find statistically significant reductions in youth participation in smoking, drinking, sexual intercourse, marijuana use, and conviction before the age of 15 the longer the biological father remains in the household. In particular, an additional 5 years with the biological father decreases the probability that a youth smokes cigarettes, drinks alcohol, engages in sexual activity, uses marijuana, and is convicted by approximately 5.3, 1.2, 3.4, 2.2, and 0.3 percentage points, respectively. Once we allow for nonlinearity in the impact of the timing of paternal exit, we also find evidence

[3] There are two obvious alternative ways to deal with this potential bias. (1) A sibling fixed effect model (see Ermisch and Francesconi 2001 and the references therein). However, since siblings are usually born within a few years of each other, we do not have enough sibling pairs with different lengths of paternal exposure to estimate such a model with any precision. In other words, almost all of the variations in paternal exposure are across families rather than within families. (2) Instrumental variables using divorce law changes in a state fixed effect model. Unfortunately, this approach is impossible in the NLSY because few laws changed during the period of interest. Moreover, even if there was more legislative variations, divorce law changes may not be valid instruments for divorce since they directly change many other things as well (see Gruber 2004 for a detailed discussion of this point).

that the point during a child's life at which their biological father leaves affects youth behavior in distinct ways. For example, youth smoking, sexual activity, and marijuana use are highest among youths whose father left during early childhood.

The remainder of the paper is as follows. Sections 2 and 3 discuss the theoretical model and estimation procedure, respectively. Section 4 describes the parental and youth data. Section 5 discusses the timing and duration of marriages during a youth's life. Section 6 discusses the results. Section 7 concludes.

2 A simple theoretical framework

Consider the following production function:

$$Y_t = Y(Y_{t-1}, d_t, i_t, s_t), \tag{1}$$

where Y denotes a specific youth outcome (such as being sexually active before reaching age 15), d is the length of time that the youth is exposed to their biological father, i is family income, and s captures exogenous shocks.[4] This formulation assumes that children always live with their biological mother and that youth outcomes at time t depend on youth outcomes in the previous period (t-1). Notice that the primary arguments of the youth outcome production function, namely, family disruption and family income, are themselves the outcomes of utility maximization on the part of parents and thus may be endogenous (we return to this issue in Sect. 3).

This production function has several important features. First, we assume that the longer the biological father remains in the household, the lower the probability that the youth partakes in a deviant behavior. In other words, exposure to one's biological father has a deterrent effect on "bad" behavior. Second, we assume that families with higher incomes purchase more goods and services that enter positively into the production of "good" youth behavior or, in the context of Eq. 1, serve to reduce the probability of deviant youth behavior. Finally, previous parental choices are relevant, as we assume that current youth outcomes are a function of previous behavior.

Recursively substituting in for lagged values of Y allows us to rewrite Eq. 1 as:

$$Y_t = Y(D_t, I_t, S_t), \tag{2}$$

where

$$\begin{aligned} D_t &= [d_t, d_{t-1}, \ldots, d_1] \\ I_t &= [i_t, i_{t-1}, \ldots, i_1] \\ S_t &= [s_t, s_{t-1}, \ldots, s_1] \end{aligned} \tag{3}$$

and the subscript 1 denotes the first year of life.

[4] Ruhm (2004) uses a similar theoretical framework to examine the effect of maternal employment on child cognitive development.

While the discussion thus far has outlined a structural production function, we are unable to estimate Eq. 2 empirically. We therefore focus on the following reduced-form model:

$$Y_t = Y(D_t, X_t, \varepsilon_t) \tag{4}$$

where X is a vector of parental, youth, and family background characteristics and ε is a disturbance term capturing shocks and variables not otherwise controlled for. An extensive list of variables is included in X in order to account for all other factors that influence youth outcomes. However, to the extent that the included regressors do not adequately control for all other factors, the reduced-form estimates of the impact of time with the biological father will be biased (this issue is discussed in detail in Sect. 3). In most specifications, we summarize D as a single continuous variable measuring total years with the biological father, but in Sect. 6.2, we allow for the possibility that the relationship between youth outcomes and time with the biological father may be nonlinear.

3 Econometric approach

In order to estimate the reduced-form model (Eq. 4), let the indicator variable Y_{jt}=1 if the youth j participates in a specified deviant behavior before age t, and let Y_{jt}=0 if otherwise. The choice problem is then described by the following latent variable model:

$$Y^*_{jt} = X_{jt}\beta + D_{jt}\delta + S_{jt} + e_{jt} \tag{5}$$

where t=15; Y^* is the net utility that a youth receives from the deviant behavior; X is a vector of control variables; D is the number of months that the biological father is present in the household; S captures shocks and unobservable parental, household, and youth characteristics; and e is a normally distributed disturbance term with mean zero and unit variance.

