Does Single Parenthood Increase the Probability of Teenage Promiscuity, Drug Use and Crime?*

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Abstract

There is longstanding evidence that children 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 at young ages. However, as of yet there is not widespread evidence or agreement as to whether or not the timing of the marital disruption differentially impacts youth outcomes. Using the National Longitudinal Survey of Youth (NLSY) and the NLSY Young Adult Supplement, we find that the longer the biological father remains in the household the lower the probability that youth engage in sexual activity. In contrast, it is youth whose fathers are never present who are more likely to be convicted of a crime, youth whose fathers leave during adolescence who are more likely to drink alcohol and use illegal drugs and youth whose fathers leave during childhood who are more likely to smoke cigarettes.

Key Words: Family Structure, Marital Dissolution, Youth Outcomes

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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 percent 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 percent (McLanahan, 1997). The decline of the 'traditional' family has spawned a large literature attempting to measure the 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 pre-school years has a larger negative effect on educational attainment than family dissolution during the elementary or high school years. Fronstin, Greenberg and Robins (2001) similarly find that family disruptions prior to the middle teenage years have a

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

[2] Examples include Painter and Levine (2000), Harper and McLanahan (1999), Comanor and Phillips (1998), Cherlin, Kiernan, and Chase-Lansdale (1995), Flewelling and Bauman (1990), McLanahan and Bumpass (1988) and Matsueda and Heimer (1987).

somewhat more negative impact on educational attainment while later disruptions have a somewhat worse impact on labor market outcomes, such as employment and earnings. And, Ermisch and Francesconi (2001) find that youth 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 (2000) find little to no evidence that youth who spend more years in single parent and/or stepparent households have worse educational outcomes than youth 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 the youth experiences 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 youth 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 child 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 difficult to determine which of the two explanations is correct, or at least more important.

Interpreting the existing empirical findings is made even more difficult by the endogeneity of family structure. In general, previous studies simply demonstrate the correlation between family structure and youth outcomes. While this provides an important description of today's family structure landscape, the direction of causation is unclear since unobserved parental characteristics may be associated with both poor parenting and family structure.

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 addition, we estimate both single equation models that assume the exogeneity of family structure and simultaneous equation models that allow for the endogeneity of family structure.

Measuring paternal presence as a continuous variable, we find moderate and statistically significant reductions in youth participation in smoking, sexual intercourse and conviction before the age of fifteen the longer the biological father remains in the household. In particular, an additional five years with the biological father decreases the probability of smoking regularly by 2.5 percentage points, engaging in sexual intercourse by 4.7 percentage point and conviction by 0.6 percentage points. We further find that the impact of father absence is even larger when we allow for family structure endogeneity in an instrumental variables framework. This suggests that by ignoring simultaneity previous studies likely understated the effect of family structure on youth outcomes.

Once we allow for non-linearity in the impact of the timing of paternal exit we also find substantial evidence that the point during a child's life at which their father leaves affects youth behavior in distinct ways. For example, youth drinking and marijuana use are more likely if marital disruption occurs during adolescence while the probability of youth smoking is higher if the disruption occurs during childhood. In contrast, paternal absence at any age increases the probability of youth sexual activity, with the increase being somewhat larger the earlier the father leaves. Finally, the timing of family dissolution appears to have no impact on the probability of criminal conviction for youth whose father is present for at least some fraction of their life, but conviction rates are higher for youth whose fathers are never married to their mother.

The remainder of the paper is as follows. Section 2 describes the parental and youth data in detail. Section 3 discusses the timing and duration of marriages during a youth's life. Section 4 discusses the estimation and results. Section 5 concludes.

2. Data

All youth, parental and family data are drawn from the Geocode version of 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 fifteen. 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-divorce factors.[3] Thirdly, and most importantly, combining these data allows us to measure the length of time that each youth lives with his/her biological father.

The sample is restricted to mothers and children residing with their mother during their entire first fifteen years of life. We restrict our attention to children living with their mother throughout their life because the small number of children raised by single fathers and alternate caregivers are too small to reliably analyze.

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. In 1994 the survey was extended to survey 'youth' aged fifteen 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. Youth are asked how old they were when they first smoked cigarettes and how often they have engaged in this behavior, began drinking alcohol at least once a month, engaged in sexual intercourse, used marijuana and how often they engaged in this behavior and were convicted of a crime other than a minor traffic offense. This information is used to construct variables indicating whether or not the respondent participated in a specified 'deviant' behavior before the age of fifteen. A respondent is coded as participating in smoking (or using marijuana) before the age of fifteen if they report participating for the first time before the age of fifteen and have smoked cigarettes

[3] While several studies include controls for family characteristics, the findings are mixed. Thomson, Hanson and McLanahan (1994) find that family income explains more of the difference between children of intact and single-parent families than divorce itself. Furstenberg and Teitler (1994) show that controlling for pre-divorce family characteristics, the quality of marital relations, child characteristics and parent-child interaction greatly reduces the estimated impact of divorce on children. In contrast, Morrison and Cherlin (1995) find that controlling for pre-divorce factors has little impact on the estimated impact of divorce on young boys.

