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Does Father Absence Place Daughters at Special Risk for Early Sexual Activity and Teenage Pregnancy?

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Abstract

The impact of father absence on early sexual activity and teenage pregnancy was investigated in longitudinal studies in the United States (N = 242) and New Zealand (N = 520), in which community samples of girls were followed prospectively from early in life (5 years) to approximately age 18. Greater exposure to father absence was strongly associated with elevated risk for early sexual activity and adolescent pregnancy. This elevated risk was either not explained (in the U.S. study) or only partly explained (in the New Zealand study) by familial, ecological, and personal disadvantages associated with father absence. After controlling for covariates, there was stronger and more consistent evidence of effects of father absence on early sexual activity and teenage pregnancy than on other behavioral or mental health problems or academic achievement Effects of father absence are discussed in terms of life-course adversity, evolutionary psychology, social learning, and behavior genetic models.

In modern Western societies, adolescent girls face a biosocial dilemma. On the one hand, the biological capacity to reproduce ordinarily develops in early adolescence; on the other hand, girls who realize this capacity before adulthood often experience a variety of negative life outcomes. Specifically, adolescent childbearing is associated with lower educational and occupational attainment, more mental and physical health problems, inadequate social support networks for parenting, and increased risk of abuse and neglect for children born to teen mothers (e.g., Furstenberg, Brooks-Gunn, & Chase-Lansdale, 1989; Konner & Shostak, 1986; Woodward & Fergusson, 1999). Despite these consequences, the United States and New Zealand have the first and second highest rates of teenage pregnancy among Western

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industrialized countries. Approximately 10% of girls in the United States and 7% of girls in New Zealand between the ages of 15 and 19 years become pregnant each year, with around half of these pregnancies culminating in a live birth (Cheesbrough, Ingham, & Massey, 1999; Dickson, Sporle, Rimene, & Paul, 2000). Given these costs to adolescents and their children, it is critical to identify life experiences and pathways that place girls at increased risk for early sexual activity and adolescent pregnancy.

Many studies have identified the absence of the biological father from the home as a major risk factor for both early sexual activity (e.g., Day, 1992; Kiernan & Hobcraft, 1997; Newcomber & Udry, 1987) and teenage pregnancy (e.g., Geronimus & Korenman, 1992; Hogan & Kitagawa, 1985; McLanahan, 1999). This finding is consistent with life-course adversity models of early sexual activity and teenage pregnancy, which posit that a life history of familial and ecological stress provokes earlier onset of sexual activity and reproduction (e.g., Belsky, Steinberg, & Draper, 1991; Coley & Chase-Lansdale, 1998; Fergusson & Woodward, 2000a; Robbins, Kaplan, & Martin, 1985; Scaramella, Conger, Simons, & Whitbeck, 1998). Life-course adversity models, however, do not attribute any special causal significance to father absence. Instead, these models conceptualize father absence as just one of many factors that can undermine the quality of family environments. According to life-course adversity models, it is not father absence per se but various other stressors associated with father absence (e.g., divorce, poverty, conflictual family relationships, erosion of parental monitoring and control) that foster early sexual activity and pregnancy in daughters (see Belsky et al., 1991, p. 658; Chisholm, 1999, p. 162; McLanahan, 1999, p. 119; Robbins et al., 1985, p. 568; Silverstein & Auerbach, 1999, p. 403).

In addition to the effects of life-course adversity, underlying personality traits may account for the relation between father absence and early sexual outcomes in daughters. Specifically, certain personality traits that predispose girls toward early sexual activity and teenage pregnancy may covary with father absence. Differences between children in externalizing behavior problems—those behaviors considered to be aggressive, disruptive, or oppositional —derive in part from individual differences in temperamental characteristics such as negative emotionality and resistance to control (Bates, Pettit, Dodge, & Ridge, 1998; Rothbart & Bates, 1998). Children who display externalizing behavioral problems early in life are at elevated risk for a variety of negative psychosocial outcomes in adolescence, including early sexual activity and teenage pregnancy (e.g., Bardone, Moffitt, Caspi, Dickson, & Silva, 1996; Quinton, Pickles, Maughan, & Rutter, 1993; Woodward & Fergusson, 1999). Moreover, individuals who have a history of externalizing disorders are not only at increased risk of becoming single parents or absent parents (e.g., Emery, Waldron, Kitzmann, & Aaron, 1999; Sampson & Laub, 1990) but also may transmit a genetic disposition toward externalizing behavioral problems and associated personality characteristics to their children (Rhee & Waldman, 2002; personality characteristics associated with both sexual risk taking and other forms of delinquent behavior in adolescence are discussed in Kotchick, Shaffer, Forehand, & Miller, 2001). Thus, girls from father-absent-homes may be at elevated risk for early sexual activity and teenage pregnancy because of higher genetic loading for externalizing behavior problems.

In contrast to the life-course adversity and personality trait models, evolutionary models suggest that early onset of father absence places daughters at special risk for early sexual activity and adolescent pregnancy. Specifically, evolutionary psychologists have hypothesized that the developmental pathways underlying variation in daughters' reproductive strategies are especially sensitive to the father's role in the family and the mothers' sexual attitudes and behavior in early childhood (Draper & Harpending, 1982, 1988; see also Ellis, McFadyen-Ketchum, Dodge, Pettit, & Bates, 1999). Consistent with Hetherington's (1972) work on the effects of early father absence on personality development in adolescent daughters, the evolutionary model suggests that girls detect and internally encode information about parental

reproductive strategies during approximately the first 5 years of life as a basis for calibrating the development of motivational systems, which make certain types of sexual behavior more or less likely in adolescence. The model thus posits a direct effect of quality of early paternal investment (e.g., father presence vs. absence, quality of paternal care giving, father-mother relationships) on early onset of sexual and reproductive behavior.

In light of these theoretical considerations, the current research examined the following set of questions:

Goals of the Current Research

1. Is earlier onset of biological father absence associated with increasing risk of early sexual activity and teenage pregnancy in daughters?

Despite voluminous research on father absence, very few studies have examined the relation between timing of onset of father absence and daughters' sexual outcomes. In a small observational study, Hetherington (1972) found that adolescent girls from early father-absent homes (divorced before age 5) tended to initiate more contact with, and seek more attention from, adult males than did girls from late father-absent homes (divorced after age 5). In a large retrospective survey, however, McLanahan (1999) did not find statistically significant relations between timing of onset of father absence and rates of teenage childbearing in daughters. The current research is the first to measure prospectively the timing of onset of father absence throughout early and middle childhood and then test for its effects on early sexual activity and pregnancy in adolescence.

2. Does earlier onset of biological father absence uniquely increase risk for early sexual activity and adolescent pregnancy in daughters, independent of both early externalizing behavior problems and familial and ecological stressors that covary with father absence? That is, does more exposure to father absence place daughters at special risk for early sexual outcomes—regardless of whether girls are rich or poor, Black or White, cooperative or defiant in kindergarten, born to teenage or adult mothers, grow up in violent or safe neighborhoods, experience many or few stressful life events, have warm-supportive or harsh-rejecting parents, are exposed to functional or dysfunctional marriages, are closely or loosely monitored by parents, and so forth?

A number of studies have found that father absence uniquely predicts early sexual activity (Day, 1992; Devine, Long, & Forehand, 1993; Miller et al., 1997; Upchurch, Aneshensel, Sucoff, & Levy-Storms, 1999) and adolescent pregnancy or child-bearing (Hogan & Kitigawa, 1985; Robbins et al, 1985), after controlling for such confounding variables as race, socioeconomic status (SES), neighborhood danger, and parental monitoring and control. All of these studies, however, began when daughters were already in early to late adolescence and thus were unable to assess familial and ecological stressors before daughters' risk for involvement in sexual activity. The current research is the first to assess prospectively life-course adversity throughout early and middle childhood, and control for its effects when testing for the relation between timing of father absence and rates of early sexual activity and adolescent pregnancy.

3. Does earlier onset of biological father absence discriminantly increase risk for early onset of sexual activity and teenage pregnancy—but not for adolescent behavioral and mental health problems more generally—independent of early externalizing problems and life-course adversity? In other words, is greater exposure to father absence a general risk factor for the development of psychopathology, or is it specific to sexual development?

To our knowledge, only Newcomer and Udry (1987) have explicitly addressed this question. In a short-term longitudinal study of White adolescents, Newcomer and Udry found that the effect of father absence on a composite measure of age-graded minor delinquencies (e.g., smoking, drinking alcohol, cheating on a test) was statistically significant and about equal in magnitude to the effect of father absence on onset of first sexual intercourse in girls. Newcomber and Udry, however, did not control for potentially confounding third variables (e.g., race, SES, mother's age at first birth) that could account for the correlation between father absence and delinquency. The current research examined the unique effects of timing of father absence on a variety of psychosocial and educational outcomes, after controlling for the effects of child conduct problems and familial and ecological stressors during childhood.

This set of questions was investigated in two independent longitudinal studies in the United States and New Zealand. In the U.S. study, a community sample of girls was followed prospectively from the summer before kindergarten through to the 12th grade. In the New Zealand study, a birth cohort of girls was followed prospectively from infancy through to age 18.