The basic choice problem is:

$$Y^*_{jt} = X_{jt}\beta + D_{jt}\delta + \varepsilon_{jt} \tag{6}$$

where $\varepsilon_{jt} = S_{jt} + e_{jt}$. In a model with a sparse set of control variables included in X, the omission of important parental, household, and youth characteristics might imply that cov (D_{jt}, S_{jt})≠0 and thus render biased estimates of δ (the parameter of interest). This problem can be mitigated by including a sufficiently rich set of control variables in X to ensure that D is orthogonal to ε.[5] Section 4 includes a detailed description of the variables included in X.

[5] As Ruhm (2004) points out, one difficulty with this approach is that the results may be difficult to interpret if endogenous regressors that absorb some portion of the effect of family structure are included.

A youth only participates in the deviant behavior if the expected net utility from doing so is positive, and thus, the probability that the youth is observed engaging in the specified deviant behavior is given by:

$$\text{prob}\left(Y_{jt}=1\right)=\text{prob}\left(X_{jt}\beta+D_{jt}\delta+\varepsilon_{jt}>0\right)=\Phi\left(X_{jt}\beta+D_{jt}\delta\right) \tag{7}$$

where $\Phi()$ is the standard normal cumulative distribution function.

4 Data

All youth, parental, and family data are drawn from the National Longitudinal Survey of Youth (NLSY) and the NLSY Young Adult Supplement (NLSY-YAS). These data suit our purposes for a number of reasons. First, the NLSY-YAS allows us to include a wide range of youth outcomes, that is, participation in smoking, drinking, sexual activity, marijuana use, and crime before the age of 15. Secondly, the NLSY and the NLSY-YAS contain a broad range of control variables for youth and their parents, which is important as it allows us to identify pre- and post-disruption factors. Thirdly, and most importantly, combining these data allows us to measure the length of time that each youth lives with his/her biological father.

Since 1986, the children of NLSY women have been surveyed biannually. Child cognitive ability and development are assessed using tests, and mothers are extensively surveyed to establish the quality of the home environment. Beginning in 1994, the survey was extended to survey "youths" aged 15 and over directly. Each youth completes an interview focusing on education, employment, and family-related behavior as well as filling out a confidential questionnaire that focuses on substance use, sexual activity, and other sensitive issues. Youths are asked how old they were when they first smoked cigarettes, began drinking alcohol at least once a month, engaged in sexual intercourse, used marijuana, and were convicted of a crime other than a minor traffic offense. This information is used to construct indicator variables equal to 1 if the respondent participated in a specified "deviant" behavior before the age of 15 and 0 if otherwise.

To maintain the largest sample possible, the retrospective deviant youth behavior reports for 2000 are used. A youth is only included if he/she is 15 or older at the 2000 interview date, so that behavior occurring up until the end of age 14 can be included. If the youth was surveyed in 2000 but did not respond to a particular deviant behavior question, his/her response in 1998 is used instead if he/she was at least 15 years old at that interview date. We similarly proceed backwards to 1996 for individuals who did not respond in 2000 and 1998 but who were 15 in 1996, and to 1994 for individuals who did not respond in 2000, 1998, and 1996 but did respond in 1994 and were at least 15 years old in that year. Table 1 reports the summary statistics for youth participation in deviant behaviors. Approximately 2% of youths are convicted of a crime before age 15, while 18, 29, 12, and 8% become sexually active, smoke, use marijuana, and drink regularly, respectively.[6]

[6] The sample size varies across deviant behaviors due to nonreporting. The summary statistics for the independent variables from specification C (see Appendix) are based on the marijuana use sample; however, similar results are found for all other dependent variable samples and are available from the authors upon request.