(marijuana) on more than one hundred (ten) occasions. Behavior is measured up until the end of age fourteen to maintain a representative sample. In particular, older youth samples are less representative because they necessarily imply the over-sampling of individuals born to women who were very young at the point of childbirth.

Again to maintain the largest and most representative sample possible, the retrospective 'deviant' youth behavior reports for 1998 are used. A youth is only included if they are fifteen or older at the interview date so that behavior occurring up until the end of age fourteen is included.

Table 1 reports the summary statistics for the sample. Approximately 4 percent of youth are convicted of a crime before age fifteen, while 19 percent, 18 percent, 16 percent and 15 percent become sexually active, smoke regularly, use marijuana regularly and drink regularly, respectively. Sample size varies across dependent variables because of non-response. The sample sizes are 1258, 803, 1297, 861 and 1282 for smoking, drinking, sex, marijuana use and conviction. The summary statistics for the independent variables are based on the sex sample, however, similar results are found for all other dependent variable samples and are available from the authors upon request.

The deviant behavior variables are linked to youth and parental control variables measured in the year in which the youth is fifteen years old. The youth's gender and birth-order are from the NLSY-YAS. The sample is evenly split between male and female children, with approximately 63 percent of the sample being first-born children. The mother's years of education, the number of siblings that the youth has, urban/rural residential location, the mother's census division of residence at age fourteen and the youth's census division of residence at age fifteen are drawn from the NLSY.

Finally, and most importantly, 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. In particular, 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 36 months of the youth's birth (see Section 3 for a more detailed discussion). In all other cases, we assume that the youth never lives with his/her biological father. Based on these assumptions, we construct the following measures of father's presence: the length of time that each youth lives with his/her biological father (the maximum is 180 months - their entire life up to the age of fifteen) and a set of indicator variables for father never present, father present 0-95 months, father present 96-179 months and father always present. Referring to Table 1, the average youth resides with his father for 117 months (9.8 years). Further, over half of the youth reside with their biological father for their entire life up to age fifteen, 19 percent never live with their father, and 18 and 9 percent suffer a family disruption before the age of 8 and between the ages of 8 and 15, respectively.

3. Family Structure: The Timing and Duration of Marriages

According to Table 2, mothers who were unmarried at the time of the youth's birth but who married within the first 36 months of the youth's life (7 percent of the sample) are similar to women who married at or before the youth's birth (73 percent of the sample). In particular, both groups of women tend to remain married for longer compared to women whose first marriage (during the youth's life) occurs more than 36 months after the respondent's birth (10 percent of the sample). The mean marriage duration for women married at or before the time of the youth's birth and women married within 36 months of the respondent's birth are 145 and 124 months,

respectively. In contrast, the average marriage of a woman whose first marriage (during the youth's life) occurs more than 36 months after respondent's birth is 77 months. Part of this difference is, of course, driven by the fact that for our purpose marriage duration is capped at 180 months. Given our inability to directly link youth and their fathers and the similarity of the marriage duration across mothers married at birth and married within 36 months, we believe that the more expansive father definition is descriptively more accurate. It should be noted, however, that our results are not sensitive to the father definition used; these issues are discussed in greater detail in Section 4.2.

One might also be concerned that the presence of a stepfather may affect youth participation in deviant behavior.[4] A number of recent studies find that children raised in stepfamilies have worse educational outcomes than children raised in intact families (Case, Lin and McLanahan 2001, Ginther and Pollak 2000, Painter and Levine 2000, Biblarz and Raftery 1999, Boggess 1998, and 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, Hanson and McLanahan 1994). In contrast, Painter and Levine (2000) find no significant difference between children raised in stepfamilies and intact families in terms of premarital birth, Thomson, Hanson and McLanahan (1994) find that children raised in stepfamilies have similar academic performance to children raised in intact families and Hill, Yeung and Duncan (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.

[4] 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, Lin and McLanahan (2000) find that the level

To determine whether the presence of a stepfather(s) affects youth smoking, drinking, sexual activity, marijuana use and conviction we therefore also measure the length of time that a child lives with a stepfather(s). Table 3 shows that 20 percent of youth whose mother married her first husband (the first from the viewpoint of the youth in question) at or before his/her birth have a stepfather(s) before the age of fifteen. Similarly, 26 percent of youth whose mothers married her first husband within 36 months of the youth's birth have a stepfather(s) before the age of fifteen. On average, the two aforementioned groups live with their first stepfather for 67 and 55 months, respectively. In contrast, 10 percent of youth have mothers who marry for the first time after they are 36 months of age and hence never live with their biological father. However, by definition these individuals do have a stepfather(s). On average, their first stepfather arrives when they are 85 months (7.1 years old) and remains in the household for 77 months. The presence of a stepfather is discussed in greater detail in Section 4.2.