Method: United States

Participants and Overview

The United States data were collected as part of the ongoing Child Development Project, a multisite longitudinal study of socialization factors in children's and adolescents' adjustment (see Dodge, Bates, & Pettit, 1990; Pettit, Bates, & Dodge, 1997). Participating families were initially recruited from three geographical areas (Nashville and Knoxville, Tennessee, and Bloomington, Indiana). At the time of kindergarten preregistration in the summers of 1987 (Cohort 1) and 1988 (Cohort 2), parents of matriculating children were solicited at random (in person at the child's school or by mail) to become involved in the study. About 75% agreed. A total of 585 families agreed to participate in the study. Of these 585 families, 281 of the children were girls. The analyses reported in this article are based on this female subsample, which was demographically diverse and representative of the geographic regions (81% White, 17% African American, 2% other; 28% lived with a single mother at the beginning of the study). The Hollingshead (1975) Four-Factor Index of Social Status was computed from demographic information provided by the parents of the girls. The mean family score on the index at the beginning of the study was 38.85 (SD = 14.0), indicating a predominantly middle-class sample. Data on girls' early externalizing behavioral problems and on familial and ecological stressors were collected in Years 1 through 9 of the study (ages 5–13), Data on adolescent sexual activity, pregnancy, internalizing and externalizing behavioral problems, academic performance, and violence were collected in Years 10 through 13 of the study (ages 14–17). At the completion of the study in Year 13, the average age of the girls was 17.3 years (*SD* = .34). Of the original 281 girls, 242 (86%) participated in the Years 10 through 13 data collections. This subset was generally representative of the original sample (16% African American; 25% from single-mother homes; mean SES = 39.45). Other analyses have shown that attrition has not significantly biased the sample on either initial child adjustment or family socialization variables (see Pettit et al., 1997; Pettit, Bates, Dodge, & Meece, 1999). Nonetheless, there was a slight but statistically nonsignificant trend for the 242 girls in the current analyses to underrepresent girls from socially disadvantaged backgrounds (low SES, African American, single-mother homes).

Following recruitment, mothers were interviewed at home in the summer before daughters' entry into kindergarten (see Dodge, Pettit, & Bates, 1994), when most children were 5 years of age. The 90-min audiorecorded interview included both open-ended and structured questions about each of two eras in the child's life (a period from 12 months of age up to 12 months ago, and the past 12 months). Questions concerned the child's development and child-care history,

family stressors, parental behavior, exposure to socializing factors, and current functioning. Reliability was assessed through independent ratings of 41 randomly selected families made by a second coder who sat in with the interviewer. Additional home interviews with the mothers were conducted in Years 7 and 9 of the study (when daughters were approximately ages 11 and 13). Questions concerned family changes and adjustment, child's involvement in after-school care settings, parenting practices, and neighborhood characteristics over the past year.

In addition, mothers annually completed child behavior-problem questionnaires and provided family demographic data. Behavior-problem questionnaires were also completed by daughters in Years 11 through 13 of the study (approximate ages 15–17). Daughters answered questions about sexual behavior and pregnancy at this time. Also at this time, research staff requested permission to view the participants' academic records.

Timing of Onset of Father Absence

To determine timing of onset of father absence, household composition data were collected during Years 1 through 9 of the study (ages 5–13). Because Hetherington (1972) and Draper and Harpending (1982) suggest that the first 5 years of life constitute a sensitive period for the effects of father absence on daughters' sexual development, *early onset of father absence* was defined in this study as absence of the "birth father" (either the biological father or an adoptive father present from birth) from the home at or before age 5. This cutoff was also chosen to allow comparison with past studies, which have commonly defined early father absence as occurring in the first 5 years (e.g., Bereczkei & Csanaky, 1996; Blain & Barkow, 1988; Hetherington, 1972). Girls were thus classified as early father absent if they were either born into single-mother families or born into intact two-parent families but subsequently experienced birth father absence at or before age 5. *Late onset of father absence* was defined as birth father presence in the home through age 5 but subsequent absence of the birth father from the home beginning sometime during ages 6 through 13. We chose age 13 as the cutoff for late father absence to complete measurement of father absence before the onset of first pregnancy in daughters. *Father presence* was defined as birth father presence in the home through age 13. Classification of girls into the father-present or father-absent groups was based solely on birth father status and did not take stepfathers into account (33% = early father absent, 12% = late father absent, 55% = father present).

Adolescent Sexual Outcomes

Early sexual activity—In Year 12 (age 16), girls were asked whether they had ever had sexual intercourse. Girls who responded "no" were coded as 0 for early sexual activity (60%); girls who responded "yes" were coded as 1 for early sexual activity (40%). The age 16 cutoff has been commonly used in past studies to demarcate early onset of sexual activity (e.g., Fergusson & Woodward, 2000b; Kiernan & Hobcraft, 1997; Paul, Firzjohn, Herbison, & Dickson, 2000).

Adolescent pregnancy—In Years 10 through 13 (ages 14–17), girls were asked annually whether they had become pregnant in the last year. Girls who reported no pregnancies over this period were coded as 0 for adolescent pregnancy (85%); girls who reported at least one pregnancy over this period were coded as 1 for adolescent pregnancy (15%).

Covariate Factors

To assess the extent to which associations between timing of father absence and adolescent sexual outcomes could be explained by the effects of early externalizing problems and familial and ecological stressors, the following 10 variables were included as covariates in the analysis. The measures of familial and ecological stress were chosen as covariates on the basis of past research indicating (a) covariation with father absence and (b) prediction to early sexual activity

and adolescent pregnancy (see reviews by Kotchick et al., 2001; Miller, Benson, & Galbraith, 2001). The covariates were measured repeatedly and prospectively from the beginning of each study through age 13.

Externalizing behavior problems (early childhood)—During Years 1 and 2 of the study (ages 5–6), mothers completed the Child Behavior Checklist (CBCL; Achenbach, 1991). The 33-item externalizing problems score, which has been reported to have excellent psychometric properties (Achenbach, 1991), was used to index daughters' early externalizing problems. A composite externalizing behavioral problems score was computed by averaging over Years 1 and 2 (Á = .81, *M* = 10.63, *SD* = 6.47).

Mother's age at first birth—Mothers reported how old they were when they first gave birth to a child (*M* = 23.23, *SD* = 4.82).

Race—Race was coded as a dummy variable: 0 = Caucasian (83%), 1 = non-Caucasian (17%). Of the 42 non-Caucasian participants, 38 were African American.

SES—SES was computed on the basis of mothers' and fathers' occupation and years of education (Hollingshead, 1975; full description in Dodge et al., 1994). Because the rank-ordering of SES between families was highly stable over time, a composite childhood SES score was computed by averaging SES scores from Year 1 (age 5) and Year 9 (age 13; α = .84, *M* = 38.11, *SD* = 12.78).

Family life stress (early childhood)—Family life stress was assessed during the Year 1 interview on the basis of questions concerning changes and adjustments in the home and their perceived impact on the child during each era (see Dodge et al., 1994). Interviewers completed ratings of the extent of stressful, challenging events faced by the child and family (1 = *minimum challenge,* 5 = *severe frequent challenges*). The rating from the two eras were averaged to yield a score for family life stressors (α = .64, proportion agreement between independent raters of the same protocol = .79, *M* = 3.04, *SD* = .94).

Dyadic adjustment (early childhood)—During the Year 1 interview, mothers were asked to recall each era and answer questions concerning the kinds of family strife and violence the child was exposed to (see Ellis et al., 1999). Interviewers then completed ratings of the severity of conflict within the parental dyad (1 = *rarely even shout;* 5 = *physical fights, more than once*). The rating from the two eras were averaged to yield an overall score (α = .74, inter-rater agreement = .80, *M* = 2.19, *SD* = 1.03). Mothers Were also asked questions concerning levels of help and emotional support from their partners during each era (see Ellis et al., 1999). Interviewers then completed ratings of level of supportiveness in the parental dyad, and the ratings from the two eras were averaged to yield an overall score (α = .88, inter-rater agreement = .86, *M* = 2.37, *SD* = .57). A composite measure of dyadic adjustment was computed by standardizing and then averaging the measures of "severity of conflict within the parental dyad" (reverse-scored) and "supportiveness in the Parental dyad" (α across the two measures = .55).

Harshness of discipline (early childhood)—During the Year 1 interview, mothers were asked about their use of discipline practices and whether the child had ever been harmed by an adult during each era (see Dodge et al., 1994). Interviewers then completed ratings of the degree of restrictive discipline received by the child (1 = *nonrestrictive, mostly prosocial guidance;* 5 = *severe, strict, often physical*) and whether the target child had been severely harmed (1 = *definitely not,* 5 = *authorities involved*). These four ratings (two ratings for each

of two life eras) were averaged to derive the early childhood harshness of discipline score (α = .81, inter-rater agreement = .78, *M* = 2.05, *SD* = .67).