Table 1 Summary statistics

	Sample size	Mean	Standard deviation
Smoking	1,751	0.29	0.45
Drinking	1,904	0.08	0.27
Sex	1,841	0.18	0.38
Marijuana use	1,914	0.12	0.33
Conviction	1,880	0.02	0.15
Years with biological father	1,914	9.13	6.50
Biological father never present	1,914	0.22	0.41
0<biological father present<5	1,914	0.13	0.34
5≤biological father present<10	1,914	0.10	0.30
10≤biological father present<15	1,914	0.06	0.24
Biological father always present	1,914	0.49	0.50
Male	1,914	0.52	0.50
Birth order	1,914	1.57	0.82
Black	1,914	0.20	0.40
Hispanic	1,914	0.08	0.27
Age of mother at youth's birth	1,914	21.21	2.92
Mother's years of education	1,914	12.39	1.95
Number of children in the household	1,914	2.62	1.14
Number of biological children	1,914	2.82	1.23
Magazines in mother's household at 14	1,914	0.53	0.50
Newspaper in mother's household at 14	1,914	0.75	0.44
Library card in mother's household at 14	1,914	0.70	0.46
Immigrant grandmother	1,914	0.06	0.24
Immigrant grandfather	1,914	0.10	0.44
Grandmother's years of education	1,790	10.61	2.71
Grandmother's years of education missing	1,914	0.05	0.23
Grandfather's years of education	1,584	10.57	3.25
Grandfather's years of education missing	1,914	0.13	0.34
Mother lived with mother and father at 14	1,914	0.67	0.47
Mother lived with mother only at 14	1,914	0.13	0.33
Mother's adjusted AFQT score	1,914	−5.87	22.83
Immigrant mother	1,914	0.05	0.21
Mother lived in the South at 14	1,914	0.36	0.48
Mother is Catholic	1,914	0.25	0.44
Mother is Baptist	1,914	0.28	0.45
Mother has no religious affiliation	1,914	0.10	0.30
Family income from age 11–15	1,914	5.11	4.84
Family income from age 6–10	1,914	4.50	5.42
Family income from age 0–5	1,914	3.60	3.52
Mother's average weekly hours from age 11–15	1,914	26.54	16.57
Mother's average weekly hours from age 6–10	1,914	21.26	15.82
Mother's average weekly hours from age 0–5	1,914	15.74	13.84

All youth outcomes measure participation before age 15. Means and standard deviations calculated using 2000 youth sampling weights

Combining the NLSY and the NLSY-YAS allows us to measure the timing of family disruption by linking youth to their biological father through the mother's marital status. The sample is restricted to mothers and children residing with their mother at age 15 because the number of children raised by single fathers and alternate caregivers are too small to reliably analyze. Similar to Bumpass et al. (1995), the father is assumed to be present in the household from the point of birth if he was either married to the mother at the point of birth or married her within 12 months of the youth's birth. In all other cases, we assume that the youth never lives with his/her biological father. Referring to Table 1, the average youth resides with his father for 9.1 years. Further, approximately half of the youth reside with their biological father for their entire life up to age 15, 22% never live with their biological father,[7] and 29% suffer a family disruption between birth and age 15.

The deviant behavior variables are linked to youth and parental controls measured at three points in time: maternal variables at age 14 and in 1979; maternal and family characteristics when the youth is 15; and average maternal and family characteristics from the youth's birth to age 5, from age 6 to 10, and from age 11 to age 15. It is important to account for average maternal and family characteristics over the youth's entire life as opposed to a single point, or single window of time, during the youth's life because variables from a particular point in time may not adequately describe the youth's lifetime environment [see Wolfe et al. (1996) for a detailed description of the "window problem"].

As previously stated, the NLSY allows us to control for a comprehensive set of explanatory variables. In Sect. 6, we begin by first including a limited set of controls and then proceed to expand the set to include an extensive set of regressors. For expository ease, we describe the variables in the order that they are added to the model in Sect. 6.

The first specification (A) includes the years that the biological father remains in the household and the set of regressors most commonly controlled for in the literature. These include the youth's race, sex, and birth order, as well as the number of children in household, mother's years of education, mother's age at the youth's birth, SMSA status, and region of residence (see Appendix for a detailed description of all variables).

Specification B includes the specification A variables plus a set of time-invariant controls for maternal background.[8] The additional variables include the number of children ever born to the youth's mother, the mother's immigrant status, the mother's Armed Forces Qualifications Test (AFQT) score,[9] the mother's education level[10] and immigrant status of the mother's mother and father, the mother's place of residence at age 14, the mother's family structure at age 14, the mother's

[7] While this seems high, it is largely driven by the large fraction of black women in the sample, who are more likely to have out-of-wedlock births [see Antecol and Bedard (2002) for a detailed discussion]. In this sample, 61.5% of black youths never lived with their biological father compared to only 11.0% of white youth.

[8] Ideally, we would include similar paternal measures, but these are either unavailable or badly reported.

[9] The AFQT score is adjusted for age and race.

[10] Due to nonreporting, mother's mother's education and mother's father's education are replaced with the average education level if the data are missing, and all models including these variables also include two dummy variables indicating missing data.

religion in 1979, and whether reading materials were present in the mother's home at age 14.

Specification C, the preferred specification, includes the specification B variables plus a set of regressors that control for the household characteristics that are varying over time and may be correlated with other factors affecting youth outcomes. These include mother's average weekly hours of work when the youth was born to age 5, from age 6 to ten, and from age 11 to age 15 and average family income for the same time periods.

Summary statistics for the specification C variables, with the exception of SMSA and region, are reported in Table 1. Focusing on the variables commonly controlled for in the literature, the sample is 52% male, 20% black, and 8% Hispanic. The average youth lives in a household with 2.6 children and was the 1.6th child born to their mother (59% are firstborn children). Finally, the mother of the average youth was 21.2 when the youth was born and has 12.4 years of education.