4. Estimation and Results

4.1 Single Equation Probit Models

In this section, we treat the length of time exposed to one's biological father as exogenous in single-equation probit models. Let the indicator variable $Y_i = 1$ if the youth participates in a specified deviant behavior before age fifteen and let $Y_i = 0$ otherwise. The choice problem is then described by the following latent variable model:

$$Y_i^* = X_i\beta_1 + D_i\delta + \varepsilon_{1i} \quad (1)$$

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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.

where Y_i^* is the net utility that a youth receives from the deviant behavior, X_i is a vector of individual characteristics (number of siblings, birth order and gender), family characteristics (family income, mother's education, mother's race, and mother's employment status) and regional characteristics (metropolitan status and the youth's census division of residence at age fifteen), D_i is the number of months that the biological father is present in the household, and ε_{1i} is a normally distributed disturbance term with mean zero and unit variance. A youth will only participate 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:

$$\text{prob}(Y_i = 1) = \text{prob}(X_i\beta_1 + D_i\delta + \varepsilon_{1i} > 0) = \Phi(X_i\beta_1 + D_i\delta) \quad (2)$$

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

Table 4 reports the probit estimates for the determinants of smoking, drinking, sex, marijuana use and conviction. In order to more easily describe the quantitative importance of the explanatory variables, all tables report the marginal effects ($\partial \text{prob}(Y_i=1)/\partial X_i$) for continuos variables and average treatment effects for the discrete variables, in both cases evaluated at means, as well as standard errors calculated using the "delta" method. The results are largely consistent with previous findings. Youth with more educated mothers are less likely to have sex, smoke and be convicted of a crime before the age of fifteen. For example, the child of a mother with an undergraduate degree is 8 percentage points less likely to have sex before age fifteen than an otherwise similar youth with a high school graduate mother. Male youth are 5 percentage points more likely to use marijuana than female youth. Black youth are 20 and 12 percentage points less likely to smoke regularly and use marijuana regularly, respectively, than

white youth. And, eldest children are substantially less likely to engage in all forms of deviant behavior compared to later born siblings. While there are few deviant behavior differences across census divisions, youth residing in urban areas are approximately 10 percentage points more likely to use marijuana and 2 percentage points more likely to be convicted of a crime before the age of fifteen.

More importantly for our purposes, we find that the greater the percentage of a youth's life that he/she lives with their biological father, the lower the probability of smoking regularly, having sex and being convicted of a crime. Five extra years with the biological father decreases the probability of participation in smoking, sex and conviction by 2.5 percentage points, 4.7 percentage points and 0.6 percentage points, respectively. In contrast, we find no evidence of a correlation between the length of time that the biological father remains in the household and regular drinking or marijuana use on the part of teenagers.

4.2 Variable Definitions and Sample Selection

To ensure that the results do not over-state the impact of exposure to the biological father due to omitted regional variables that may be correlated with youth behavior measures, we re-estimate equation (2) including additional controls for current census division of residence.[5] One might also be concerned that the results presented in Section 4.1 may suffer from sample selection bias because children born to young mothers disproportionately form the sample. To check, at least in a rough way, that this is not driving the results, youth born to women who had their first child before the age of seventeen are dropped from the sample. Number of siblings may also be endogenous if some couples try to 'save' their marriage by having an additional

child. To ensure that our results are robust to this possibility, we re-estimate equation (2) excluding number of siblings from the list of explanatory variables. Finally, one may conversely believe that the results are driven by the omission of parental behavior measures from the explanatory variable list. While we do not have access to adequate measures of sexual behavior and conviction for mothers and fathers, the NLSY does report smoking behavior for mothers in 1998. As a last robustness check we therefore add an indicator for maternal smoking in 1998 to the list of regressors in equation (2). The results for these four robustness checks are reported in Table 5.[6] In all cases the results are very similar to those reported in Table 4.

One might also be concerned that the results are sensitive to our father definition. As discussed in Section 3, either a more restrictive or expansive definition of paternal presence can be used. Panel A of Table 6 presents four father definitions: a man is considered the youth's father if he was married to the mother within 0, 12, 36 and 60 months of the youth's birth. Notice that the 36-month specification is the definition used up to this point and is included in Table 6 for comparative purposes. Regardless of the father definition utilized the results are again very similar.

Finally, Panel B of Table 6 also includes a measure of the length of time that each youth lives with a stepfather under each of the four biological father definitions. In general, stepfather presence has no effect on youth participation in smoking, sexual activity, drinking and marijuana use. Our sexual activity finding is consistent with the Painter and Levine (2000) finding that youth sexual activity is unaffected by stepfather presence. Similar to Harper and McLanahan (1999), the one behavior that appears to be deterred by stepfathers is criminal conviction.