Harshness of discipline (preadolescence)—Harshness of discipline was also assessed during the Years 7 and 9 interviews. Using a 4-point scale (1 = *never*, 4= *frequently*), mothers rated how often they used each of six harsh disciplinary tactics (e.g., scold, slap or hit with hand, use belt/paddle). A composite harshness of discipline measure was computed by averaging the Year 7 (α = .67) and Year 9 (α = .67) measures (α across the two measures = .77, *M* = 2.06, *SD* = .42).

Parental monitoring (preadolescence)—Parental monitoring was assessed during the Years 7 and 9 home interviews with the mothers. Although the two measures had slightly different content, both employed 5-point frequency scales and focused on parents' awareness of their children's activities and companions. A composite measure of parental monitoring was computed by standardizing and then averaging the Year 7 (α = .73, *M* = 4.65, *SD* = .34; see Pettit et al., 1999) and Year 9 (α = .67, *M* = 4.32, *SD* = .45; see Pettit, Laird, Dodge, Bates, & Criss, 2001) measures (α across the two measures = .66).

Neighborhood danger (preadolescence)—Neighborhood danger was assessed during the Years 7 and 9 home interviews with the mother. During the Year 7 interview, mothers responded to a set of six items (adapted from the Self-Care Checklist; see Posner & Vandell, 1994) describing their general appraisal of neighborhood and family safety. Items were rated on a 6-point scale (*very safe* to *very unsafe*) and averaged to form an overall neighborhood safety score (α = .90, *M* = 2.01, *SD* = .86). In addition, immediately following the Year 7 and Year 9 interviews, the interviewer completed a 4-point rating of overall neighborhood safety (*very safe* to *very unsafe; Ms* = 1.82 and 1.71, *SDs* = .85 and .77, respectively). A composite measure of neighborhood danger was computed by standardizing and then averaging the mother-report and two interviewer-report measures (Á across the three measures = .78).

Measures of Psychosocial Adjustment and Educational Achievement (Adolescence)

To assess the extent to which timing of father absence discriminantly predicted early sexual activity and adolescent pregnancy (but not other behavioral and mental health problems), the following educational and psychosocial outcome variables were investigated. These outcomes were measured concurrently with assessment of timing of sexual activity and adolescent pregnancy from ages 14 to 18.

High school grade point average (GPA)—Data on high school GPA were drawn from archival school records (Grades 9–11). Staff members examined each child's file and noted the grades earned in math, language, science, and social studies. Conventional grade conversions were used (i.e., A = 4, B = 3, C = 2, D = 1, E = 0). A composite GPA was calculated for each child by averaging the grades received across the four subjects across the three years (α = .89, *M* = 2.50, *SD* = .96).

Violent acts (adolescence)—Data on violent acts were collected in Years 12 and 13 (approximate ages 16–17). Girls in each year reported how often they had performed each of seven violent acts in the last 12 months (e.g., "How many times have you been physically cruel to someone else [causing harm]?" "How many times have you *started* a fight with someone else, where you hurt that person?" "How many times have you used a weapon that can cause serious physical harm to others [like a bat, brick, broken bottle, knife, or gun]?"). Girls who reported no violent acts in either year were coded as 0 for violent acts (76%); girls who reported at least one violent act in either year were coded as 1 for violent acts (24%).

Externalizing behavior problems (adolescence)—Self-report and mother reports of externalizing behavior problems were assessed in Years 11 through 13 (ages 15–17) using the Youth Self-Report (YSR) and CBCL, respectively (Achenbach, 1991). The highly reliable externalizing problems score (30 and 33 items in the YSR and CBCL, respectively) was used to index daughters' adolescent externalizing problems. A composite self-report externalizing behavioral problems score was computed by averaging self-reports over Years 11 through 13 (α across the three scores = .87, M = 10.72, SD = 6.29) and a composite mother-report externalizing behavioral problems score was computed by averaging mother reports over Years 11 through 13 (α across the three scores = .90, M = 7.91, SD = 7.39). The composite self-report and mother-report externalizing scores were moderately correlated, r (241) = .52, $p < .001$. To facilitate comparison with rates of early sexual activity and teenage pregnancy, both self-reports and mother reports of both externalizing behavior problems were dichotomized (bottom 85% = 0, top 15% = 1).

Internalizing behavior problems (adolescence)—Self-report and mother, reports of internalizing behavior problems—those behaviors considered to be anxious, withdrawn, or depressed—were also assessed in Years 11 through 13 using the YSR and CBCL (Achenbach, 1991). The highly reliable internalizing problems score (32 items in both the YSR and CBCL) was used to index daughters' adolescent internalizing problems. A composite self-report internalizing behavioral problems score was computed by averaging self-reports over Years 11 through 13 (α across the three scores = .86, M = 11.39, SD = 7.40) and a composite mother-report internalizing behavioral problems score was computed by averaging mother reports over Years 11 through 13 (α across the three scores = .84, M = 7.18, SD = 5.98). The composite self-report and mother-report internalizing scores were moderately correlated, r (241) = .46, $p<.001$. Again, to facilitate comparison with rates of early sexual activity and teenage pregnancy, both self-reports and mother reports of both internalizing behavior problems were dichotomized (bottom 85% = 0, top 15% = 1).

Method: New Zealand

Participants and Overview

The New Zealand data were collected as part of the Christchurch Health and Development Study (CHDS). The CHDS is an ongoing longitudinal study of an unselected birth cohort of 1,265 children (635 males, 630 females) born in the Christchurch, New Zealand, urban region during a 4-month period in mid-1977 (Fergusson & Horwood, 2001; Fergusson, Horwood, Shannon, & Lawton, 1989). The current research is based on this female subsample, which was demographically diverse and representative of the geographic region (13% Maori/Polynesian, 25% father unemployed or in low-skill occupation, 8% living with a single mother at birth). The girls and their families have been studied at birth, 4 months, 1 year, and at annual intervals to age 16 years, and again at ages 18 and 21 years. In the vast majority of cases (typically > 95%) follow-up assessments have been conducted within 4 weeks of the sample member's birthday. Data have been collected from a combination of sources including: parental interviews (birth–16 years), self-report (8–21 years), psychometric testing (8–13 years), teacher reports (6–13 years), medical records (birth–21 years), and police records (13–21 years). In general terms the aims of the study have been to build up a running record of the life history, social circumstances, health, and development of a large cohort of New Zealand children growing up in the 1980s and 1990s, In particular, the study has gathered a wealth of information on family composition, social and family functioning in childhood, and psychosocial outcomes in adolescence.

The present analyses are based on the sample of 520 female cohort members for whom information on the timing of father absence and adolescent outcome measures was available.

This sample represented 83% of the original cohort of 630 females and was generally representative of the original sample (13% Maori/Polynesian, 23% father unemployed or in low-skill occupation, and 7% living with a single mother at birth). Comparison of the analysis sample of 520 females with the remaining 110 sample members from the original female cohort on a range of sociodemographic measures collected at birth suggested slight but statistically significant ($p < .05$) tendencies for the analysis sample to under-represent girls from socially disadvantaged backgrounds (low paternal occupational status, low maternal education). This raises the issue of the extent to which study findings could be influenced by the effects of sample-selection bias. To examine this issue, all analyses were repeated using the data-weighting method described by Carlin, Wolfe, Coffey, and Patton (1999) to adjust for possible selection effects resulting from the pattern of sample attrition. These analyses produced essentially identical results to those based on the unweighted data, suggesting that the small biases detected in the sample are unlikely to affect study conclusions. Because the two sets of results were mutually consistent, in the interests of simplicity, the results reported here are based on the unweighted sample data.

Timing of Onset of Father Absence

Comprehensive data were gathered on family composition at annual intervals to age 13, including information on the relationship between the daughter and any adult males in the home. Classification of girls into the three father-absent and father-present groups (early father absent, late father absent, and father present) was based on the same coding procedures used in the U.S. sample (16% = early father absent, 11% = late father absent, 73% = father present).

Adolescent Sexual Outcomes

Early sexual activity—At each assessment from ages 14 to 16, sample members were questioned concerning their sexual behavior, including their experience of consensual sexual intercourse since the previous assessment. At age 18 sample members were again questioned concerning their previous experience of sexual intercourse, and those who reported such experience were asked to report their age at first experience of consensual intercourse. Young women were classified as having engaged in early sexual activity if they had ever reported involvement in consensual sexual intercourse before age 16. Overall, 33% of the sample reported early sexual activity.

Adolescent pregnancy—At age 14, the mothers of female sample members were asked whether their daughter had ever been pregnant. From age 15 onwards sample members themselves were questioned about any pregnancies since the previous assessment and, in particular, the timing and outcome of these pregnancies. Young women were classified as having an adolescent pregnancy if they had ever been reported as being pregnant before age 18. Overall, 8% of young women had been pregnant before age 18.

Covariate Factors

To assess the extent to which associations between timing of father absence and adolescent sexual outcomes could be explained by the effects of child conduct problems and familial and ecological stressors, we included the following 10 variables as covariates in the analysis.

