

Confidence of paternity, divorce, and investment in children by Albuquerque men

Kermyt G. Anderson^{a,*}, Hillard Kaplan^b, Jane B. Lancaster^b

^a*Department of Anthropology, University of Oklahoma, Norman, OK 73019, USA*

^b*Human Evolutionary Ecology Program, Department of Anthropology, University of New Mexico, Albuquerque, NM 87131, USA*

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Abstract

Using a sample of men living in Albuquerque, NM, we examined the relationship between paternity confidence and men's investment in children. In humans, men may reduce their investment in a child in two ways: indirectly, by ending their relationship with the child's mother and ceasing to cohabit with the child (e.g., divorce), and directly, by allocating less time and fewer resources to the child. In this article, we tested two hypotheses regarding the effect of paternity confidence on investment in children: (1) men will be more likely to divorce women if they suspect or are sure that they are not the father of their wife's child, and (2) controlling for divorce, men will reduce direct investments in low paternity confidence children relative to high paternity confidence children. The first hypothesis was supported by the data. The second hypothesis was supported for two out of three measures of paternal investment we examined; low paternity confidence reduces the time men spend with a child in a group with other children or adults, and it reduces extensive involvement with the child's educational progress; there was no effect of paternity confidence on the amount of time men spend with children in one-on-one interactions. We also examined the effects of unstated paternity confidence (e.g., when men decline to answer the question) on divorce and paternal investment. Overall, the results suggested that paternity confidence plays an important role in shaping men's relationships with women and with their putative genetic children.

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1. Introduction

Asymmetry of parental investment is a fundamental feature of sexual reproduction (e.g., Clutton-Brock, 1991; Low, 2000). In the vast majority of species, female gametes are larger than male gametes and provide the initial energy plant for development. Moreover, when investment extends beyond the initial energetic input into gametes, it is often the female that provides the extra care or resources. In some cases, however, males do provide substantial inputs into offspring, rarely more than females but sometimes as much as females. Therefore, paternal care is much more variable across species than maternal care. While among birds and mammals, most females engage in extensive parental investment, male care of offspring is rather rare among mammals, common in birds, and highly variable among fish (Clutton-Brock, 1991). Because parental care is costly,

evolution predicts that males will provide less parental investment for putative genetic offspring who are unlikely to be their actual offspring (e.g., Alexander, 1974; Trivers, 1972; Xia, 1992).

The distinctions between actual paternity, nonpaternity, and paternity confidence are often confounded or overlooked in the literature (Anderson, Kaplan, & Lancaster, in press; Schwagmeyer & Mock, 1993). Paternity refers to the actual likelihood that a man is (or is not) the biological father of a particular child. Nonpaternity is the exclusion of paternity and refers to the likelihood that a man is not the genetic father of a particular child. Modern paternity tests do not prove paternity; rather, they demonstrate nonpaternity by showing that a given man is exceedingly unlikely to have fathered a particular child. In contrast, paternity confidence refers to a man's internal (not necessarily conscious or articulated) assessment of his paternity.

Among humans, beliefs about paternity and men's responsibility for children vary greatly cross-culturally (e.g., Beckerman et al., 1998; Hrdy, 2000; Levine, 1987),

* Corresponding author.

E-mail address: kanders@ou.edu (K.G. Anderson).

though men in many different cultures pay great attention to paternity (e.g., Betzig, 1989; Daly & Wilson, 1988). In Western legal tradition, men are generally not held responsible for putative children who are in fact not theirs (Rudavsky, 1999; Wilson, 1987), and American men who refuse to pay child support often cite suspected nonpaternity as justification (Dubey, 1995).

The mechanics of internal fertilization and live birth mean that while women are always sure of maternity, men can never be fully positive of paternity. Men must rely instead on indirect cues such as mate fidelity or child resemblance to assess whether they are likely to be the father of a particular child (e.g., Davis & Daly, 1997). Most research on paternity confidence has focused on men's resemblance to children and their ability to detect it (reviewed in Anderson et al., *in press*). In contrast, Anderson et al. (*in press*) examined demographic correlates of paternity confidence, using data on men in Albuquerque, NM. They reported that men were more likely to report low paternity confidence in a pregnancy if the man was not married to the child's mother or if the pregnancy was unplanned. Both of these factors are likely to correlate to some extent with the potential for mate infidelity. No research has directly examined how accurately men assess paternity confidence, though indirect evidence suggests that men with high paternity confidence may be more accurate in their assessment than men with low paternity confidence (Anderson, 2006).