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[5] Ideally, we would control for mother's state of residence at age fourteen and the current state of residence, however, the cell sizes become too small in many cases.

However, the estimates are quite imprecise under some father presence definitions. Finally, the addition of the stepfather variable has little impact on the estimated deterrence effect of time spent with the biological father.

4.3 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 re-estimate equation (2) replacing the continuous father's presence variable with a series of indicator variables. The base model reported in Panel A of Table 7 simply includes an indicator variable equal to one if the youth spent less than their entire life with their biological father, and zero otherwise. Panel B generalizes the model to include two indicator variables: biological father never present and biological father present between 1 and 179 months. Finally, Panel C includes indicator variables for biological father never present, biological father present between 1 and 95 months and biological father present between 96 and 179 months. Biological father always present is the omitted category in all the models.

Similar to the results presented in Table 4, the results reported in Panel A of Table 7 show that youth participation in smoking and sex are lower in traditional households. Youth who spend less than their entire life with their biological father are 7.7 and 13.9 percentage points more likely to smoke and become sexually active before the age of fifteen. In contrast to Table 4, the indicator variable for father not always present is statistically significant in the marijuana use model. The point estimate suggests that youth who spend less than their entire life

[6] The results are also similar when controls for the frequency of the father's visits are included and if the small number of cases where the deviant behavior takes place before the father leaves the household are excluded. These results are available from the authors upon request.

with their biological father are 7.4 percentage points more likely to use marijuana. Also in contrast to Table 4, father's presence is not a statistically significant determinant of criminal conviction.

Panels B and C suggest that the lack of statistical significance in the conviction equation in Panel A occurs because youth with never present fathers are more likely to be convicted of a crime while the time that initially present fathers leave has no affect on youth criminal behavior. This finding is consistent with Harper and McLanahan (1999). These models also document the differential impact of the timing of paternal exit on youth participation in drinking and marijuana use compared to smoking. The probability that a youth drinks and/or uses marijuana is highest for youth experiencing marital dissolution during adolescence while youth who experience marital disruption during childhood are more likely to smoke cigarettes. For example, a youth whose father left when he was between the ages of 96 months and 179 months is 9.5 and 15.9 percentage points more likely to drink and use marijuana, respectively, than a youth from an intact family. On the other hand, a youth whose father left when he was between the ages of 1 month and 95 months is 11.7 percentage points more likely to smoke. Finally, as in Painter and Levine (2000) the timing of the disruption appears to have less effect on youth sexual behavior than the existence of the disruption itself.

4.4 Simultaneous Equation Model

Thus far, we have treated the length of time that the biological father remains in the household as exogenous. However, this seems unlikely to be the case. It seems more likely that unobserved personality traits affect both parenting skills and marital status. In this case, a single-equation model may confound exposure to the biological father with unobserved parental

attributes rendering biased estimates. We address this concern using the timing of state level divorce law changes to instrument for the length of time (measured continuously) that the biological father remains in the household.[7]

In this case, the choice problem is a two-equation model (equation (1) is replicated here for illustrative purposes),

$$Y_i^* = X_i\beta_1 + D_i\delta + \varepsilon_{1i} \quad \text{and,}$$

$$D_i = X_i\beta_2 + Z_i\gamma + \varepsilon_{2i} \tag{3}$$

where Z_i is an instrument vector, ε_{2i} is a random error term, and all other variables are as defined the same as above.

We follow Rivers and Vuong (1988) and estimate this limited dependent variable model with endogenous variables using their two-stage conditional maximum likelihood (2SCML) approach. In the first stage we estimate equation (3) using ordinary least squares (OLS) to obtain the least squares residual, $\hat{\varepsilon}_{2i} = D_i - Z_i\hat{\gamma} - X_i\hat{\beta}_2$. In the second stage, the choice problem is then described by the following latent variable model:

$$Y_i^* = X_i\beta_1 + D_i\delta + \hat{\varepsilon}_{2i}\lambda + \varepsilon_{1i}. \tag{4}$$

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

$$\text{prob}(Y_i = 1) = \text{prob}(X_i\beta_1 + D_i\delta + \hat{\varepsilon}_{2i}\lambda + \varepsilon_{1i} > 0) = \Phi(X_i\beta_1 + D_i\delta + \hat{\varepsilon}_{2i}\lambda) \tag{5}$$

[7] We are unable to take into account the endogeneity issue for our non-linear indicators of father presence as we do not have a sufficient numbers of instruments.

In order for the model to be identified, Z_i must contain at least one variable that is not contained in X_i. An instrument is valid if it is correlated with the number of months the respondent spends with their biological father, but uncorrelated with the probability of experiencing the youth outcome, that is, it must be uncorrelated with the error term. We use the mother's years of exposure to unilateral divorce laws since age twenty-one (which may change if the mother changes states).