Early conduct problems (6 years)—When sample members were age 6, maternal and teacher reports of the child's tendencies to conduct disordered and oppositional behaviors were obtained using the 9-item mother- and teacher-report versions of the Rutter Behavior Rating Scale (Rutter, Tizard, & Whitmore, 1970). For the present analysis the maternal and teacher reports were summed to produce an overall scale measure reflecting the extent to which the child was reported to be exhibiting conduct problems at age 6 ($\alpha = .83$, $M = 20–44$, $SD = 3.21$).

Maternal age at first childbirth—The mother's age at first childbirth was assessed during the initial parental interview at the time of the survey child's birth. The mean age at first childbirth was 23.7 years (*SD* = 4.2).

Race—The sample member's ethnicity was coded as a dummy variable: 0 = European New Zealander (87%), 1 = Maori/Polynesian (13%).

Maternal education—The mother's education level was assessed at the time of the survey child's birth and coded into a three-level classification: no formal educational qualifications (50.0% of the sample), high school qualifications (28.3%), and postsecondary certificate or degree (21.7%), Higher scores indicated higher levels of educational achievement.

Father's occupational status—Father's occupational status was classified at the time of the survey child's birth using the Elley-Irving (1976) scale of occupational status for New Zealand. This scale classifies families into six groups on the basis of paternal occupation. In the present analysis, the Elley-Irving coding was reduced to a three-level classification as follows: Levels 1, 2 (professional, managerial: 22.5% of the sample); Levels 3,4 (clerical, technical, skilled: 54.4%); and Levels 5, 6 (semiskilled, unskilled, unemployed: 23.1%). This variable was reverse-scored so that higher scores represent higher occupational status.

Family living standards (0–10 years)—At each assessment from ages 1 to 10 years, a measure of the quality of the family's standard of living was obtained on the basis of an interviewer rating of family living standards. Ratings were made on a 5-point scale (1 =*family obviously poor/very poor*, 5= *family obviously affluent and well-to-do*). These ratings were averaged over the 10-year period to provide an overall measure of the quality of family living standards during this period (α across the 10 ratings = .92, *M* = 2.16, *SD* = .45).

Family life stress (0–10 years)—At each assessment up to the child's age 10, parents were questioned about the occurrence of adverse family life events during the preceding year using a 20-item life events inventory based on the Holmes and Rahe (1967) Social Readjustment Rating Scale. For each year, a life events score was calculated for the family based on a count of the number of adverse events reported. To provide an overall measure of the family's exposure to adverse life stress from birth to 10 years, the annual life events scores were summed over the 10-year period (α across the 10 ratings = .80, mean number of adverse life events = 20.80, *SD* = 12.22).

Marital conflict (0–10 years)—At annual intervals up until the children were age 10, parents were questioned using three items that described the quality of the marital relationship over the previous 12 months. For each item, a count of the number of positive reports over the 10-year period was calculated, and the resulting count measures were combined to produce a scale measure of the extent to which sample members were exposed to parental conflict from birth to age 10 years (Fergusson, Horwood, & Lynskey, 1992; α =.66, *M* = 4.24, *SD* = 8.98).

Early mother-child interaction (3 years)—To provide an assessment of the quality of early mother-child interactions, when sample members were age 3, mothers were assessed on the 10-item Maternal Emotional Responsiveness and 5-item Maternal Punitiveness subscales of the Home Observation for Measurement of the Environment (HOME) Inventory (Bradley & Caldwell, 1977; Elardo, Bradley, & Caldwell, 1977). Each item is scored 0 or 1 to indicate the absence or presence of the target behavior. The Maternal Emotional Responsiveness subscale provides an index of the frequency with which the mother makes positive emotional responses to her child and was scored so that a high score indicates more positive responses (α = .69, *M* = 8.44, *SD* = 1.41). The Maternal Punitiveness subscale provides an index of the

frequency with the which the mother is observed to make punitive responses to her child's behavior and was scored so that a high score implies more punitive responses ($\alpha = .71$, $M = .82$, $SD = .80$).

Measures of Psychosocial Adjustment and Educational Achievement (14–18 years)

At ages 15 and 16, sample members were interviewed by trained survey interviewers on a comprehensive mental health interview that examined various aspects of the young person's psychosocial adjustment over the preceding 12 months. A parallel interview was administered to parents. At age 18, a similar interview was administered to sample members that assessed the individual's mental health, psychosocial adjustment, and educational achievement from 16 to 18 years. Using this information, the following additional outcome measures were constructed.

School qualifications—School Certificate is a national series of examinations that is undertaken by most New Zealand students in their third year of high school. Students may sit examinations in any number of subjects (typically four or five), and performance in each subject is graded from A to E, with a grade of C or better implying a pass in that subject. For the present analysis, a young woman was classified as having left school without qualifications if she had left school by age 18 years without at least one pass grade in School Certificate: This criterion was met by 16.5% of the sample.

Mood disorder—At ages 15 and 16, information on the young person's experience of depressive symptomatology was obtained using items from the child and parent versions of the Diagnostic Interview Schedule for Children (DISC; Costello, Edelbrock, Kalas, Kessler, & Klaric, 1982). This information was used to classify young people according to the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev. [*DSM-III-R*], American Psychiatric Association, 1987) symptom criteria for major depression (Fergusson, Horwood, & Lynskey, 1993). At age 18 years, the assessment of depressive symptomatology was based on the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. [*DSM-IV],* American Psychiatric Association, 1994) criteria for major depression assessed using items from the Composite International Diagnostic Interview (CIDI; World Health Organization, 1993). For the present analysis, young women were classified as having a mood disorder from 14 to 18 years if they met the relevant *DSM* criteria for major depression on the basis of self- or parent-report at any time during the 4-year period: This criterion was met by 37.3% of the sample.

Anxiety disorder—Parallel to the assessment of major depression, at ages 15 and 16 sample members and their parents were also questioned about the young person's history of anxiety symptomatology in the previous 12 months using items from the DISC. This information was used to classify young people on *DSM-III-R* criteria for the following anxiety disorders: separation anxiety, overanxious disorder, generalized anxiety disorder, social phobia, simple phobia, agoraphobia, and panic disorder. As part of the age 18 interview, items from the CIDI were used to assess *DSM-IV* symptom criteria for the following anxiety disorders: generalized anxiety disorder, social phobia, specific phobia, agoraphobia, and panic disorder. For the present analysis, young women were classified as having an anxiety disorder if they met *DSM* criteria for any of the preceding disorders over the 4-year period: This criterion was met by 44.6% of the sample.

Suicide attempts—At ages 15, 16, and 18, sample members were questioned about their experience of suicidal thoughts since the previous assessment. Those reporting suicidal thoughts were further questioned about any suicide attempts and the frequency, nature, and outcome of any such attempt(s). Overall, 7.1% of the sample reported taking at least one suicide attempt during the 4-year period. All respondents who reported suicidal behavior or other

mental health problems were offered assistance in obtaining a referral to an appropriate treatment service.

Violent offending—At ages 15 and 16, the young person's involvement in criminal offending over the previous year was assessed using the Self Report Early Delinquency inventory (SRED; Moffitt & Silva, 1988). Similar questioning was conducted at age 18 using the Self Report Delinquency Inventory (SRDI; Elliott & Huizinga, 1989). Using these data, young women were classified as being violent offenders if they reported committing any violent offence (including physical assault, getting into fights, using a weapon or strong-arm tactics to commit a robbery, threatening behavior, and related offenses) over the 4-year period: This criterion was met by 13.7% of the sample.

Conduct disorder—At ages 15 and 16, sample members were assessed on *DSM-III-R* symptom criteria for conduct disorder based on self-reports and parent reports on the SRED (Fergusson et al, 1993). At age 18, *DSM-1V* criteria for conduct disorder were derived from items in the SRDI. Young women were classified as conduct disordered if they met *DSM* criteria for conduct disorder on the basis of self-report or parental report at any time during the 4-year period: This criterion was met by 7.5% of the sample.

Results

Statistical Analyses

As described previously, there were 16 dependent variables to be analyzed: early sexual activity, teenage pregnancy, and six other measures of psychosocial adjustment and educational achievement in each of the two samples. With one exception (GPA in the U.S. sample), all outcomes were dichotomous. Analysis of the associations between father absence and the dependent variables was conducted in several stages.

Before conducting the primary data analysis, preliminary analyses were carried out to test the linearity of the associations between the three-level timing of onset of father absence measure and the dependent variables. For the 15 dichotomous dependent variables, these tests were conducted using the Mantel-Haenszel chi-square test of linearity. Comparison of the Mantel-Haenszel results with the alternative Pearson's chi-square test of independence showed that, in all cases, the linear model appeared to provide the best fitting and most parsimonious representation of the association. For the measure of GPA, similar tests of linearity were conducted within an ANOVA framework. These tests also suggested that a linear model most accurately represented the association. We thus concluded that the relations between timing of onset of father absence and all outcome measures were essentially linear. In all subsequent analyses, therefore, father absence was treated as a continuous (linear) variable, which was coded so that higher scores indicated earlier onset of father absence (0 = father presence, 1 = late onset of father absence, 2 = early onset of father absence).