5 Family structure and youth participation in deviant behavior

We begin by following conventional practice and comparing youth outcomes across family types where the father is always present to family types where the father is not always present (see the top panel of Table 2). As one might expect,

Table 2 Paternal presence and youth behavior

	Smoking	Drinking	Sex	Marijuana	Conviction
Boys and girls					
Biological father always present	0.25	0.07	0.12	0.10	0.01
Biological father not always present	0.33	0.09	0.23	0.15	0.03
Biological father never present	0.22	0.07	0.25	0.12	0.03
0<biological father present<5	0.49	0.10	0.28	0.19	0.04
5≤biological father present<10	0.40	0.10	0.18	0.16	0.04
10≤biological father present<15	0.28	0.08	0.16	0.09	0.02
Boys					
Biological father always present	0.25	0.08	0.12	0.10	0.01
Biological father not always present	0.31	0.07	0.26	0.15	0.04
Biological father never present	0.23	0.06	0.26	0.13	0.03
0<biological father present<5	0.41	0.10	0.33	0.21	0.06
5≤biological father present<10	0.45	0.06	0.24	0.18	0.05
10≤biological father present<15	0.20	0.09	0.13	0.08	0.05
Girls					
Biological father always present	0.24	0.06	0.11	0.09	0.01
Biological father not always present	0.35	0.10	0.21	0.14	0.03
Biological father never present	0.21	0.08	0.24	0.12	0.04
0<biological father present<5	0.56	0.11	0.23	0.18	0.01
5≤biological father present<10	0.35	0.14	0.13	0.15	0.03
10≤biological father present<15	0.37	0.07	0.18	0.10	0.00

Percentages calculated using 2000 youth sampling weights

youths who spend their entire childhood with both biological parents (row 1) are less likely to participate in all forms of deviant behavior compared to youths who spend less than their entire childhood with their biological father (row 2). However, the simple behavior differences between youths whose father is always present and youths who spend at least some fraction of their first 15 years without their father may mask important differences in the impact of the timing of paternal departure. We therefore separate youths whose fathers are not always present into groups based on the length of time that the father is in the household: the biological father is never present, present when the youth is born until (but not including) his/her fifth year, present when the youth is 5 years old until (but not including) his/her tenth year, and present when the youth is 10 years old until (but not including) his/her 15th year.

Breaking youths whose fathers are not always present into these four groups reveals several interesting patterns (see the top panel of Table 2). First, for youths whose fathers were present at birth (rows 4 through 6), the longer the biological father remains in the household, the less likely the youth is to participate in deviant behaviors. Secondly, youths whose fathers were never present (row 3) are less likely to partake in all forms of deviant behaviors than are youths whose biological fathers were present when the youth was born until (but not including) age 5 (row 4). This suggests that the existence of a disruption itself matters, in addition to the timing of the disruption. Furthermore, youths whose biological fathers are never present are less likely to smoke (row 3, column 1) than youths from all other family structure types. While at first this seems perplexing, it is largely driven by the fact that a large portion of the sample that never has a biological father present are black, and blacks are less likely to smoke than all other groups.[11]

The bottom two panels of Table 2 report the fraction of youths participating in deviant behaviors across family structures separately for boys and girls. While the levels of youth behavior differ somewhat across boys and girls, the patterns across family structures are similar. We return to this issue in Sect. 6.1.

Taken as a whole, the results reported thus far tentatively suggest that youth from nontraditional families are more likely to partake in deviant behaviors and that the timing of the disruption matters. However, whether this relationship is linear or nonlinear is unclear from these descriptive statistics. The remainder of the paper more formally explores these issues.

6 Results

6.1 The impact of parental presence on youth behavior

Table 3 reports the probit estimates of paternal presence for smoking, drinking, sex, marijuana use, and conviction for three specifications. Panel A includes the years that the biological father remains in the household and the set of regressors most commonly controlled for in the literature, i.e., specification A (see Sect. 4 for details). In order to more easily describe the quantitative importance of this var-

[11] According to our tabulations, 62% (11%) of black (nonblack) youths never lived with their father and 15% (33%) have smoked a cigarette.