The Geocode version of the NLSY reports the mother's state of residence at age fourteen and in all survey years from 1979-98. Given this information we can construct a mother's exposure to different divorce laws. The year in which each state enacted irretrievable breakdown (no-fault divorce) is listed in Appendix Table A1.[8] We are forced to restrict annual exposure to after the age of twenty-one because the NLSY only reports state of residence for age fourteen and then in each year from 1979-98. As a result we do not know the state of residence for women aged fifteen to twenty-two in the years before 1979.

Beginning in the late 1960s states began allowing the 'irretrievable breakdown of the marriage' to constitute grounds for divorce. Most of these reforms, broadly labeled no-fault divorce, do not require mutual consent. Length of exposure to no-fault divorce laws is a useful instrument for divorce as marital termination costs fell and state-level divorce rates rose after the introduction of the new law. For example, using a panel of divorce rates from 1968 to 1988, Friedberg (1998) shows that liberalized divorce laws lead to rising divorce rates. Over this period the divorce rate rose from three to five per one thousand people.[9]

[8] All dates are from Ellman and Lohr (1998).
[9] Wolfers (2000) argues that this change results from pent up demand for divorce and that its direct effect on the divorce rate has largely run its course within eight years of a state law change.

Is simultaneous equations the appropriate approach? In order to ascertain this, we test the null hypothesis that the number of months that the biological father is present in the household (D_i) is exogenous (H_0: $\lambda=0$). We employ the following test statistic proposed by Rivers and Vuong (1988):

$$CLR=2[L_0-L_1] \quad (6)$$

where CLR stands for conditional likelihood ratio, L_0 is the likelihood ratio from the unconstrained model (equation (5)) and L_1 is the likelihood ratio from the constrained model (equation (2)). The CLR statistic is distributed chi-squared with m degrees of freedom, where m is the number of endogenous variables included in equation (2).

The CLR test statistics for the five youth outcomes (smoking, drinking, sex, marijuana use and conviction) before age fifteen are reported at the bottom of Table 8. We cannot reject the null hypothesis of exogeneity (H_0: $\lambda=0$) at the 10 percent significance level for the drinking, marijuana use and conviction models.[10] However, length of time exposed to the biological father is insignificant in the single-stage equation for the drinking and marijuana use models and the failure to reject exogeneity in the conviction model may simply reflect statistical imprecision due to a very low conviction rate (4 percent). Finally, we reject the null hypothesis of exogeneity at the 10 percent significance level for the smoking and sex models. Overall, there is some evidence that the usual probit estimator of equation (2) is inappropriate for the smoking and sex models and that the 2SMCL approach, which takes into account the endogeneity of the number of months that the biological father was present in the household, is preferred. For completeness however we present the 2SCML for all youth outcomes.

[10] The 90 percent critical values for the chi-squared distribution is 2.706 (d.f.=1).

Table 8 reports the 2SCML marginal effect estimates for smoking, drinking, sex, marijuana use and conviction. Except for the coefficient on the presence of the biological father, the 2SCML results are, in general, similar to the single-equation estimates. Male youth are 5 percentage points more likely than female youth to use marijuana regularly, Black youth are 27 percentage points less likely to smoke regularly than white youth, and first born children are substantially less likely to partake in all forms of deviant behaviors (except drinking) compared to later born siblings. The main exceptions are that maternal education no longer reduces teenage promiscuity, smoking and conviction, and black youth are no longer less likely to use marijuana regularly than white youth.

The biggest difference between the single- and two-equation models lies in the estimated impact of time with the biological father. The magnitude of the biological father coefficient increases substantially, however, it is no longer statistically significant at the 10 percent level for conviction. The imprecision of the time with the biological father coefficient in the conviction model is again not surprising given the small number of youth reporting a conviction before age fifteen. In the single-equation model, one (five) more year(s) with the biological father decreases the probability of engaging in sexual intercourse before the age of fifteen by approximately 1.0 (4.7) percentage points. Once the endogeneity of family structure is accounted for, the estimated causal impact is a 3.9 (13.4) percentage point decrease. Similarly, one (five) more year(s) with the biological father results in a 3.8 (12.1) percentage point decrease in the probability of smoking regularly, and a 0.5 (1.6) percentage point decrease in the probability of conviction.

The larger 2SCML coefficients are likely the result of omitted variable bias in the OLS estimates. Omitted maternal ability is a likely candidate. As divorce laws ease, on the margin, a

larger number of less able women may opt for divorce. At the same time, these women may be less able to compensate for the absence of the father.

5. Conclusion

This study has documented the differential impact of parental instability by age at separation across a wide range of deviant youth behaviors. Defining paternal presence in a linear fashion we find that an additional five years with the biological father decreases the probability of smoking regularly by at least 2.5 percentage points, engaging in sexual intercourse by at least 4.7 percentage point and conviction by at least 0.6 percentage points. Defining paternal presence using a series of indicator variables, we further find substantial evidence that the point during a child's life at which their father leaves affects youth behavior in distinct ways. For example, youth drinking and marijuana use are more likely if marital disruption occurs during adolescence while the probability of youth smoking is higher if the disruption occurs during childhood.