Treating father absence in this manner is conceptually similar to analyzing age at onset of father absence. Although age at onset might be a more appropriate metric for analysis, detailed information on this variable was available only in the New Zealand sample. Thus, for consistency we have used the same three-level classification of timing of onset of father absence across the two samples. However, further analysis of the New Zealand data indicated that age at onset of father absence correlated in excess of .97 with the current three-level measure. This suggests that similar conclusions would be drawn if more accurate assessments of the timing of father absence were available in both samples.

The principal data analyses were based on a series of regression analyses examining the relations between the timing of father absence and the 16 dependent variables before and after

adjustment for child, family, and ecological factors. For binary dependent variables, these analyses were conducted using logistic regression methods in which the log odds of the dependent variable was modeled as a linear function of the riming of father absence and covariates (where applicable). The full covariate adjusted model fitted to the data was of the form:

$$\text{logit}[\,\text{pr}(Yi)]=B0i+B1iX1+\sum BjiZj$$

where logit[pr(*Yi*)] was the log odds of the *i*th dependent variable, X1 was the continuous measure of timing of father absence, and *Zj* was the set of child, family, and ecological covariates. The parameter B1*i* represents the effect of father absence on the log odds of the *i*th dependent variable. A measure of effect size is provided by the odds ratio between the timing of father absence and the dependent variable. The odds ratio represents the multiplicative effect of a one-unit shift in the three-level father absence variable. The corresponding analyses for the continuous dependent variable (GPA) were based on standard linear regression, and the measure of effect size is provided by the standardized regression coefficient (beta) for the timing of father absence measure.

To illustrate the extent of the association between the timing of father absence and the binary outcome measures after adjustment for covariates, estimates of the adjusted rates for each outcome were computed using the parameters of the fitted logistic regression models. The adjusted rates were computed using the method described by Lee (1981) and can be interpreted as the hypothetical rates of each outcome that would have been observed had all sample members experienced their existing mix of covariate factors but varied in their exposure to father absence.

Rates of Early Sexual Activity and Adolescent Pregnancy by Timing of Father Absence

Do rates of early sexual activity and adolescent pregnancy differ according to timing of onset of father absence? We expected a dose-response relationship in which early father-absent girls would have the highest rates of early sexual activity and teenage pregnancy, followed by late father-absent girls, followed by father-present girls.

Figure 1 shows rates of early sexual activity and teenage pregnancy in both the U.S. and New Zealand samples according to timing of father absence: Early father absence (beginning ages 0–5), late father absence (beginning ages 6–13), and father presence (ages 0–13), For each father-absent and father-present group, the solid lines in the figure show the percentage of girls who had sexual intercourse by age 16 and the percentage of girls who experienced an adolescent pregnancy. Logistic regression of the data in Figure 1 showed that earlier onset of father absence was associated with a corresponding increase in girls' rates of both early sexual activity and adolescent pregnancy in both samples. For early sexual activity in the U.S. sample: N = 227, B(SE = .16) = .70, χ^2 = 20.51, p<.0001, odds ratio = 2.01; and for early sexual activity in the New Zealand sample: N = 520, B(SE = .12) = .76, χ^2 = 38.04, p < .0001, odds ratio = 2.14. For adolescent pregnancy in the U.S. sample: N = 242, B(SE = .23) = 1.15, χ^2 = 24.97, p<. 0001, odds ratio = 3.15; and for adolescent pregnancy in the New Zealand sample: N = 520, B (SE = .19) = 1.16, χ^2 = 38,28, p<.0001, odds ratio = 3.19. As expected, early father-absent girls had the highest rates of both early sexual activity and adolescent pregnancy, followed by late father-absent girls, followed by father-present girls (Figure 1). For example, adolescent pregnancy rates were approximately 7 times higher in the U.S. sample and 8 times higher in the New Zealand sample among early father-absent girls than among father-present girls. In addition, there was remarkable similarity between the U.S. and New Zealand samples in both

the ordering of results across groups and the base rates for early sexual activity and teenage pregnancy within each group (despite the overall base rates' being higher in the U.S. sample).

Child, Family, and Ecological Factors Associated With Timing of Father Absence, Early Sexual Activity, and Adolescent Pregnancy

Although the results in Figure 1 indicate that earlier onset of father absence was associated with increased risk of early sexual activity and adolescent pregnancy, it is possible that these associations are due to contextual factors that correlate with both the timing of father absence and early sexual activity and adolescent pregnancy. To examine this issue, Table 1 displays mean levels of child conduct problems and familial and ecological stressors in relation to (a) the timing of father absence, (b) occurrence of early sexual activity, and (c) occurrence of an adolescent pregnancy For ease of data presentation, all measures (except for race and mother's age at first birth) have been expressed in standardized form. Mean differences were tested using the *F* statistic.

Table 1 demonstrates the presence of a pervasive relationship between earlier timing of father absence and more exposure to familial and ecological stressors. Across both samples, girls whose birth fathers were absent from an earlier age were more likely to come from socially disadvantaged backgrounds characterized by young motherhood, minority racial status, lower SES, more family life stress, poor parental relationships (i.e., low dyadic adjustment, high marital conflict), and low-quality parental investment (i.e., harsh discipline, lack of parental monitoring, low maternal emotional responsiveness). The strong pattern of covariation between timing of father absence and girls' exposure to familial and ecological stressors was similar across the two samples (Table 1).

Table 1 also demonstrates, in both the U.S. and New Zealand samples, that early conduct problems and exposure to familial and ecological stressors during childhood were associated with precocious sexual outcomes. That is, girls who displayed early conduct problems; who were from socially disadvantaged backgrounds characterized by young motherhood, minority racial status, lower SES, and more family life stress; who were exposed to dysfunctional parental relationships; and who received low-quality parental investment were more likely to engage in early sexual activity and become pregnant as adolescents (Table 1). The overall pattern of relations between girls' early behavioral, familial, and ecological characteristics and their subsequent involvement in early sexual and reproductive activity was again similar across the two samples (Table 1).

Rates of Early Sexual Activity and Adolescent Pregnancy by Timing of Father Absence, After Adjustment for Covariates

Next, we examined whether timing of father absence contributed to subsequent risk of early sexual activity and teenage pregnancy, even after controlling for early child conduct problems and familial and ecological stressors. That is, we examined whether father absence constituted an independent path to early sexual and reproductive activity.

The results presented in Figure 1 and Table 1 indicate that although father absence was associated with elevated risk of early sexual activity and adolescent pregnancy, the behavioral, familial, and ecological profiles of father-absent girls were comparatively disadvantaged. Moreover, early conduct problems and exposure to familial and ecological stressors consistently predicted early sexual activity and adolescent pregnancy. Thus, girls' behavioral, familial, and ecological profiles could potentially account for the relations between timing of father absence and subsequent sexual outcomes.

To address this issue, we conducted logistic regressions to estimate the strength of the association between timing of father absence and rates of early sexual activity and adolescent pregnancy after adjustment for child conduct problems and familial and ecological stressors. Ten covariates were simultaneously controlled for in the analyses. These covariates are listed in the first column of Table 1 (see upper section of table for covariates in the U.S. study and lower section of table for covariates in New Zealand study).

As shown by the broken lines in Figure 1, after statistical adjustment for all covariates, there continued to be a linear logistic association between earlier onset of father absence and higher rates of both early sexual activity and adolescent pregnancy in both samples. For early sexual activity in the U.S. sample: $N = 197$, $B(SE = .23) = .72$, $\chi^2 = 9.54$, $p = .002$, odds ratio = 2,04; and for early sexual activity in the New Zealand sample: $N = 466$, $B(SE = .17) = .45$, $\chi^2 = 6.75$, $p = .009$, odds ratio = 1.57. For adolescent pregnancy in the U.S. sample: $N = 207$, $B(SE = .33) = .1.07$, $\chi^2 = 10.45$, $p = .001$, odds ratio = 2.91; and for adolescent pregnancy in the New Zealand sample: $N = 466$, $B(SE = .26) = .74$, $\chi^2 = 7.89$, $p = .005$, odds ratio = 2,09. Thus, even after simultaneously controlling for all covariates, early father-absent girls continued to have the highest rates of both early sexual activity and adolescent pregnancy, followed by late father-absent girls, followed by father-present girls (Figure 1). For example, after covariate adjustment, adolescent pregnancy rates were approximately 5 times higher in the U.S. sample and 3 times higher in the New Zealand sample among early father-absent girls than among father-present girls (Figure 1).

There was one notable difference between the U.S. and New Zealand samples. Whereas the effects of father absence on sexual activity and adolescent pregnancy remained largely unchanged after covariate adjustment in the U.S. sample, these effects were substantively reduced after covariate adjustment in the New Zealand sample (as shown in Figure 1). To examine which covariates caused this reduction, additional logistic regression analyses were conducted in the New Zealand sample in which father absence was entered into the equation simultaneously with each covariate. This enabled us to calculate the degree to which individual covariates caused a reduction in the effect of father absence (as indicated by change in the odds ratio) on early sexual activity and adolescent pregnancy. For early sexual activity, the following covariates each caused a reduction in the odds ratio at least 10%: mothers' age at first birth, family life stress, father's occupational status, maternal education, and marital conflict. Similarly, for adolescent pregnancy, reductions in the odds ratio of at least 10% were caused by family living standards, family life stress, father's occupational status, maternal education, maternal punitiveness, and marital conflict.

