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# A National Sample of U.S. Paternity Tests: Do Parents of Dissimilar Race Have Less Difficulty Surmising Paternity?

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**150 Word Abstract**
Nearly 300,000 paternity tests are performed in the U.S. annually. Our objective is to determine the demographic make up of test subjects and how well ethnic background predicts a paternity inclusion. We formed a national database of 9999 paternity test results weighted to represent the population of paternity establishment caseloads for the U.S. The alleged father was positively matched to the child in 72% of cases. The probability of a match varied little across racial/ethnic categories with a low of 67% in African Americans and a high of 82% among Native Americans. Maternal age increased the likelihood of a match. European origin mothers nominating non-Europeans as fathers were less likely to identify the correct man as father. We conclude that for the average test subject the group mean 72% probability of matching offers nearly as good an estimate as one based on a subject's age, race and child characteristics.

## Introduction

A neglected complement to the demography of intermarriage is the demography of interracial non-marital unions. In this paper we focus on non-marital unions that have led to a child with contested paternity. We will attempt to determine the background of the fathers in these unions and whether interracial non-marital unions differ substantially compared to intra-racial non-marital unions.

What we know about children for whom paternity has been established comes primarily from surveys that ask mothers about actions that may have been taken by the father of her child to formally acknowledge paternity (i.e. whether his name is on the birth certificate, whether he has signed a paternity acknowledgement form, whether he has been identified as the father via genetic testing). Over the last two decades, state IV-D offices require a mother to assist in paternity establishment as a condition of welfare receipt, increasing the use of genetic testing to determine paternity. Roughly 290,000 DNA based paternity tests are performed in the U.S. annually. Most of these tests are performed to establish the basis of a child support order. Very little is known about the population seeking genetic verification of paternity, or whether characteristics of the mother, child or alleged father are correlated with the test results. Since the physical features of a child, may make a child's paternity more obvious, one might suppose that couples with dissimilar racial backgrounds would be more likely to yield tests that prove that a man is the father.

## Objective

This paper will describe the racial and ethnic background, and average age of mothers and alleged fathers who obtain DNA based paternity tests in the U.S. The paper will assess any systematic patterns by race, age, and child sex in the frequency with which the test yields a positive match for an alleged father in both inter-racial and intra-racial unions.

**Methods**

Orchid Genescreen Inc. performs roughly half of all DNA based paternity tests in the U.S. and has contracts with State Child Support Enforcement[1] Offices in over 33 states. Based on their test results for 152,737 trios we formed a nationally representative sample of 9999 trios with weights based on paternity establishment caseloads for each of the following regions NorthWest, NorthEast, NorthCentral, Central MidWest, East Central, South Central, MidAtlantic, SouthWest, and California. 5711 cases were excluded from the sampling frame of 152,737 because father's age or child's age were missing or miscoded. Based on the weighted sample we tabulated mother and alleged father's race and age , child gender. We also tabulate match rates for the overall sample and by age and race.

**Results**

Mothers did not submit genetic samples in 10.15 %of cases. Table 1 shows the proportion of cases and the proportion yielding a positive match by the racial group of the parents. Table 2 shows the proportion of cases and the proportion yielding a positive match by mother's age and by father's age. Table 3 shows the caseload and the match rate by child's age. Table 4 shows caseload and match rate by child sex. Overall the alleged father was positively matched to the child in 72% of cases. Table 5 shows the caseloads by the various combinations of parental ethnicity. Table 6 shows the proportions matching by various combinations. Table 7 shows the results of logistic regression models showing that the child's sex has no correlation with the likelihood of a positive match in the DNA testset. Maternal age increases the likelihood of a match, and African American ethnic group decreases the likelihood of a match. Overall Table 7 demonstrates that very few characteristics of the mother, child or alleged father explain the likelihood of a positive match. In other models we found that a positive match was less likely for a couple of dissimilar ethnic backgrounds, but this result was of small magnitude and only statistically significant if the woman was over age 25.

**Discussion**

DNA based paternity tests identify the alleged father as the actual father in only 72% of cases in a sample of genetic tests that is weighted to be equally representative of paternity establishment caseloads in the U.S. for 2002. There is almost no evidence that couples with dissimilar ethnic backgrounds have a higher or lower rate of paternity test matching than couples of similar backgrounds.