The persistent finding that the duration of paternal presence deters deviant youth behavior in single- and two-equation models gives us more confidence that there is a causal link between family structure and youth outcomes. This is important because despite our attempts to control for all observable parental characteristics it is of course still possible that omitted variables are correlated with both the probability of marital instability and youth outcomes.

Finally, by estimating the impact of the timing of family dissolution on smoking, drinking, sexual activity, marijuana use and conviction in a single data source we have relatively strong evidence that the observed differences in deviant behavior in response to the timing of the marital dissolution observed in the literature are in fact really differences and not simply the result of different samples. In particular, our findings for conviction, which suggest that it the

absence of the father rather than the timing of the disruption that matters, are consistent with Harper and McLanahan (1999) who use the NLSY to solely examine youth incarceration. Further, we find that youth participation in sexual intercourse is affected more by the disruption itself than by the timing of the disruption. This finding is similar to Painter and Levine (2000), who examine premarital birth in the National Educational Longitudinal Survey of 1988 (NELS).

While we have documented the complex relationship between family structure, the timing of the marital disruption and youth behavior, many questions remain unanswered. For example, does the timing of the marital disruption affect youth raised in single-father households in a similar fashion? Or is a maternal absence associated with higher levels of deviant behaviors than paternal absence? Unfortunately, these questions require more extensive data than are presently available.

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Table 1. Summary Statistics

	Sample Size	Mean	Standard Deviation
Smoking	1258	0.1806	0.3849
Drinking	803	0.1502	0.3575
Sex	1297	0.1927	0.3945
Marijuana Use	861	0.1596	0.3665
Conviction	1282	0.0397	0.1953
Months with Biological Father	1297	116.5925	76.8073
Biological Father is Never Present	1297	0.1948	0.3962
0<Biological Father Present<96	1297	0.1825	0.3864
96<=Biological Father Present<180	1297	0.0870	0.2819
Biological Father is Always Present	1297	0.5357	0.4989
Number of Siblings	1297	2.6459	1.1376
First Born Child	1297	0.6323	0.4824
Male	1297	0.5051	0.5002
Black	1297	0.2019	0.4016
Race other than White or Black	1297	0.0266	0.1610
Mother's Years of Education	1297	12.2463	1.7376
Mother's Average Hours of Work	1297	24.0838	15.9283
Average Net Family Income	1297	45.1704	49.7098
SMSA, Not Central City	1297	0.3890	0.4877
SMSA, Central City Not Known	1297	0.2128	0.4095
SMSA, Central City	1297	0.1123	0.3159

All youth outcomes measure participation before age fifteen. Means and standard deviations calculated using 1998 youth sampling weights.

Table 2. Timing and Duration of the Mother's First Marriage Experienced by Youth

	Percent of Sample	Mean Age at Marriage (in months)	Mean Age at Divorce (in months)
Married at Youth's Birth	0.73	0	145
Not Married at Youth's Birth	0.27	NA	NA
Married During Youth's Life	0.17	55	153
Married at or Before Youth is 36 Months	0.07	16	140
Married After Youth is 36 Months	0.10	85	162
Never Married	0.10	NA	NA

Percentages calculated using 1998 youth sampling weights.

Table 3. Timing and Duration of Fathers and Stepfathers

Youth Age at Time of Marriage	Percent of Sample	Mean Age at Father's Arrival	Mean Months with Father	Percent of Group with Stepfather	Mean Age at Stepfather's Arrival	Mean Months with Stepfather
Before Youth was Born	0.73	0	145	0.20	99	67
0 Months < Youth < 37 Months	0.07	16	140	0.26	117	55
Youth is older than 36 Months	0.10	NA	NA	NA	85	77

Percentages calculated using 1998 youth sampling weights.

Table 4. Probit Estimates (Marginal Effects)

	Smoking	Drinking	Sex	Drugs	Conviction
Months with Biological Father	**-0.0005**	0.0001	**-0.0009**	-0.0003	**-0.0001**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Number of Siblings	-0.0169	0.0072	**-0.0199**	-0.0119	**0.0056**
	(0.0126)	(0.0148)	(0.0119)	(0.0138)	(0.0035)
First Born	**-0.1085**	**-0.0779**	**-0.0675**	**-0.0797**	**-0.0245**
	(0.0315)	(0.0346)	(0.0287)	(0.0357)	(0.0108)
Male	0.0069	0.0113	0.0041	**0.0514**	0.0106
	(0.0260)	(0.0301)	(0.0253)	(0.0290)	(0.0083)
Black	**-0.1955**	-0.0468	-0.0182	**-0.1186**	-0.0119
	(0.0195)	(0.0339)	(0.0309)	(0.0258)	(0.0073)
Race other than White or Black	-0.0389	**0.1448**	0.0123	0.0518	**0.0617**
	(0.0589)	(0.1018)	(0.0681)	(0.0870)	(0.0477)
Mother's Years of Education	**-0.0227**	-0.0027	**-0.0199**	-0.0091	**-0.0054**
	(0.0080)	(0.0075)	(0.0069)	(0.0088)	(0.0021)
Mother's Average Hours of Work	-0.0009	**0.0016**	-0.0001	0.0009	0.0000
	(0.0009)	(0.0010)	(0.0008)	(0.0010)	(0.0002)
Average Net Family Income	0.0002	0.0001	-0.0001	0.0001	-0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0001)
Impact of One more Year with Father	-0.0054	0.0009	-0.0103	-0.0039	-0.0012
Impact of Five more Years with Father	-0.0254	0.0044	-0.0473	-0.0186	-0.0055
Sample Size	1258	803	1297	861	1282