The prediction that males will invest less in offspring who are unlikely to be theirs has received limited empirical examination. For avian species, the prediction is generally met, although the effect is not as strong or as universal as originally predicted (Møller & Birkhead, 1993; Schwagmeyer et al., 1999; Whittingham & Dunn, 2001), and many of the avian studies have been criticized on methodological grounds (Kempenaers & Sheldon, 1997; Schwagmeyer & Mock, 1993; Sheldon, 2002). Among nonhuman primates, it has been questioned whether paternal care ever reflects paternity (e.g., Van Schaik & Paul, 1996).

Among humans, analyses of qualitative cross-cultural data suggest that paternity confidence is positively associated with men's involvement with children, or with investment or inheritance from paternal kin (Diamond & Lorca, 1989; Flinn, 1981; Gaulin & Schlegel, 1980; Greene, 1979; Hartung, 1985; Kurland, 1979). Within societies, greater investment by matrilineal than patrilineal kin suggests significant levels of nonpaternity, or more precisely, it suggests reduced levels of paternity confidence (Euler & Weitzel, 1996; Gaulin, McBurney, & Brakeman-Wartell, 1997; McBurney, Simon, Gaulin, & Geliebter, 2002; but see Pashos, 2000, for mixed results). Relatively, little is known about the rates of actual paternity cross-culturally (see Anderson, 2006, for a detailed analysis).

Fox and Bruce (2001) used a sample of men in Knoxville County, TN, to examine the relationship between confidence of paternity and (a) a measure of men's affective

involvement with children, and (b) a composite fathering variable. They found a positive relationship for both outcomes, but paternity confidence was unrelated to several other measures of fathering (responsivity, harshness, and behavioral engagement). However, Fox and Bruce (2001) provided no substantive information on how they measured paternity confidence, making the interpretation and contextualization of their results difficult.

No study has directly examined the quantitative relationship between actual paternity and investment in or involvement with children. In the current study, we propose to examine how self-reported paternity confidence influences men's investment in their putative genetic offspring. We analyze how paternity confidence influences paternal investment indirectly, through the likelihood that men may abandon low paternity confidence children, and directly, through reduced direct male involvement with low paternity confidence children after controlling for divorce status.

1.1. Hypotheses

We proposed two routes through which low paternity confidence may reduce paternal investment. One route is through divorce or separation from the child's mother, which often results in men ceasing to live with the child. In many cultures, divorce results in reduced male investment in children from previous relationships (e.g., Amato, 1987; Anderson, Kaplan, Lam, & Lancaster, 1999; Anderson, Kaplan, & Lancaster, 1999; Hofferth & Anderson, 2003; Simpson, 1997; Teachman, 1991; Weiss & Willis, 1985; Weiss & Willis, 1993). This reduction in investment occurs in part not only because of reduced contact between men and children, but also because men have reallocated resources toward new avenues of mating effort, as well as perhaps into new children or stepchildren (Anderson, 2000). Divorce can be considered an indirect form of reduced investment in children and results in our first hypothesis: (1) Men will be more likely to divorce women if they suspect or are sure that they are not the father of their partner's child.

Whether or not divorce has occurred, men may reduce direct investment in low paternity confidence children. Controlling for paternal coresidence in this analysis is crucial. We expected to find an effect of paternity confidence on men's investments in children, above and beyond the effects of divorce on investment. This led to our second hypothesis: (2) Controlling for divorce, men will reduce direct investments in low paternity confidence children relative to high paternity confidence children.

2. Methods

We used self-reported data from the Albuquerque men data set, a sample of men living in Albuquerque, NM, collected between 1990 and 1993 (see Kaplan, Lancaster, & Anderson, 1998, for further details). Participants were recruited at the Bernalillo County (New Mexico) Motor

Vehicle Division (MVD) if they met the following eligibility criteria: (1) being 25 years or older and (2) having come to the MVD for the purpose of license origination, renewal, or for a photo ID. Interviews with approximately 1325 men were conducted in private by trained student interviewers; participants were paid \$30.

The interview collected retrospective data on, among other things, each respondent's marital, reproductive, and parenting histories. Men were asked about their reproductive and parenting behavior in the context of married, cohabiting, and casual relationships. Actual paternity was not measured (e.g., through genetic analysis), but paternity confidence was. For each pregnancy that men reported, they were asked, "Are you certain that you are the father of this pregnancy?" They were given the choice of answering yes (certain he is the father), no (certain he is not the father), or uncertain (may or may not be the father). These responses were collapsed into a dichotomous variable for low paternity confidence, which was scored as 1 if a man indicated any doubts that the offspring might be his (uncertain he is the father or certain he is not the father), and 0 if he expressed no doubts. Albuquerque men reported low paternity confidence in 49 of 3066 (1.46%) pregnancies attributed to them (Anderson et al., *in press*).