  Because only a few weak associations between parental race and age and the likelihood of a positive match in a paternity test were found, we conclude that knowing parental race, ages, and sex of the child is of little assistance in predicting which samples will produce a positive match. It remains an open research question how many of the test results come as a complete surprise to the parties involved. If paternity test results are inherently unpredictable, observing the behavior of a sample of men obtaining these test results would offer a "natural experiment" in determining how altered biological relatedness to a child affects the parenting behavior of men.

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[1]States that were aggregated into regions were as follows: NorthWest AK, WA; NorthEast: CT, RI, NY, ME, MA, NH, VT; NorthCentral: ID, ND, OK; CentralCentral: NB, KS; Eastern Central: KY, OH, TN; South Central: AR, LA; MidAtlantic: MD, VA, WV; SouthWest: CO, NV, NM, TX, UT, WY; California.
States that had sufficient samples to represent themselves were as follows: AL, AZ, CA, DE, FL, GA, HI,IL, IN, IO, MI, MN, MS, MO, MT, NJ, OR, PA, SD, VT, WI.

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| Table 1.  Race/Ethnicity and Match Rates By Race/Ethnicity | | | | |
|---|---|---|---|---|
| | **Father's Race** | **Mother's Race** | **Percent With Positive Match By Father's Race** | **Percent With Positive Match By Mother's Race** |
| **European American** | 40.07 | 46.43 | 74.69 | 75.18 |
| **African American** | 37.50 | 32.70 | 67.39 | 67.98 |
| **Latino** | 14.66 | 13.44 | 73.33 | 74.92 |
| **Asian Amercan/Middle Eastern/North African** | 1.01 | 0.96 | 80.2 | 79.07 |
| **Native American** | 0.66 | 0.78 | 81.82 | 85.71 |
| **Other Unspecified** | 6.09 | 5.69 | 76.35 | 73.23 |
| **N** | 9999 | 8930 | 9999 | 8930 |

| Table 2. Parent's Age as of Sept 30, 2003 and Match Rates By Age | | | | |
|---|---|---|---|---|
| Age Group | Father's Age | Mother's Age | Percent With Positive Match By Father's Age | Percent With Positive Match By Mother's Age |
| 10-14 | 0.04 | 0 | 75.00 | |
| 15-19 | 2.62 | 7.46 | 75.95 | 70.45 |
| 20-24 | 13.70 | 25.44 | 70.29 | 70.55 |
| 25-29 | 24.39 | 29.59 | 70.40 | 71.90 |
| 30-34 | 17.07 | 16.64 | 70.40 | 73.45 |
| 35-39 | 14.94 | 12.90 | 73.49 | 76.54 |
| 40-44 | 7.76 | 5.34 | 73.32 | 78.32 |
| 45-49 | 4.75 | 2.08 | 70.53 | 70.66 |
| 50-54 | 1.90 | 0.42 | 75.79 | 91.18 |
| 55-59 | 1.01 | 0.12 | 70.30 | 80.00 |
| 60-64 | 0.45 | 0 | 68.89 | 0 |
| 65-69 | 0.29 | 0.01 | 75.86 | 100.00 |
| 70-74 | 0.06 | 0 | 83.33 | |
| 75-79 | 0.01 | 0 | 0.00 | |
| 80-84 | 0.03 | 0 | 0.00 | |
| 85+ | 0.07 | 0 | 85.71 | |
| Total | 100% | 100% | 71.96% | 72.72% |
| N | 8909 | 8034 | 8909 | 8034 |