All models also include the youth's census division of residence at age fifteen indicator variables and metropolitan status indicator variables. Heteroskedastic consistent standard errors are in parentheses. Bold coefficients are statistically significant at the 10% level. All youth outcomes measure participation before age fifteen. 1998 youth sampling weights are used.

Table 5. Probit Estimates (Marginal Effects) - Alternative Specifications

Months with Biological Father	Smoking	Drinking	Sex	Marijuana	Conviction
Including Mother's CD of Residence at age 14	**-0.0004**	0.0000	**-0.0009**	**-0.0004**	**-0.0001**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0000)
Excluding Mothers whose First Birth is Before Age 17	**-0.0005**	0.0000	**-0.0009**	-0.0003	-0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Excluding Number of Siblings	**-0.0005**	0.0001	**-0.0009**	-0.0003	**-0.0001**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Including Indicator for Maternal Smoking in 1998	**-0.0004**	0.0001	**-0.0008**	-0.0003	-0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)

All models also include the youth's census division of residence at age fifteen indicator variables and metropolitan status indicator variables. Heteroskedastic consistent standard errors are in parentheses. Bold coefficients are statistically significant at the 10% level. All youth outcomes measure participation before age fifteen. 1998 youth sampling weights are used.

Table 6. Probit Estimates (Marginal Effects) - Alternative Father and Stepfather Definitions

	Panel A: Father Definitions					Panel B: Father Definitions plus Stepfather				
	Smoking	Drinking	Sex	Marijuana	Conviction	Smoking	Drinking	Sex	Marijuana	Conviction
0 Months										
Father	**-0.0003**	0.0001	**-0.0010**	-0.0003	**-0.0001**	**-0.0006**	-0.0001	**-0.0011**	**-0.0004**	**-0.0002**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0001)
Stepfather						**-0.0006**	-0.0004	-0.0003	-0.0003	**-0.0002**
						(0.0003)	(0.0004)	(0.0003)	(0.0003)	(0.0001)
12 Months										
Father	**-0.0004**	0.0001	**-0.0009**	-0.0003	**-0.0001**	**-0.0006**	-0.0001	**-0.0010**	-0.0004	**-0.0002**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0001)
Stepfather						-0.0005	-0.0004	-0.0003	-0.0002	**-0.0002**
						(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0001)
36 Months										
Father	**-0.0005**	0.0001	**-0.0009**	-0.0003	**-0.0001**	**-0.0005**	-0.0001	**-0.0009**	-0.0004	**-0.0002**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Stepfather						-0.0003	-0.0005	-0.0002	-0.0002	-0.0002
						(0.0004)	(0.0005)	(0.0004)	(0.0004)	(0.0001)
60 Months										
Father	**-0.0005**	0.0000	**-0.0009**	-0.0003	**-0.0001**	**-0.0006**	-0.0001	**-0.0009**	-0.0003	**-0.0002**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Stepfather						0.0000	-0.0003	0.0000	-0.0002	-0.0001
						(0.0004)	(0.0005)	(0.0004)	(0.0005)	(0.0001)

All models also include the youth's census division of residence at age fifteen indicator variables and metropolitan status indicator variables. Heteroskedastic consistent standard errors are in parentheses. Bold coefficients are statistically significant at the 10% level. All youth outcomes measure participation before age fifteen. 1998 youth sampling weights are used.