Table 3 Probit estimates (marginal effects)

	Smoking	Drinking	Sex	Marijuana	Conviction
Panel A					
Years with biological father	**−0.0100**	**−0.0024**	**−0.0071**	**−0.0048**	**−0.0014**
	(0.0022)	(0.0011)	(0.0017)	(0.0014)	(0.0005)
Impact of 5 more years with father	−0.050	−0.012	−0.035	−0.024	−0.007
Panel B					
Years with biological father	**−0.0107**	−0.0020	**−0.0070**	**−0.0041**	**−0.0012**
	(0.0023)	(0.0011)	(0.0017)	(0.0014)	(0.0004)
Impact of 5 more years with father	−0.054	−0.010	−0.035	−0.021	−0.006
Panel C					
Years with biological father	**−0.0106**	**−0.0025**	**−0.0067**	**−0.0043**	**−0.0007**
	(0.0024)	(0.0011)	(0.0018)	(0.0014)	(0.0003)
Impact of 5 more years with father	−0.053	−0.012	−0.034	−0.022	−0.003
Sample size	1,751	1,904	1,841	1,914	1,880

Heteroskedastic consistent standard errors are in parentheses. Bold coefficients are statistically significant at the 5% level. All youth outcomes measure participation before age 15. 2000 youth sampling weights are used. Panel labels (A–C) indicate the variables included (the variable lists are cumulative, e.g., C includes A and B). See Appendix for more details

iable, all tables report the average treatment effect, evaluated at means, as well as standard errors calculated using the "delta" method.

According to panel A, the longer the biological father remains in the household, the lower the probability that the youth participates in all forms of deviant behavior. And that in all cases, the estimates are statistically significant at the conventional level. For expository ease, it is easiest to consider the impact of 5 extra years with the biological father. In particular, 5 more years with the biological father decreases the probability of participation in smoking, drinking, sex, marijuana use, and conviction by 5.0, 1.2, 3.5, 2.4, and 0.7 percentage points, respectively. To put these results in context, given that 29% of youths have smoked cigarettes at least once before age 15, a 5-percentage-point reduction in smoking participation translates into a 17% lower probability of smoking before the age of 15 for youth whose fathers remain in the household for an extra 5 years. The percentage reductions in drinking, sex, marijuana, and conviction associated with an additional 5 years with the biological father are similarly 15, 20, 20, and 30% relative to the mean.

As previously discussed, it is reasonable to be concerned that observable maternal, household, and youth characteristics may be correlated with the length of time that the father remains in the household and thus bias the estimated impact of years with the father on youth behavior. In order to mitigate this potential bias, we follow Painter and Levine (2000), Waldfogel et al. (2002), and Ruhm (2004) and include several extensive sets of controls in panels B and C corresponding to

Table 4 Probit estimates (marginal effects) for models with interactions

	Smoking	Drinking	Sex	Marijuana	Conviction
Panel 1: boys and girls					
Years with biological father	**−0.0110**	**−0.0036**	**−0.0057**	**−0.0038**	**−0.0007**
	(0.0031)	(0.0014)	(0.0023)	(0.0018)	(0.0004)
Years with biological father * male	0.0009	0.0023	−0.0019	−0.0009	0.0000
	(0.0039)	(0.0018)	(0.0028)	(0.0023)	(0.0005)
P value for joint significance	0.00	0.03	0.00	0.01	0.02
Impact of 5 more years with father for:					
Boys	−0.051	−0.006	−0.038	−0.024	−0.003
Girls	−0.055	−0.018	−0.029	−0.019	−0.003
Panel 2: mother's education					
Years with biological father	−0.0034	−0.0049	−0.0056	−0.0017	−0.0008
	(0.0129)	(0.0062)	(0.0098)	(0.0082)	(0.0012)
Years with biological father * education	−0.0006	0.0002	−0.0001	−0.0002	0.0000
	(0.0011)	(0.0005)	(0.0008)	(0.0007)	(0.0001)
P value for joint significance	0.00	0.07	0.00	0.01	0.02
Impact of 5 more years with father if:					
Mother's education is 12	−0.053	−0.012	−0.033	−0.021	−0.003
Mother's education is 13	−0.056	−0.011	−0.034	−0.022	−0.003
Sample size	1,751	1,904	1,841	1,914	1,880

Heteroskedastic consistent standard errors are in parentheses. Bold coefficients are statistically significant at the 5% level. All youth outcomes measure participation before age 15. 2000 youth sampling weights are used. All panels also include the variables listed in specification C. See Appendix for more details

specifications B and C (see Sect. 4). However, adding an extensive list of maternal and household measures has very little impact. For all outcomes, the point estimates for specifications A, B, and C are statistically indistinguishable from each other at the conventional level.[12,13] Our findings are consistent with Morrison and Cherlin (1995) and Painter and Levine (2000) who find that controlling for pre-disruption factors only moderately reduces the estimated impact of family disruption. In contrast, Thomson et al. (1994) and Furstenberg and Teitler (1994) find that controlling for pre-disruption factors greatly reduces the estimated impact of family disruption on child/youth outcomes.