Finally, to examine which group of covariates uniquely predicted early sexual activity and teenage pregnancy after controlling for timing of father absence, we again performed the logistic regression analyses using forward stepwise procedures, forcing the entry of the father absence variable into the equation on the first step and then allowing free entry of all covariates into the equation on subsequent steps. In the U.S. sample, in prediction of both early sexual activity and adolescent pregnancy, only early childhood externalizing problems entered the equation after controlling for timing of father absence. None of the measures of familial or ecological stress, therefore, predicted early sexual outcomes after controlling for timing of father absence and early externalizing problems. In the New Zealand sample, in prediction of both early sexual activity and adolescent pregnancy, both maternal education and family life stress entered the equation after controlling for timing of father absence. In addition, father's occupational status entered the equation for predicting early sexual activity.

Rates of Behavioral Problems and Academic Performance by Timing of Father Absence, Before and After Adjustment for Covariates

Next, we examined whether father absence discriminantly increased risk for adolescent sexual outcomes but not for behavioral and mental health problems in general. To address this question, we conducted the same regression analyses that were conducted in the preceding section, but we substituted different outcome variables for early sexual activity and teenage pregnancy. The outcome measures examined in the U.S. sample included externalizing behavioral problems (ages 15–17; mother report and child report), internalizing behavior problems (ages 15–17; mother report and child report), violent acts (ages 16–17), and high school GPA. The outcome measures examined in the New Zealand sample included *DSM–III–R* diagnoses for conduct disorder, mood disorder, and anxiety disorder (all ages 14–18); violent offending (ages 14–18); attempted suicide (ages 14–18); and failure to attain at least one pass in School Certificate before leaving high school. As in the previous analyses, the effect of timing of onset of father absence on each outcome variable was examined before and after adjustment for all covariates listed in Table 1.

The key analysis concerns the effect of timing of father absence after adjustment for covariates. As shown in Table 2 (adjusted rates in parentheses), after statistical adjustment for all covariates, there were no substantively meaningful linear relations between timing of father absence and any of the measures of behavioral problems (all p values > .33) in the U.S. sample, as indicated by both the low odds ratios (*range* = 1.05–1.35) and relatively flat rates of behavioral problems across the two father-absent and one father-present groups. In addition, after statistical adjustment for all covariates, there was not a substantively meaningful relation between father absence and high school GPA ($N = 177$, $\beta = -.11$, $t = -1.43$, $p = .16$).

As noted in the Method section, the four measures of externalizing and internalizing behavior problems were dichotomized (to facilitate comparison with other outcome variables). Because dichotomization attenuates the power to detect relations with other variables (MacCallum, Zhang, Preacher, & Rucker, 2002), we also performed the analyses using standard linear regression with continuous measures of the four dependent variables (as described in the Method section). After controlling for the full set of covariates, the effects of timing of onset of father absence on both mother- and daughter-reported externalizing and internalizing behavior problems remained uniformly small and statistically nonsignificant ($N = 203$; βs range from .01 to .16, all ps >.05).

The pattern of results was different for the New Zealand sample. As shown in Table 3 (adjusted rates in parentheses), after statistical adjustment for all covariates, there was a pattern of modest associations between father absence and the measures of behavioral and mental health problems, as indicated by both the odds ratios (*range* = 1.36–1.59) and the modest decline in rates of these outcome variables across the two father-absent and one father-present groups. Most of these associations obtained at least marginal statistical significance.

In sum, in the U.S. sample, after statistically controlling for all covariates, timing of onset of father absence remained strongly associated with early sexual activity and teenage pregnancy but not with other behavioral problems and academic performance. Although the direction of the effects indicated that earlier onset of father absence was associated with more behavioral and academic problems in the U.S. sample, the size of the effects were small and did not approach statistical significance. By contrast, in the New Zealand sample, after statistically controlling for all covariates, there was still a pattern of at least trend associations between timing of father absence and the measures of adolescent adjustment, with odds ratios ranging from 1.36 to 2.09. Although early sexual activity and teenage pregnancy occupied the upper end of this range, and although the odds ratio for teenage pregnancy was substantially higher than for any other variable (+.50 or greater), there was not a clear divide between the effects

of father absence on early sexual activity and other behavioral and mental health outcomes. Specifically, after covariate adjustment, the odds ratio for early sexual activity (1.57) was about the same as for conduct disorder (1.59), violent offending (1.56), and no school qualifications (1.50).

Discussion

Does father absence uniquely and discriminantly increase daughters' risk for early sexual activity and teenage pregnancy, independent of early externalizing behavior problems and exposure to familial and ecological stressors during childhood? In addressing this question, the current research had several important strengths. First, the use of a cross-national research design enabled us to replicate key findings across diverse samples in different countries. Second, in conducting two studies, we were able to carry out independent tests of the hypotheses using different measures and methods. The similarity in results across the U.S. and New Zealand samples underscores the robustness and generalizability of fee findings. Nonetheless, it will be important to replicate these findings in non-Western samples (see Waynforth, 2002). Third, the longitudinal nature of the research—in which girls were prospectively studied throughout their entire childhoods—enabled us to examine child and family variables that preceded risk for involvement in sexual activity and pregnancy in adolescence. Finally, the use of multiple informants, in which antecedent child and family data were collected from mothers and adolescent sexual outcome data were collected from daughters, makes it less likely that the current findings are an artifact of method variance.

Does Father Absence Place Daughters at Special Risk for Early Sexual Activity and Teenage Pregnancy?

Although the current research cannot demonstrate causation, three converging lines of evidence suggest that the answer to this question is yes. First, in both the U.S. and New Zealand samples, there was a dose–response relationship between timing of onset of father absence and early sexual outcomes: Early father-absent girls had the highest rates of both early sexual activity and adolescent pregnancy, followed by late father-absent girls, followed by father-present girls. This dose–response relationship suggests that past research, which has consistently treated father absence as a dichotomous yes–no variable, has underestimated the impact of father absence on daughters' sexual outcomes. This issue may be especially relevant to predicting rates of teenage pregnancy, which were 7 to 8 times higher among early father-absent girls, but only 2 to 3 times higher among late father-absent girls, than among father-present girls.

Second, in both the U.S. and New Zealand samples, father absence constituted a unique and independent path to early sexual activity and adolescent pregnancy. Although measures of early conduct problems and life-course adversity covaried with both timing of father absence and adolescent sexual outcomes, these measures either did not account for (in the U.S. sample) or only partially accounted for (in the New Zealand sample) the links between father absence and early sexual activity and teenage pregnancy. The relations between father absence and teenage pregnancy were particularly robust. For example, after controlling for all of the covariates, early father-absent girls were still about 5 times more likely in the U.S. sample and 3 times more likely in the New Zealand sample to experience an adolescent pregnancy than were father-present girls. In total, these data suggest that father absence may affect daughters' sexual development through processes that operate independently of life-course adversity and go beyond mere continuation of early conduct problems.

Third, in the U.S. sample, father absence was discriminantly associated with early sexual activity and teenage pregnancy. This association was specific to sexual outcomes and, after controlling for early conduct problems and familial and ecological stressors, did not extend to academic, behavioral, or mental health problems more generally. In the New Zealand sample,

however, the picture was less clear. After covariate adjustment, there was still a pattern of at least trend associations between timing of father absence and the measures of adolescent adjustment, with early sexual activity and adolescent pregnancy occupying the upper end of this range of associations. Considering the U.S. and New Zealand findings together, after controlling for measures of early conduct problems and life-course adversity, the effects of father absence on sex and pregnancy (a) were generally stronger than were the effects of father absence on other outcome variables and (b) clearly replicated across the two studies whereas other effects of father absence were more equivocal and replicated only in the sense of being in the same direction. In sum, after covariate adjustment, there was stronger and more consistent evidence of effects of father absence on early sexual activity and teenage pregnancy than on other behavioral or mental health problems or academic achievement.

It is worth reiterating that all of these conclusions are based on the linear model, which provided the best fitting and most parsimonious representation of the associations between father absence and the outcome variables. Power would have been low, however, to detect nonlinearity in the U.S. sample (given the use of dichotomous dependent variables and the relatively small sample size in the late father-absent group). The base rates shown in Table 2 indicate nonlinear trends in the U.S. data, with late father-absent girls displaying higher rates of internalizing problems (both child and mother reports) and externalizing problems (child reports only) than either early father-absent or father-present girls. These nonlinear trends did not replicate in the New Zealand data (see Table 3). Nonetheless, the possibility that late father absence places daughters at special risk for some outcome variables deserves further consideration in future research with larger sample sizes.