Nonresponse rates for paternity confidence were relatively high, which is not surprising given the sensitive nature of the question. Roughly twice as many men refused to answer the question (102 pregnancies or 3.04%) as volunteered low paternity confidence. Statistical analysis typically discarded cases that are missing data for any variables under consideration, but in this instance, we analyzed those cases as a separate group in order to determine if men who refused to report paternity confidence exhibited lower parental investment, as might be the case if refusal actually reflected low confidence. In a separate analysis of the Albuquerque Men data set, Anderson et al. (*in press*) found that both low and unstated paternity confidence status were predicted by a pregnancy being unplanned, suggesting that low and unstated paternity confidence are similar. However, there were also key differences: low paternity confidence, but not unstated paternity confidence, was significantly associated with unmarried couples, while unstated paternity confidence, but not low paternity confidence, was significantly associated with Hispanic ethnicity. Anderson et al. (*in press*) also found that both low and unstated paternity confidence were positive predictors of pregnancies ending in an elective abortion, but only unstated paternity confidence predicted pregnancies ending in miscarriage/stillbirth. Thus, while there were similarities between low paternity confidence and unstated paternity confidence, they were not identical. For this reason, we divided men's children into three groups: those in which men have high paternity confidence, low paternity confidence, or unstated paternity confidence.

The current analysis included only live-born putative biological children attributed to the respondents; step,

adoptive, and foster children, as well as pregnancies that did not result in live birth, were excluded from the analysis. We used two subsamples of these data to examine the consequences of paternity confidence for children. The divorce sample looked at the probability of divorce using an event history data set containing 22,677 person-years contributed by 2582 putative genetic children parented by 1101 men. Each child contributed 1 year for each year of life, from birth through 10 years old or until her parents divorced, whichever comes first. (Because the sample included unmarried as well as married couples, we used the terms *divorce* and *union dissolution* interchangeably to refer to the cessation of a sexual relationship that involved pregnancy; the couple's legal marital status were controlled for in multivariate analysis.) Because these data were censored for some children (e.g., children who were younger than 10 years at the time of interview and whose parents had not divorced but might still experience divorce before the age of 10 years), we used Cox proportional hazards analysis to model the probability of divorce occurring within a given year. This statistical method controlled for censoring by analyzing the probability of divorce separately for each year a child was at risk of experiencing parental divorce, while controlling for multiple observations per child, and multiple children contributed per respondent. Cox proportional hazards analysis thus modeled how long it took for an event to occur; in this case, the event in question was the divorce of a child's parents.

We also controlled, using multivariate analysis, for numerous background characteristics that were likely to influence the probability of divorce. These included the respondent's age in each risk year, his income that year (in logged 1990 dollars), his education (in years), the child's mother's education (in years), the calendar year of the risk year, whether or not the couple was legally married at the time, the number of children the couple had together (e.g., excluding children from other relationships), the respondent's ethnicity (Anglo,¹ Hispanic, or other), and the child's gender.

A second subsample of the Albuquerque men data set was used to examine paternal investment in children, using three retrospective measures of men's involvement with children aged 5 through 12 years. For each putative biological child, respondents were asked to provide direct estimates of two kinds of time involvement. The first question asked was, "When he/she was between 5 and

¹ In New Mexico, the term *Anglo* refers to all individuals of non-Hispanic European descent, regardless of whether or not they are of Anglo-Saxon heritage. Most Hispanics in our sample were born in the United States and were not recent immigrants. The sample used in the divorce analysis contained 631 Anglo men (1491 children), 326 Hispanic men (975 children), and 43 men of other or undefined ethnicities (116 children). The sample used in the analyses of time involvement with children contained 608 Anglo men (1512 children), 320 Hispanic men (956 children), and 41 men of other or undefined ethnicities (113 children).