In an attempt to explore possible interactions between the impact of paternal presence and youth outcomes, Table 4 expands specification C to include interactions between years with the biological father and child gender (panel 1) and maternal years of education (panel 2). The first panel provides no evidence of a differential impact of years with the biological father for boys and girls. While the two paternal presence measures are jointly significant for all outcomes, except for

[12] The results are also similar when maternal church attendance, attitudes towards female roles, smoking, and marijuana use are included in the control vector. We also estimated all models defining the presence of the biological father in a variety of ways. In all cases, the results are similar and are available from the author upon request.

[13] All other coefficient estimates are available upon request.

drinking, at the 10% level or better, in no case is the interaction term statistically significant.

It also seems possible that the impact of the presence of the biological father in the household may differ across men based on their observable characteristics. For example, highly educated men may have a stronger impact on youth outcomes than less educated men. On the other hand, the presence of the father may be more important in low-education households if less educated women have a harder time as single parents. Given the ambiguous prediction, it is an empirical question. While we do not have good measures of paternal education, given assortative mating, maternal and paternal characteristics are likely highly correlated. As such, panel 2 interacts the length of time the biological father remains in the household with maternal education. Again, the point estimates provide no evidence of an interaction effect.

Table 5 Paternal presence and youth behavior (marginal effects)

	Smoking	Drinking	Sex	Marijuana	Conviction
Panel 1					
<100% of life with biological father	**0.1285**	0.0262	**0.0769**	**0.0475**	**0.0092**
	(0.0294)	(0.0141)	(0.0226)	(0.0187)	(0.0043)
Panel 2					
Biological father never present	**0.1025**	**0.0449**	**0.0797**	**0.0588**	**0.0179**
	(0.0440)	(0.0229)	(0.0332)	(0.0296)	(0.0113)
0<biological father present<5	**0.2144**	0.0253	**0.1467**	**0.0783**	0.0117
	(0.0484)	(0.0245)	(0.0432)	(0.0347)	(0.0089)
5≤biological father present<10	**0.1611**	0.0324	0.0546	0.0563	**0.0138**
	(0.0542)	(0.0285)	(0.0409)	(0.0356)	(0.0104)
10≤biological father present<15	0.0285	0.0066	0.0129	−0.0132	0.0047
	(0.0611)	(0.0305)	(0.0464)	(0.0337)	(0.0091)
Joint significance of paternal presence (*P* value)	0.00	0.24	0.00	0.03	0.08
Panel 3					
Biological father never present	**0.1002**	**0.0671**	**0.1148**	0.0540	**0.0257**
	(0.0511)	(0.0300)	(0.0400)	(0.0333)	(0.0158)
0<biological father present<5	**0.2116**	0.0501	**0.1924**	**0.0724**	**0.0196**
	(0.0573)	(0.0321)	(0.0523)	(0.0398)	(0.0142)
5≤biological father present<10	**0.1585**	0.0554	**0.0929**	0.0510	**0.0233**
	(0.0604)	(0.0377)	(0.0487)	(0.0394)	(0.0162)
10≤biological father present<15	0.0271	0.0180	0.0304	−0.0155	0.0075
	(0.0620)	(0.0343)	(0.0501)	(0.0338)	(0.0110)
Stepfather present for some period	0.0034	−0.0248	−0.0451	0.0063	−0.0047
	(0.0384)	(0.0155)	(0.0240)	(0.0219)	(0.0031)
Joint significance of paternal presence (*P* value)	0.00	0.11	0.00	0.14	0.05
Sample size	1,751	1,904	1,841	1,914	1,880

Heteroskedastic consistent standard errors are in parentheses. Bold coefficients are statistically significant at the 5% level. All youth outcomes measure participation before age 15. 2000 youth sampling weights are used. All models also include variable list C. See Appendix for a detailed variable list

6.2 The timing of the family disruption and youth behavior

To further our understanding of the effect of the timing of family disruption on youth outcomes, we allow for the possibility that the impact of paternal exit from the household is nonlinear. In particular, we reestimate Eq. 7 for specification C, replacing the continuous father presence variable with a series of indicator variables. The base model reported in panel 1 of Table 5 includes an indicator variable equal to 1 if the youth spent less than their entire life with their biological father and 0 if otherwise. Panel 2 generalizes the model to include four indicator variables: the biological father was never present, the biological father was present when the youth was born until (but not including) age 5, the biological father was present when the youth was 5 until (but not including) age ten, and the biological father was present when the youth was 10 until (but not including) age 15. In both panels, biological father always present is the omitted category.

Similar to the results presented in panel C of Table 3, the results reported in panel 1 of Table 5 show that youth participation in smoking, drinking, sex, marijuana, and conviction is lower in traditional households. And that in all cases, the estimates are statistically significant at the conventional level. In particular, youths who spend less than their entire life with their biological father are 12.9, 2.6, 7.7, 4.8, and 0.9 percentage points more likely to smoke, drink, become sexually active, use marijuana, and be convicted before the age of 15.