Implications for the Life-Course Adversity Model

In the literature on early sexual activity and teenage pregnancy, the life-course adversity model occupies a dominant position. It proposes that a life history of familial and ecological stress—poverty, exposure to violence, inadequate parental guidance and supervision, lack of educational and career opportunities—makes early sexual activity and adolescent pregnancy more likely (e.g., Coley & Chase-Lansdale, 1998; Rindfuss & St. John, 1983). The life-course adversity model has gained wide acceptance through consistent empirical support. Rates of teenage pregnancy have been found to covary positively with family stress, conflict, and disruptions (e.g., Fergusson & Woodward, 2000a; Hanson, Myers, & Ginsburg, 1987; Robbins et al., 1985); with low parental warmth or support, lack of parental control and monitoring, and maternal punitive behavior (e.g., Fergusson & Woodward, 2000a; Hansen et al., 1987; Scaramella et al., 1998; reviewed in Miller et al., 2001); with low SES (e.g., Fergusson & Woodward, 2000a; Geronimus & Korenman, 1992; Robbins et al., 1985); with high neighborhood mortality rates (Geronimus, 1996; Wilson & Daly, 1997); and with minority racial or ethnic status (Cheesbrough et al., 1999; Dickson et al., 2000). The results presented in Table 1 are consistent with this body of research.

As discussed in the Introduction, the life-course adversity model has incorporated father absence as one of many stressors that can influence sexual outcomes. Indeed, as shown in Table 1, timing of father absence significantly covaried with all of the measures of familial and ecological stress in both the U.S. and New Zealand studies. Proponents of the life-course adversity model have recurrently stated that father absence predicts early sexual outcomes because it covaries with these stressors (Belsky, et al., 1991, p. 658; Chisholm, 1999, p. 162; McLanahan, 1999, p. 119; Robbins et al., 1985, p. 568; Silverstein & Averbach, 1999, p. 403).

The current research suggests that the opposite interpretation is equally plausible: Measures of life-course adversity may predict early sexual outcomes primarily because they covary with timing of father absence. In the U.S. sample, father absence predicted early sexual activity and adolescent pregnancy after controlling for early conduct problems and all of the measures of

familial and ecological stress; however, none of the measures of familial and ecological stress predicted either early sexual activity or adolescent pregnancy after controlling for timing of father absence and early conduct problems. The results in the New Zealand sample were more equivocal: Both father absence and some measures of familial and ecological stress (i.e., maternal education and family life stress) independently predicted early sexual outcomes.

Evolutionary and Social Learning Models

Given that the life-course adversity model does not appear to explain the current results, the question then becomes: What are the psychological mechanisms and processes that account for the relations between increasing exposure to father absence and greater risk for early sexual activity and adolescent pregnancy? From a social learning perspective, increasing duration of father absence is associated with increasing exposure of daughters to their mothers' dating and repartnering behaviors, and these exposures may encourage earlier onset of sexual behavior in daughters, with consequent increased risk of teenage pregnancy. As Thornton and Camburn (1987, p. 325) suggest, "We expect that many children know whether their parents are sexually active after a marital dissolution and that formerly married parents who continue to be sexually active serve as behavioral models for their maturing children, thus increasing the children's levels of permissiveness." The social learning model thus posits that the effect of father absence on daughters' sexual outcomes will be mediated by mothers' dating and repartnering behaviors. This hypothesis deserves careful consideration in future research.

Another possibility is that mothers' dating and repartnering behaviors do not fully mediate the relation between father absence and precocious sexual outcomes in daughters. Rather, as discussed earlier, quality of paternal investment may have a direct effect on daughters' sexuality. The current evolutionary model posits that the motivational systems underlying variation in timing of sexual and reproductive behavior are especially sensitive to the father's role in the family in early childhood. According to Draper and Harpending (1982, 1988), girls whose early family experiences are characterized by father absence tend to develop sexual psychologies that are consistent with the expectation that male parental investment is unreliable and unimportant; these girls are hypothesized to develop in a manner that accelerates onset of sexual activity and reproduction, reduces reticence in forming sexual relationships, and orients the individual toward relatively unstable pair-bonds (see also Ellis & Garber, 2000; Ellis et al., 1999). This evolutionary model posits an early sensitive period (approximately the first 5 years of life) for the effects of father absence on daughters' sexual development. Although the current results—that earlier onset of father absence was associated with greater risk for early sexual activity and teenage pregnancy—are consistent with the sensitive period hypothesis, they do not clearly support it because timing of father absence was confounded with length of father absence in the current research. In total, the current results are equally consistent with either a sensitive period or linear dose–response interpretation.

Alternative Behavior Genetic Explanations

Perhaps the major weakness of the current research design was that it was not genetically informative. As noted in the Introduction, one plausible behavior-genetic explanation for the current findings is that, through genetic transmission, mothers and fathers who have a history of externalizing disorders not only tend to have daughters who experience externalizing behavioral problems (including increased rates of early sexual activity and teen pregnancy) but also tend to disproportionately expose their daughters to father absence and accompanying maternal dating and repartnering behaviors because externalizing disorders predict divorce. A second plausible behavior-genetic explanation is that mothers who experience early age of first sex and pregnancy not only tend to have daughters who experience early age of first sex and pregnancy (through genetic transmission; see Dunne et al., 1997; Rodgers, Rowe, & Buster, 1999) but also tend to expose disproportionately their daughters to father absence and maternal

dating and repartnering because young mothers are less likely to form stable relationships with the fathers of their children (e.g., Amato, 1996; Bennett, Bloom, & Miller, 1995).

Consistent with these behavior genetic models, in the current research both early childhood conduct problems in daughters and earlier age at first birth in mothers generally predicted early sexual activity and adolescent pregnancy in daughters. It is important, though, that controlling for both early conduct problems and mothers' age at first birth (along with the other covariates) either did not account for (in the U.S. sample) or only partially accounted for (in the New Zealand sample) the relations between father absence and elevated rates of early sexual activity and adolescent pregnancy. Although these results do not rule out the possibility that common genetic influences underlie the covariation between father absence and precocious sexual outcomes (see especially Comings, Muhleman, Johnson, & MacMurray, 2002), they do make it less likely that the current findings can be accounted for by the specific genetic pathways outlined above.

Conclusion

Over the last 25 years the field of developmental psychology has experienced a fundamental shift away from a social address perspective, in which variables such as father absence and social class were studied without explicitly considering how they influenced child functioning, to a developmental process perspective, in which intervening pathways and mechanisms have become of fundamental interest (discussed in Bronfenbrenner & Crouter, 1983). Critiques of the father absence literature (reviewed in Phares, 1996) partly motivated this change. A widely held assumption is that it is not father absence per se that is harmful to children but the stress associated with divorce, family conflict, loss of a second parent loss of an adult male income, and so on. The current research suggests that, in relation to daughters' sexual development, the social address of father absence is important in its own right and not just as a proxy for its many correlates. This does not imply that process is unimportant, but rather that relevant processes are likely to be father driven (e.g., father–daughter processes, father–mother relationships, exposure to stepfathers; see Ellis et al., 1999).

In conclusion, father absence was an overriding risk factor for early sexual activity and adolescent pregnancy. Conversely, father presence was a major protective factor against early sexual outcomes, even if other risk factors were present. These findings may support social policies that encourage fathers to form and remain in families with their children (unless the marriage is highly conflictual or violent; Amato & Booth, 1997).

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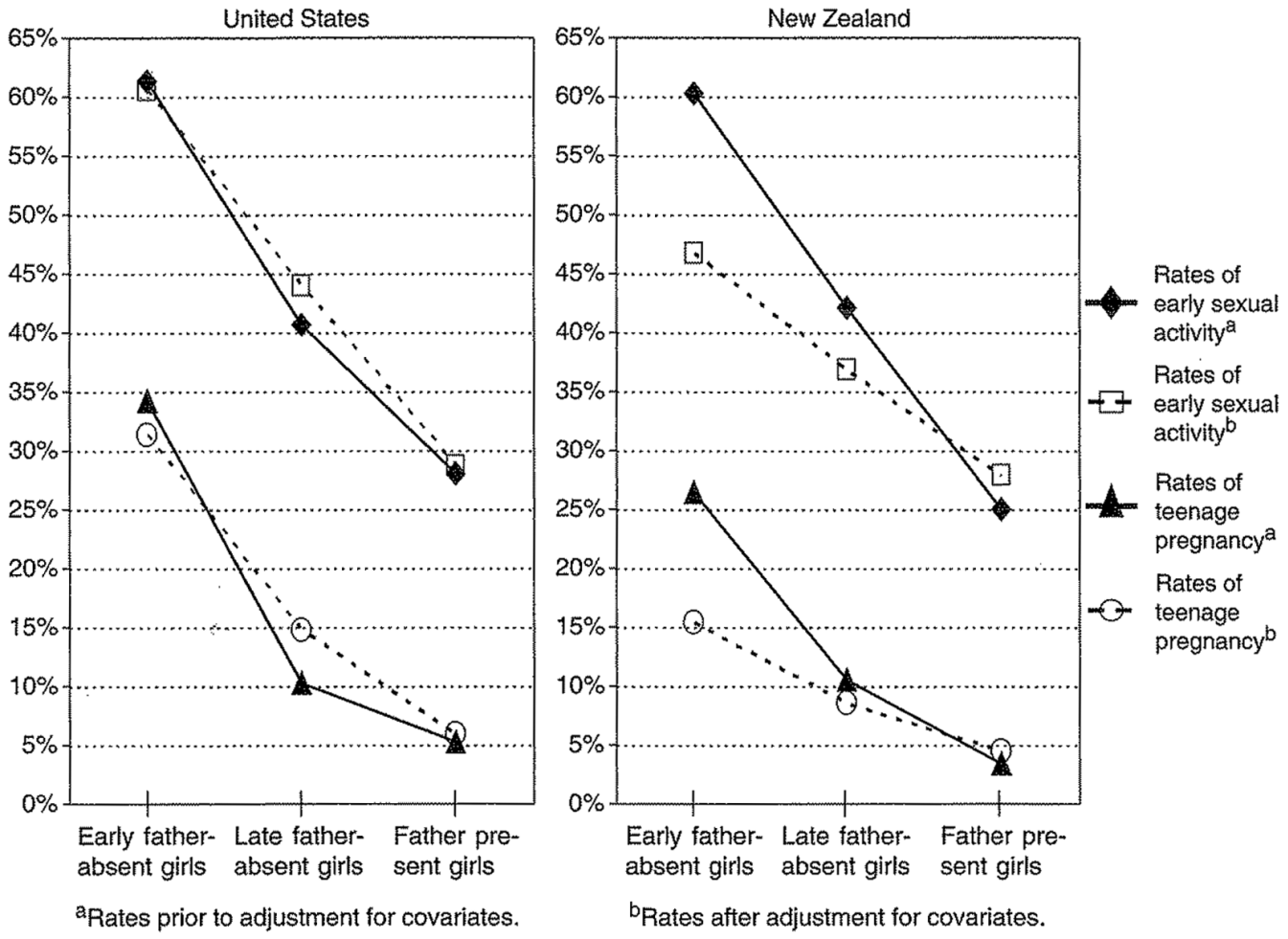