Table 1
Descriptive statistics for variables used to predict union dissolution, by paternity confidence

	Paternity confidence						$F_{2,2579}$	p
	High		Low		Unstated			
	Mean	SD	Mean	SD	Mean	SD		
Respondent's age (years)	28.56	5.87	27.16	5.98	28.38	6.33	0.92	.4000
Logged income (in 1990 dollars)	9.87	1.61	9.45	2.59	9.65	0.73	1.39	.2490
Respondent's education (years)	15.70	3.53	15.28	4.06	10.26	4.02	39.6	.0000
Mother's education (years)	13.99	3.71	11.91	3.49	11.82	4.22	10.54	.0000
Calendar year of pregnancy	1962.70	12.61	1965.00	13.73	1955.00	12.90	6.81	.0011
Couple ever legally married	0.98	0.14	0.78	0.42	0.97	0.17	29.74	.0000
No. of children the couple has together	1.16	1.44	0.75	0.98	2.65	2.46	19.01	.0000
Respondent is Anglo	0.58	0.49	0.69	0.47	0.06	0.24	19.98	.0000
Respondent is Hispanic	0.37	0.48	0.31	0.47	0.94	0.24	23.92	.0000
Respondent is other ethnicity	0.05	0.21	0.00	0.00	0.00	0.00	1.59	.2035
Child is male	0.52	0.50	0.63	0.49	0.59	0.50	1.05	.3484
N (no. of children)	2516		32		34			

Statistics calculated for the focal child's year of birth.

12 years old, in a typical week, how many hours did you spend with him/her in one-on-one interaction?" The second question asked (for the same age interval) was, "In a typical week, how many hours did you spend with this child in a group with other children or adults?" The frequency of each type of interaction was rated on a five-point scale: 1 (never), 2 (0–2 h per week), 3 (3–5 h per week), 4 (6–15 h per week), or 5 (16 h or more a week). Because this is an ordinal variable, representing a nonlinear distribution of hours spent with children, the time involvement variables will be analyzed using ordered logistic regression. This technique is similar to logistic regression, except that it allows for multiple ordinal outcome levels rather than only two. The data set used for the analysis contains 2581 children parented by 973 men.

The third paternal involvement variable we used came from the question, asked for those aged 5 through 12 years, "How involved were you with his/her educational progress (his/her schooling)?" This was coded as three levels ("little or not at all involved," "moderately involved," and "helped him/her extensively with his/her work"). Relatively few people responded to the first two categories, and the variable was recoded as a dichotomous variable measuring 1 if the respondent was extensively involved with the child's education progress (his/her schooling) and 0 if the respondent was not extensively involved (i.e., collapsing "little or not at all involved" and "moderately involved"). This measure of paternal investment was available for 1984 children parented by 778 respondents.

Again, multivariate analysis were used to control for the effects of background variables. The background variables included the respondent's age, income (in logged 1990 dollars), and education; the child's mother's education; the calendar year; whether the couple was legally married; the number of children the couple had together; the respondent's ethnicity; and the child's gender. Variables that may vary over time (age, income, calendar year, marital status,

and number of children) were evaluated with respect to the child's fifth year of life.

All analyses were performed using Stata/SE 9.2 for Windows. Multivariate analyses were controlled for multiple observations (children) per respondent, using the "cluster" option in Stata.

3. Results

3.1. Divorce

Table 1 presents descriptive statistics, by level of paternity confidence, for the variables used in the analysis of divorce. For this table only, each variable is assessed for the focal child's year of birth. The final column of the table presents the F statistic and p value associated with an analysis of variance for each variable, indicating whether there is a significant variation across different levels of paternity confidence.

Neither the man's age nor his logged income at the time the child was born varied significantly by confidence of paternity. The education levels of each parent showed highly significant variation, with men whose paternity confidence was unstated having less education than other men, and mothers of high paternity confidence children having more education than other mothers. Children whose paternity confidence was unstated tended to be born in earlier calendar years than other children, while children whose paternity confidence was low were less likely to have parents who were married at the time of their birth. Low paternity confidence children had the fewest siblings, and unstated paternity confidence children had the most. Ethnicity varied by confidence of paternity, with Anglos the least likely not to state paternity confidence and Hispanics the most. There was no significant variation by paternity confidence for men of other ethnicities (reflecting their relative scarcity in the data set), nor did the child's

gender vary significantly. (For further details on the demographic correlates of paternity confidence among Albuquerque men, see Anderson et al., in press).

Confidence of paternity was related to the probability of divorce, as illustrated in Fig. 1, which shows life table survival curves to union dissolution following birth. Men with high and unstated levels of paternity confidence in children had very similar survival curves, and both were unlikely to divorce following the birth of a child. Men with low paternity confidence were much more likely to experience union dissolution; less than half of these men were still in relationships with the child’s mother when the child was 4 years old, as opposed to about 90% of men with high or unstated levels of paternity confidence.