Panel 2 reveals two facts. One, youths whose fathers were never present are more likely to partake in all forms of deviant behavior than youths whose fathers are always present. And two, the probability that a youth smokes, has sex, and/or uses marijuana is highest for youths experiencing marital dissolution during early childhood. These results imply that the timing of disruption is important, in addition to the existence of a disruption. In contrast, Painter and Levine (2000) find that the timing of the disruption has less effect on youth sexual behavior than the existence of the disruption itself.

One might also be concerned that the presence of a stepfather may affect youth participation in deviant behavior.[14] A number of recent studies find that children raised in stepfamilies have worse educational outcomes than children raised in intact families (Case et al. 2001; Ginther and Pollak 2003; Painter and Levine 2000; Biblarz and Raftery 1999; Boggess 1998; Wojtkiewicz 1993). Children raised in stepfamilies are also more likely to be incarcerated (Harper and McLanahan 1999) and are more likely to exhibit behavioral problems (Thomson et al. 1994). In contrast, Painter and Levine (2000) find no significant difference between children raised in stepfamilies and intact families in terms of premarital fertility, Thomson et al. (1994) find that children raised in stepfamilies have similar academic performance to children raised in intact families, and Hill et al. (2001) report both positive and negative effects of maternal remarriage on educational attainment depending on the age of the child/youth at the time of remarriage and the gender of the offspring.

[14] Changes in child support enforcement might also lead to changes in youth outcomes. While there were major changes to the Child Support Enforcement in 1984 and 1988, Case et al. (2000) find that the level and probability of receiving child support payments have been relatively constant since the late 1970s. This being said, we do control for family income, which includes alimony and child support.

To determine whether the presence of a stepfather affects the deviant youth behaviors included in the present study, panel 3 of Table 5 includes an indicator variable equal to 1 if a stepfather is present in the household at any point in time. We find no evidence that youths raised in stepfamilies perform worse than youths from intact families for any of our indicator variables. Moreover, the inclusion of the stepfather indicator does not change the general patterns found for the presence of the biological father indicator variables.

7 Conclusion

This study has documented the differential impact of parental instability by age at separation across a wide range of deviant youth behaviors. We find that an additional 5 years with the biological father decreases the probability of smoking by 5.3 percentage points, drinking by 1.2 percentage points, engaging in sexual intercourse by 3.4 percentage points, marijuana use by 2.2 percentage points, and conviction by 0.3 percentage points. To the extent that we have adequately controlled for family and environmental characteristics and thus isolated the impact of paternal presence on youth participation in deviant behaviors, the estimates indicate that the longer the father remains in the household, the "better off" the youth is. However, the results reported in this paper do not necessarily suggest a policy of discouraging divorce for at least two reasons. First, the reported estimates do not inform us about youth outcomes in the event that divorce does not occur but family stress continues to increase because marital dissolution is barred. Secondly, maternal bargaining power may be reduced if divorce is less easily obtainable. To the extent that mother's invest more in children, such a shift might be to the detriment of children in "unstable" intact families.

Acknowledgements We thank Eric Helland; Janet Currie; Duncan Thomas; seminar participants at the 2001 Society of Labor Economists meetings, the 2001 American Law and Association meetings, the UCLA/RAND labor economics seminar, the 56th European Meetings of the Econometric Society, and the 16th Annual Congress of the European Economic Association; and two anonymous referees for helpful comments.

Data appendix

Specification	Variable Description
A	Years with biological father
	Race: black and Hispanic (omitted category: all other groups)
	Male
	Birth order (1=oldest child)
	Number of children in household
	Mother's years of education
	Mother's age at youth's birth
	3 SMSA indicators (omitted category: not in an SMSA)
	3 Regional indicators (omitted category: Northeast)

B	Number of children ever born to the youth's mother
	Mother's immigrant status (=1 if an immigrant)
	Mother's adjusted AFQT score (see footnote 9)
	Mother's mother's education (see footnote 10)
	Mother's mother's immigrant status (=1 if an immigrant)
	Mother lived in the south at age 14
	Mother's father's education (see footnote 10)
	Mother's father's immigrant status (=1 if an immigrant)
	Mother's family structure at age 14 (included categories: live with both parents, live with mother only)
	Mother's religion in 1979 (included categories: Catholic, Baptist, no religious affiliation)
	Reading material in mother's household at age 14 (included variables: magazines, newspaper, library card)
C	Mother's average weekly hours of work when child was 0–5
	Mother's average weekly hours of work when child was 6–10
	Mother's average weekly hours of work when child was 11–15
	Average annual family income when child was 0–5 (in $10,000.00)
	Average annual family income when child was 6–10 (in $10,000.00)
	Average annual family income when child was 11–15 (in $10,000.00)

References

Antecol H, Bedard K (2002) The relative earnings of young Mexican, black, and white women. Ind Labor Relat Rev 56(1):122–135