Table 7. Fraternal Presence and Youth Behavior (Marginal Effects)

	Smoking	Drinking	Sex	Marijuana	Conviction
Panel A					
<100% of Life with Biological Father	**0.0774**	0.0108	**0.1391**	**0.0741**	0.0143
	(0.0283)	(0.0315)	(0.0290)	(0.0315)	(0.0099)
Panel B					
Biological Father is Never Present	0.0407	-0.0202	**0.1680**	0.0549	**0.0235**
	(0.0439)	(0.0396)	(0.0458)	(0.0489)	(0.0163)
0<Biological Father Present<180	**0.0969**	0.0232	**0.1467**	**0.0933**	0.0124
	(0.0355)	(0.0362)	(0.0378)	(0.0409)	(0.0133)
Panel C					
Biological Father is Never Present	0.0409	-0.0179	**0.1679**	0.0554	**0.0236**
	(0.0439)	(0.0394)	(0.0457)	(0.0489)	(0.0163)
0<Biological Father Present<96	**0.1172**	-0.0104	**0.1649**	0.0639	0.0156
	(0.0434)	(0.0400)	(0.0456)	(0.0482)	(0.0166)
96<=Biological Father Present<180	0.0663	**0.0945**	**0.1295**	**0.1585**	0.0073
	(0.0560)	(0.0627)	(0.0605)	(0.0697)	(0.0214)

All models also include the youth's census division of residence at age fifteen indicator variables and metropolitan status indicator variables. Heteroskedastic consistent standard errors are in parentheses. Bold coefficients are statistically significant at the 10% level. All youth outcomes measure participation before age fifteen. 1998 youth sampling weights are used.

Table 8. 2SCML - Simultaneous Equations Probit Estimates (Marginal Effects)

	Smoking	Drinking	Sex	Marijuana	Conviction
Months with Biological Father	**-0.0036**	0.0012	**-0.0035**	-0.0007	-0.0005
	(0.0019)	(0.0019)	(0.0019)	(0.0017)	(0.0005)
Number of Siblings	-0.0024	0.0039	-0.0113	-0.0112	**0.0070**
	(0.0148)	(0.0151)	(0.0133)	(0.0144)	(0.0038)
First Born	**-0.1491**	-0.0648	**-0.1016**	**-0.0861**	**-0.0294**
	(0.0425)	(0.0420)	(0.0374)	(0.0480)	(0.0137)
Male	0.0276	0.0006	0.0214	**0.0530**	0.0129
	(0.0279)	(0.0358)	(0.0273)	(0.0300)	(0.0082)
Black	**-0.2726**	0.0340	-0.1629	-0.1331	-0.0265
	(0.0480)	(0.1558)	(0.0813)	(0.0727)	(0.0179)
Race other than White or Black	-0.0782	0.2130	-0.0560	0.0381	0.0357
	(0.0477)	(0.1612)	(0.0665)	(0.1075)	(0.0478)
Mother's Years of Education	-0.0069	-0.0084	-0.0058	-0.0077	-0.0035
	(0.0129)	(0.0129)	(0.0118)	(0.0117)	(0.0030)
Mother's Average Hours of Work	-0.0013	**0.0017**	-0.0005	0.0008	0.0000
	(0.0009)	(0.0010)	(0.0009)	(0.0010)	(0.0003)
Average Net Family Income	0.0006	0.0000	0.0003	0.0001	-0.0002
	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.0001)
Impact of One more Year with Father	-0.0384	0.0151	-0.0386	-0.0080	-0.0050
Impact of Five more Years with Father	-0.1209	0.0862	-0.1335	-0.0365	-0.0158
CLR	4.4675	0.5767	2.8879	0.0643	0.5280
First Stage					
F-Statistic for Instrument	8.8800	8.3700	9.5400	9.0700	11.0800
Partial R-Squared	0.0076	0.0110	0.0078	0.0116	0.0090
Sample Size	1258	803	1297	861	1282

All models also include the youth's census division of residence at age fifteen indicator variables and metropolitan status indicator variables. Heteroskedastic consistent standard errors are in parentheses. Bold coefficients are statistically significant at the 10% level. All youth outcomes measure participation before age fifteen. 1998 youth sampling weights are used.

Table A1. State Divorce Law Changes

	Irretrievable Breakdown (No-Fault Divorce)	No-Fault Based Property Division and Alimony
Alabama	1971	
Alaska	1974	1974
Arizona	1973	1973
Arkansas	1979	1979
California	1969	1969
Colorado	1971	1971
Connecticut	1973	
Delaware	1974	1974
Florida	1971	1986
Georgia	1973	
Hawaii	1972	1960
Idaho	1971	1990
Illinois	1983	1977
Indiana	1973	1973
Iowa	1970	1972
Kansas		1990
Kentucky	1972	
Louisiana	1973	
Maine		1985
Maryland		
Massachusetts		
Michigan	1971	
Minnesota	1974	1974
Mississippi	1976	
Missouri	1973	
Montana	1975	1975
Nebraska	1972	1972
Nevada	1931	
New Hampshire		
New Jersey		1980
New Mexico		1976
New York		
North Carolina		
North Dakota	1971	
Ohio	1974	
Oklahoma		1975
Oregon	1971	1971
Pennsylvania	1980	
Rhode Island	1975	
South Carolina		
South Dakota	1985	
Tennessee	1977	
Texas	1969	
Utah	1987	1987
Vermont		
Virgina		
Washington	1973	1973
West Virginia	1977	
Wisconsin	1977	1977
Wyoming	1977	

All dates are from Ellman and Lohr (1998).