A multivariate Cox proportional hazards model of the probability of divorce is presented in Table 2. The coefficient is presented as a hazards ratio: values greater than 1.0 indicate that the outcome is more likely to happen as the value of the independent variable increases, while values less than 1.0 indicate that the outcome is less likely to happen as the value of the independent variable increases. All else being equal, divorce is less likely to occur following the birth of a child if the man is older or more educated, if the child’s mother is more educated, or if the couple is legally married. Union dissolution is more likely to occur in recent calendar years. Income and the couple’s previous fertility have no significant effect on union dissolution. With respect to ethnicity, Hispanics are significantly less likely to divorce than Anglos, but there is no significant difference between Anglos and other (non-Hispanic) ethnic groups. Additionally, the child’s gender has no effect on parental divorce.

Consistent with the pattern depicted in Fig. 1, low paternity confidence has a tremendous effect on the probability of divorce. All else being equal, union dissolution is 4.9 times more likely to occur following a child’s birth if the man has low paternity confidence in a

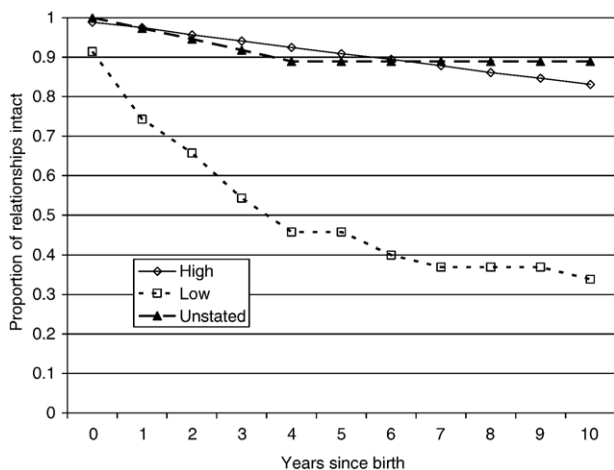


Fig. 1. Time until union dissolution following birth, by paternity confidence.

Table 2

Cox proportional hazards analysis of the probability of union dissolution within 10 years following birth

	Hazards ratio	SD	p
Respondent’s age	0.942	0.014	.000
Logged income	1.033	0.053	.522
Respondent’s education (years)	0.941	0.024	.016
Mother’s education (years)	0.939	0.023	.009
Calendar year	1.052	0.007	.000
Couple ever legally married	0.313	0.083	.000
No. of children the couple has together	0.939	0.072	.413
Anglo (reference group)	–	–	–
Hispanic	0.620	0.104	.004
Other ethnicity	1.158	0.349	.626
Child is male	0.986	0.094	.883
High paternity confidence (reference group)	–	–	–
Low paternity confidence	4.935	1.417	.000
Unstated paternity confidence	0.861	0.804	.873
χ^2	173.35		
p	.0000		

n = 22677 person-years from 2582 children parented by 1000 men.

Standard errors are adjusted to control for multiple children per respondent.

child than if he has high paternity confidence. The probability of union dissolution is not significantly different for children whose paternity confidence was unstated than children in whom men have high paternity confidence. This model does not test for a difference between low and unknown paternity confidence. In an identical model with low paternity confidence as the omitted baseline, divorce is marginally less likely following the birth of a child whose paternity confidence is unstated vs. one with low paternity confidence ($p = .071$).

3.2. Investment in children

Examination of the median or mean time involvement with children, as measured retrospectively for children aged 5 through 12 years, suggested that paternal investment varied significantly by paternity confidence in this sample. The median time spent with a child in one-on-one interactions was 3 to 5 h per week for high paternity confidence children and less than 2 h per week for both low and unknown paternity confidence children. Wilcoxon rank-sum tests, used because the dependent variable was neither continuous nor normally distributed, showed that the median time spent one-on-one with high paternity confidence children was significantly greater than the median for low paternity confidence children ($z = 2.357, p = .0184$) and for children whose paternity confidence was unstated ($z = 2.753, p = .0059$). The medians for low and unstated paternity confidence children were not significantly different from each other ($z = -0.300, p = .7644$). The median amount of time per week men reported spending with a child in a group with other children or adults was 16 h or more for both high and unknown paternity confidence children, and 6 to 15 h for low paternity confidence

Table 3
Ordered logistic models of time men spent with a child in one-on-one interactions, aged 5 to 12 years