Astone NM, McLanahan SS (1991) Family structure, parental practices and high school completion. Am Sociol Rev 56(3):309–320

Biblarz TJ, Raftery AE (1999) Family structure, educational attainment, and socioeconomic success: rethinking the pathology of matriarchy. Am J Sociol 105(2):321–365

Boggess S (1998) Family structure, economic status, and educational attainment. J Popul Econ 11(2):205–222

Bumpass LL, Raley RK, Sweet JA (1995) The changing character of stepfamilies: implications of cohabitation and nonmarital childbearing. Demography 32(3):425–436

Case A, Lin I-F, McLanahan S (2000) Understanding child support trends: economic, demographic, and political contributions. NBER Working Paper Number 8056

Case A, Lin I-F, McLanahan S (2001) Educational attainment of siblings in step families. Evol Hum Behav 22(4):269–289

Cherlin AJ, Kiernan KE, Chase-Lansdale PL (1995) Parental divorce in childhood and demographic outcomes in young adulthood. Demography 32(3):299–318

Comanor WS, Phillips L (2002) The impact of income and family structure on delinquency. J Appl Econ 5(2):209–232

Ermisch JF, Francesconi M (2001) Family structure and children's achievements. J Popul Econ 14(2):249–270

Flewelling RL, Bauman KE (1990) Family structure as predictor of initial substance use and sexual intercourse in early adolescence. J Marriage Fam 52(1):171–181

Fronstin P, Greenberg DH, Robins PK (2001) Parental disruption and the labour market performance of children when they reach adulthood. J Popul Econ 14(1):137–172

Furstenberg FF, Teitler JO (1994) Reconsidering the effects of marital disruption: what happens to children of divorce in early adulthood? J Fam Issues 15(2):173–190

Garasky S (1995) The effects of family structure on educational attainment: do the effects vary by the age of the child? Am J Econ Sociol 54(1):89–105

Ginther DK, Pollak RA (2003) Does family structure affect children's educational outcomes? NBER Working Paper Number 9628

Gruber J (2001) Risky behavior among youth: an economic analysis. University of Chicago Press, Chicago

Gruber J (2004) Is making divorce easier bad for children? The long-run implications of unilateral divorce. J Labor Econ 22(4):799–833

Harper CC, McLanahan SS (1999) Father absence and youth incarceration. Center for Research and Child Wellbeing Working Paper Number 99–03
Hill MS, Yeung W-J, Duncan GJ (2001) Childhood family structure and young adult behaviors. J Popul Econ 14(2):271–299
Jonsson JO, Gahler M (1997) Family dissolution, family reconstitution, and children's educational careers: recent evidence for Sweden. Demography 34(2):277–293
Krein SF, Beller AH (1988) Educational attainment of children from single-parent families: differences by exposure, gender and race. Demography 25(2):221–234
Manski CG, Sandefur GD, McLanahan S, Powers D (1992) Alternative estimates of the effect of family structure during adolescence on high school graduation. J Am Stat Assoc 87 (417):25–37
Matsueda RL, Heimer K (1987) Race, family structure and delinquency: a test of differential association and social control theories. Am Sociol Rev 52(6):130–152
McLanahan S (1997) Parent absence or poverty: which matters more? In: Duncan GJ, Brooks-Gunn J (eds) Consequences of growing up poor. Russell Sage Foundation, New York, pp 35–48
McLanahan S, Bumpass L (1988) Intergenerational consequences of family disruption. Am J Sociol 94(1):130–152
Moffitt R (1992) Incentive effects of the U.S. welfare system: a review. J Econ Lit 30(1):1–61
Morrison DR, Cherlin AJ (1995) The divorce process and young children's well-being: a prospective analysis. J Marriage Fam 57(3):800–812
Painter G, Levine DI (2000) Family structure and youths' outcomes: which correlations are causal? J Hum Resour 35(3):524–549
Ruhm CJ (2004) Parental employment and child cognitive development. J Hum Resour 39 (1):155–192
Sandefur GD, McLanahan S, Wojtkiewicz RA (1992) The effects of parental marital status during adolescence on high school graduation. Soc Forces 71(1):103–121
Thomson E, Hanson T, McLanahan S (1994) Family structure and child well-being: economic resources vs. parental behaviors. Soc Forces 73(1):221–242
Waldfogel J, Han W-J, Brooks-Gunn J (2002) The effects of early maternal employment on child cognitive development. Demography 39(2):369–392
Wojtkiewicz RA (1993) Simplicity and complexity in the effects of parental structure on high school graduation. Demography 30(4):701–717
Wolfe B, Haveman R, Ginther D, An CB (1996) The "window problem" in studies of children's attainment: a methodological exploration. J Am Stat Assoc 91(435):970–982