Figure 1.
Rates of early sexual activity and teenage pregnancy, before and after adjustment for covariates.

Table 1

Mean Levels of Child Conduct Problems and Familial and Ecological Stressors by Timing of Father Absence, Early Sexual Activity, and Adolescent Pregnancy: United States and New Zealand

	Father absence status				Sexual activity			Pregnancy status		
Variable	**Early father absence**	**Late father absence**	**Father presence**	***P***	**Early sexual activity**	**No early sexual activity**	***P***	**Pregnant**	**Not pregnant**	***P***
United States										
Externalizing problems (ages 4–6)	0.20	−0.24	−0.08	2.86	0.22	−0.13	6.66*	0.48	−0.09	10.77***
Mother's age at first birth	20.82	22.30	24.84	19.80***	22.69	23.63	1.98	21.6S	23.51	4.24*
Race (% other)	32%	21%	8%	19.28***	24%	13%	4.33*	41%	13%	16.65***
SES (ages 4–13)	−0.58	−0.07	0.40	28.78***	−0.19	0.18	7.71**	−0.59	0.15	17.48***
Family life stress (ages 1–5)	0.43	0.23	−0.35	18.55***	0.17	−0.13	5.30*	0.33	−0.08	4.38*
Dyadic adjustment (ages 1–5)	−0.79	0.09	0.42	46.26***	−0.34	0.27	21.72***	−0.67	0.15	21.72***
Harsh discipline (ages 4–5)	0.38	−0.21	−0.19	9.00***	0.22	−0.14	7.52**	0.58	−0.11	15–76***
Harsh discipline (ages 10–13)	0.25	−0.25	−0.08	3.69*	0.07	−0.06	0.87	0.45	−0.07	7.83**
Parental monitoring (ages 10–13)	−0.47	−0.04	0.30	15.10***	−0.22	0.21	10.14**	−0.66	0.13	18.67***
Neighborhood danger (ages 10–13)	0.57	−0.08	−0.31	29.39***	0.20	−0.13	7.68**	0.55	−0.11	18.10***
New Zealand										
Conduct problems (age 6)	0.38	0.20	−0.11	9.25***	0.16	−0.08	6.12*	0.52	−0.05	12.17***
Mother's age at first birth	21.01	22.70	24.43	27.07***	22.29	24.38	30.47***	21.67	23.88	11.03***
Race (% Maori/Polynesian)	28%	19%	8%	26.52***	15%	12%	.94	29%	11%	10.63***
Father's occupation (at birth)	−0.54	−0.20	0.15	18.84***	−0.32	0.16	27.28***	−0.63	0.05	18.50**
Mother's education (at birth)	−0.46	−0.31	0.15	16.43***	−0.32	0.15	26.93***	−0.54	0.05	13.70**
Standard of living (ages 0–10)	−0.77	−0.23	0.20	38.27***	−0.24	0.12	15.43***	−0.64	0.06	19.67***
Family life stress (ages 0–10)	0.73	0.58	−0.23	42.78***	0.34	−0.16	27.72***	0.79	−0.07	26.79***
Mom emotional responsiveness (age 3)	−0.49	−0.07	0.11	12.61***	−0.16	0.08	6.20*	−0.24	0.02	2.59
Mom punitiveness (age 3)	0.40	−0.19	−0.05	8.15***	0.10	−0.05	2.32	0.48	−0.04	10.14**
Marital conflict (ages 0–10)	1.18	0.59	−0.32	111.10***	0.32	−0.15	23.87***	0.86	−0.07	31.71***

Note. All variables standardized, except race and mother's age at first birth. *P* statistic and *p* values for comparison of means using oneway ANOVA. Comparison of percentages by race are based on the χ^2 test. For the U.S. sample, *Ns* = 213–243; for the New Zealand sample, *Ns* = 468–520.

* $p < .05$,

** $p < .01$.

*** $p < .001$.

Table 2

Rates of Behavioral Problems and Academic Performance by Timing of Father Absence, Before and After Adjustment for Covariates: United States

Variable	Timing of onset of father absence			*B*(*SE*)	χ^2	*p*	Odds ratio
	Early onset of father absence	Late onset of father absence	Father presence				
Externalizing problems							
Mother report	25.6%	10.3%	9.8%	.58 (.20)	8.55	.003	1.79
	(15.8%)	(13.3%)	(11.1%)	.30 (.36)	0.69	.41	1.35
Child report	15.6%	24.1%	11.3%	.20 (.20)	1.02	.31	1.22
	(17.5%)	(14.7%)	(12.3%)	.28 (.36)	0.61	.44	1.32
Internalizing problems							
Mother report	14.1%	24.1%	12.9%	.08 (.20)	0.15	.70	1.08
	(14.1%)	(13.7%)	(13.2%)	.05 (.31)	0.02	.89	1.05
Child report	15.6%	27.6%	12.8%	.14 (.19)	0.52	.47	1.15
	(18.9%)	(16.3%)	(13.9%)	.22 (.31)	0.49	.49	1.24
Violent acts	39.0%	29.6%	15.3%	.63 (.17)	14.22	<.001	1.88
	(28.1%)	(23.8%)	(20.1%)	.25 (.26)	0.94	.33	1.28

Note. Percentages after covariate adjustment are shown in parentheses. N = 240 and 203 (mother report externalizing and Internalizing), N = 239 and 202 (child report externalizing and internalizing), and N = 236 and 202 (violent offending), before and after covariate adjustment, respectively.

Table 3

Rates of Behavioral and Mental Health Problems by Timing of Father Absence, Before and After Adjustment for Covariates: New Zealand

Variable	Timing of onset of father absence			*B*(*SE*)	χ^2	*p*	Odds ratio
	Early onset of father absence	Late onset of father absence	Father presence				
Conduct disorder	16.9%	15.8%	4.2%	.78 (.19)	17.85	<.001	2.19
	(12.6%)	(8.5%)	(5.7%)	.46 (.27)	3.03	.082	1.59
Mood disorder	54.2%	49.1%	31.8%	.49 (.12)	17.04	<.001	1.64
	(48.1%)	(40.9%)	(34.1%)	.31 (.17)	3.29	.070	1.36
Anxiety disorder	59.0%	54.4%	40.0%	.41 (.12)	11.72	.001	1.50
	(56.5%)	(48.8%)	(41.0%)	.33 (.17)	3.80	.051	1.39
Violent offending	31.3%	14.0%	9.7%	.71 (15)	23.12	<.001	2.03
	(21.4%)	(15.2%)	(10.5%)	.44 (.21)	4.28	.039	1.56
Suicide attempt	14.5%	8.8%	5.3%	.56 (.19)	8.33	.004	1.74
	(10.9%)	(8.3%)	(6.3%)	.32 (.27)	1.40	.237	1.38
No school qualifications	35.8%	37.5%	9.3%	.90 (.14)	41.09	<.001	2.45
	(23.7%)	(18.5%)	(14.1%)	.40 (.21)	3.62	.057	1.50

Note. Percentages after covariate adjustment are shown in parentheses. For school qualifications, $N = 515$ and 461 before and after covariate adjustment, respectively; for all other variables, $N = 520$ and 466 before and after covariate adjustment, respectively.