	Model 1			Model 2		
	Coefficient	SD	<i>p</i>	Coefficient	SD	<i>p</i>
Respondent's age	0.007	0.009	.456	0.012	0.009	.189
Logged income	0.053	0.040	.192	0.055	0.039	.164
Respondent's education (years)	0.013	0.023	.573	0.010	0.023	.649
Mother's education (years)	0.058	0.023	.012	0.042	0.024	.072
Calendar year	0.012	0.005	.013	0.014	0.005	.004
Couple ever legally married	0.974	0.540	.071	0.589	0.391	.133
No. of children the couple has together	−0.281	0.042	.000	−0.409	0.045	.000
Anglo (reference group)	–	–	–	–	–	–
Respondent is Hispanic	0.366	0.149	.014	0.422	0.149	.005
Respondent is other ethnicity	−0.108	0.230	.639	−0.055	0.231	.812
Child is male	0.262	0.071	.000	0.257	0.073	.000
Respondent and child's mother divorced/broke up	–	–	–	−2.189	0.304	.000
High paternity confidence (reference group)	–	–	–	–	–	–
Low paternity confidence	−1.429	0.643	.026	−0.736	0.624	.238
Unstated paternity confidence	−0.717	0.620	.247	−0.522	0.640	.415
χ^2	107.99			167.36		
<i>p</i>	.0000			.0000		

n = 2581 children parented by 973 men.

Time-variant variables calculated for when child was 5 years old.

children. According to Wilcoxon rank-sum tests, the medians for these distributions were all significantly different from each other ($z = 3.956$, $p = .0001$ for high vs. low paternity confidence; $z = -2.126$, $p = .0335$ for high vs. unstated paternity confidence; and $z = -3.896$, $p = .0001$ for low vs. unstated paternity confidence). Lastly, men reported extensive educational involvement with 60.4% of high paternity confidence children, as do 66.7% of men with unstated paternity confidence; in an analysis of variance, these mean proportions were not significantly different ($F_{1,1958} = 0.34$, $p = .5620$). Men were extensively involved with schooling for only 29.2% of low paternity confidence children, which was significantly less than the level of involvement with either high ($F_{1,1961} = 9.71$, $p = .0019$) or unstated ($F_{1,43} = 7.04$, $p = .0111$) paternity confidence children. For all three measures of paternal investment, low paternity confidence children received less investment than high paternity confidence children. The descriptive statistics for other variables used in analysis by paternity confidence were essentially identical to those presented for the divorce sample (Table 1) and thus was not repeated here.

Ordered logistic models of the time men spend one-on-one with children are presented in Table 3. There are two models in the table. Model 1 does not control for parental divorce or separation, and Model 2 adds a variable indicating whether the man had divorced or broken up with the child's mother by the time the child was 5 years old. Many of the control variables in Model 1 have significant effects on men's involvement with children. The mother's education, the calendar year, being legally married, being Hispanic, and the child being male all have significant positive effects on men's involvement with children, while the number of children the couple has together has a significantly negative effect on men's one-on-one interac-

tions with a child. Men spend marginally more time with children if they were ever legally married to the child's mother. The man's age, income, and education, as well as being of other (non-Anglo, non-Hispanic) ethnicity, were not significant predictors of the time spent alone with children. All else being equal, men spend significantly less time with low paternity confidence children than with high paternity confidence children, while unstated paternity confidence has no significant effect. Relationship status, when added (Model 2), has a significant effect; not surprisingly, men spend less time with children if they are no longer in a relationship with the child's mother. The effect of low paternity confidence loses statistical significance. Thus, the reduction in time spent one-on-one with low paternity confidence children reported above is apparently a result of the parents being divorced. In an identical model with low paternity confidence as the omitted baseline (not shown), no significant difference was found between time spent alone with low and unknown paternity confidence children.

Table 4 presents multivariate ordered logistic models of the time men spend with a child in a group with other children or adults, for children aged 5 through 12 years. Among the background variables in Model 1, being legally married and being Hispanic both have significant positive effects on group time involvement with children, while being of non-Anglo non-Hispanic ethnicity has a marginally significant negative effect. Men spend significantly less time in a group with low paternity confidence than high paternity confidence children, and they spend more time (though the effect is only marginally significant) with children whose paternity confidence is unstated than with high paternity confidence children. Furthermore, these patterns remain after controlling for whether the parents divorced or broke

Table 4
Ordered logistic models of time men spent with a child in a group with others, aged 5 to 12 years

	Model 1			Model 2		
	Coefficient	SD	<i>p</i>	Coefficient	SD	<i>p</i>
Respondent's age	0.004	0.010	.695	0.009	0.010	.366
Logged income	−0.002	0.052	.970	−0.002	0.050	.964
Respondent's education (years)	−0.013	0.026	.616	−0.017	0.026	.503
Mother's education (years)	0.023	0.023	.325	0.007	0.024	.759
Calendar year	0.004	0.005	.472	0.006	0.006	.258
Couple ever legally married	1.102	0.554	.047	0.786	0.471	.095
No. of children the couple has together	0.047	0.068	.487	−0.069	0.062	.268
Anglo (reference group)	−	−	−	−	−	−
Respondent is Hispanic	0.355	0.171	.038	0.412	0.172	.017
Respondent is other ethnicity	−0.547	0.290	.059	−0.490	0.279	.080
Child is male	0.073	0.079	.357	0.089	0.081	.271
Respondent and child's mother divorced/broke up	−	−	−	−1.997	0.340	.000
High paternity confidence (reference group)	−	−	−	−	−	−
Low paternity confidence	−1.248	0.375	.001	−0.764	0.338	.024
Unstated paternity confidence	0.859	0.488	.079	1.020	0.497	.040
χ^2	39.82			79.67		
<i>p</i>	.0000			.0000		

n = 2581 children parented by 973 men.

Time-variant variables calculated for when child was 5 years old.

up by the time the child was 5 years old (Model 2). Divorce has a significantly negative effect on time involvement in a group with children, but even controlling for this, men report spending significantly less time with low paternity confidence children, and significantly more time with unstated paternity confidence children. In an identical model with low paternity confidence as the omitted baseline (not shown), men spent significantly less time with low than with unknown paternity confidence children, even when divorce is controlled for.

Lastly, Table 5 presents logistic regression models of the probability that men were extensively involved with children's educational progress between the age of 5 and 12 years. Model 1 shows that the education of the respondent and of the child's mother have significantly positive effects on educational involvement, as do being legally married or being Hispanic. The calendar year has a marginally significant negative effect, while the respondent's income has a marginally significant positive effect. Controlling for these background factors, men are significantly less likely to be

Table 5
Logistic models of whether men were extensively involved in children's educational progress, aged 5 to 12 years

	Model 1			Model 2		
	Coefficient	SD	<i>p</i>	Coefficient	SD	<i>p</i>
Intercept	18.573	12.701	.144	17.970	13.051	.169
Respondent's age	0.014	0.012	.261	0.017	0.012	.164
Logged income	0.075	0.041	.069	0.073	0.041	.077
Respondent's education (years)	0.082	0.028	.004	0.080	0.028	.004
Mother's education (years)	0.059	0.028	.035	0.046	0.028	.106
Calendar year	−0.012	0.007	.078	−0.011	0.007	.108
Couple ever legally married	1.014	0.459	.027	0.664	0.451	.141
Number of children the couple has together	−0.021	0.057	.709	−0.111	0.062	.073
Anglo (reference group)	−	−	−	−	−	−
Respondent is Hispanic	1.024	0.208	.000	1.045	0.210	.000
Respondent is other ethnicity	−0.243	0.373	.514	−0.218	0.372	.558
Child is male	0.027	0.095	.776	0.019	0.096	.846
Respondent and child's mother divorced/broke up	−	−	−	−1.242	0.263	0.000
High paternity confidence (reference group)	−	−	−	−	−	−
Low paternity confidence	−1.214	0.460	.008	−0.984	0.468	.036
Unstated paternity confidence	0.269	1.027	.793	0.395	1.032	.702
χ^2	48.89			75.87		
<i>p</i>	.0000			.0000		

n = 1984 children parented by 778 men.

Standard errors are adjusted to control for multiple children per respondent.

extensively involved with the schooling of low paternity confidence children than high paternity confidence children. Children whose paternity confidence is unstated are not significantly different from high paternity confidence children. The effect of low paternity confidence on educational involvement persists after parental relationship status is added to the model (Model 2). Although divorce has a significantly negative effect on being extensively involved with schooling, men are still less likely to report high educational involvement with low paternity confidence children. The effect of unstated paternity confidence remained nonsignificant after divorce was added to the model. In an identical model with low paternity confidence as the omitted baseline (not shown), no significant difference was found between low and unknown paternity confidence children in terms of paternal involvement in education.

4. Discussion

In this article, we used data from a sample of men living in Albuquerque, NM, to examine whether men's assessment of paternity confidence impacts their relationships with the mothers of their putative children, as well as with the children themselves. We examined outcomes for three types of children: children in whom men had high paternity confidence or low paternity confidence, or whose paternity confidence was unstated.

Our first hypothesis, that men would be more likely to divorce women after the birth of a child if they have low paternity confidence in that child, was supported. We found that low paternity confidence was significantly associated with higher probability of union dissolution, although unstated paternity confidence had no significant effect.

Our second hypothesis was that men would invest less in low paternity confidence children, above and beyond the effect of divorce in reducing their investment in such children. We examined three measures of investment in children, all assessed retrospectively for children aged 5 through 12 years. We found no direct effect of paternity confidence on the time spent one-on-one with a child once divorce was controlled for. Divorce had a significant negative effect on the time spent alone with a child, and as we had already established, low paternity confidence children were more likely to experience parental divorce. Thus, paternity confidence had only an indirect effect on time involvement with children alone, by increasing the probability that a child's parents would divorce. Paternity confidence had significant effects on the amount of time men reported spending with a child in a group. Controlling for divorce, men spent less time with a child and others if the child was a low paternity confidence child. However, men reported spending more time with the child and others if the child's paternity confidence was unstated. This result suggests that men prefer to interact in groups with children whose paternity confidence is unstated (perhaps with the child's high paternity confidence siblings). Our last measure of investment in children, whether

men were extensively involved in the children's schooling, was significantly reduced for low paternity confidence children with divorce controlled for. Unstated paternity confidence had no significant effect on men's involvement with children's schooling.

While we initially hypothesized that unstated paternity confidence might actually be unreported low paternity confidence, the results do not strongly support this suggestion, as these two types of paternity confidence are associated with different outcomes. Low paternity confidence increases the probability of divorce, while unstated paternity confidence has no effect. With respect to paternal involvement, men spend more time with a child and others if the child's paternity confidence is unstated than if it is a high paternity confidence child. We report elsewhere (Anderson et al., *in press*) that the demographic correlates of low and unstated paternity confidence differ somewhat as well. Unstated paternity confidence resembles high paternity confidence as much as low paternity confidence, and may represent an intermediate category, for example, men who may harbor some doubts about paternity, but not enough to cross the threshold of low paternity confidence. Clearly, further work into the psychological mechanisms by which men evaluate paternity is needed.

Because unstated paternity confidence is associated with Hispanic ethnicity while low paternity confidence is not (Anderson et al., *in press*), unstated paternity confidence may possibly stem from a reluctance on the part of Hispanic men to discuss paternity confidence in general. If this is true, then Hispanic men should be more likely than non-Hispanic men to refuse to discuss paternity for all of their children, and not just one particular child. Among the 843 men in the paternal investment sample who had more than one child in the data set, only six (0.71%) refused to answer paternity confidence for all of their children. All six of these men were Hispanic. However, the other 282 Hispanic men with more than one child in the sample (97.9% of multiparous Hispanics) were willing to discuss paternity confidence for at least one of their children. Since the overwhelming majority of Hispanics were willing to discuss paternity confidence, we cannot simply dismiss unstated paternity confidence as a cultural reluctance to address the issue of nonpaternity.

To the best of our knowledge, no previous study has provided an in-depth examination of the relationship between paternity confidence, divorce, and paternal investment. Fox and Bruce (2001) report that paternity confidence had a significant effect on several measures of paternal involvement for a sample of men in Tennessee, but they provide little information about the measurement of paternity confidence, or the characteristics associated with it. They include marital status as a control variable, but do not examine whether paternity confidence contributes to the likelihood of union dissolution. Our study is the first to simultaneously examine divorce and paternal investment as outcomes of paternity confidence.

A potentially important limitation of this study is the difficulty in determining the direction of causal effects. It is possible that a woman may decide to have extramarital relations because she is married to a low-investing man or because she is contemplating divorce. Thus, low paternal investment (or signs thereof) or low likelihood of relationship stability may cause low paternity confidence rather than low confidence causing marital dissolution and reduced investment. Future research should attempt to control for such selection biases, perhaps through longitudinal data collection.

In conclusion, we have examined the relationship between paternity confidence, divorce, and men's investment in children. Men are significantly more likely to divorce women after the birth of a child if they have low paternity confidence in that child, thus, indirectly reducing investment in that child. Controlling for divorce, low paternity confidence results in an additional reduction in time spent with the child and others, and with reduced likelihood of being extensively involved with the child's schooling, although there is no additional effect of paternity confidence on the time spent alone with a child, above and beyond the effect of divorce on this outcome. We conclude that paternity confidence plays an important role in influencing men's relationships with the women who bear their children and with the children themselves.

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