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| Table 3  Age of Child and Match Rate by Age of Child | | |
|---|---|---|
| **Child's Age on Sept 30, 2003** | **% of Children** | **% with Positive Match** |
| **0** | 1.11 | 74.77 |
| **1** | 9.74 | 71.87 |
| **2** | 14.58 | 74.35 |
| **3** | 13.78 | 73.08 |
| **4** | 12.01 | 74.94 |
| **5** | 10.44 | 70.50 |
| **6** | 7.01 | 71.18 |
| **7** | 4.59 | 69.72 |
| **8** | 3.96 | 70.96 |
| **9** | 3.88 | 69.33 |
| **10** | 2.70 | 70.37 |
| **11** | 2.78 | 74.10 |
| **12** | 2.26 | 65.49 |
| **13** | 2.36 | 68.22 |
| **14** | 1.96 | 71.43 |
| **15** | 1.98 | 66.67 |
| **16** | 1.49 | 70.47 |
| **17** | 1.41 | 68.09 |
| **18** | 1.06 | 74.53 |
| **19** | 0.89 | 66.29 |
| **Total** | 100% | 71.96 |
| **N** | 9999 | 9999 |

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| Table 4  Sex of Child and Match Rate by Sex of Child | | |
|---|---|---|
| | **Sex of Child** | **Percent with Positive Match** |
| **Boy** | 51.05 | 71.84 |
| **Girl** | 48.95 | 72.07 |

| | Table 5. Case Volume By Ethnicity of Parents | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Mother's Ethnicity** | | | | | | |
| **Father's Ethnicity** | **European** | **African American** | **Latino** | **Asian/MidEast** | **Native** | **Other** | **Total** |
| **European** | 3114 | 74 | 136 | 8 | 17 | 192 | **3541** |
| **African American** | 428 | 2725 | 96 | 3 | 5 | 152 | **3409** |
| **Latino** | 259 | 68 | 873 | 3 | 17 | 94 | **1314** |
| **Asian MidEast** | 14 | 1 | 8 | 64 | 24 | 10 | **121** |
| **Native** | 28 | 1 | 7 | 0 | 0 | 5 | **41** |
| **Other** | 204 | 98 | 100 | 8 | 5 | 124 | **539** |
| **Total** | **4047** | **2967** | **1220** | **86** | **68** | **577** | **8965** |

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*Sums to 8965, because mothers did not submit samples in 998 samples and did not
report ethnicity in an additional 36 samples
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| Table 6. Match Rates (Percent of Cases Where Fatherhood is Proven) | | | | | | |
|---|---|---|---|---|---|---|
| **Mother's Ethnicity** | | | | | | |
| **Father's Ethnicity** | **European** | **African American** | **Latino** | **Asian/MidEast** | **Native** | **Other** |
| **European** | 75.63 | 71.62 | 71.32 | | | 76.04 |
| **African American** | 70.33 | 69.98 | 78.13 | | | 73.03 |
| **Latino** | 72.2 | 67.65 | 74.91 | | | 74.47 |
| **Asian MidEast** | | | | 81.25 | | |
| **Native** | | | | | | |
| **Other** | 78.92 | 67.35 | 85 | | | 66.94 |
| | | | | | | |
| *Shaded Cells have less than 50 couples. | | | | | | |

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| Table 7. Odds Ratios Predicting Positive Match | | | |
|---|---|---|---|
| Mother's Age | 1.018 | 1.018 | 1.018 |
| | (3.36)** | (3.30)** | (3.35)** |
| Father's Age | 0.995 | 0.995 | 0.995 |
| | (-1.490) | (-1.510) | (-1.500) |
| Child is a Boy | 1.017 | 1.016 | 1.013 |
| | (-.350) | (-.310) | (-.260) |
| Father is Black | 0.903 | | 0.78 |
| | (-1.040) | | (3.95)** |
| Father is Latino | 0.871 | | 0.926 |
| | (-1.700) | | (-1.120) |
| Father is Asian | 1.054 | | 1.198 |
| | (-.230) | | (2.31)* |
| Father is Native American | 0.791 | | 0.986 |
| | (-1.160) | | (-.080) |
| Father is Other/Unspecified | 1.052 | | 1.025 |
| | (-.410) | | (-.220) |
| Mother is Black | 0.832 | 0.771 | |
| | (-1.930) | (4.61)** | |
| Mother is Latino | 1.109 | 1.018 | |
| | (-1.060) | (-.230) | |
| Mother is Asian | 1.219 | 1.285 | |
| | (-.650) | (-1.510) | |
| Mother is Other/Unspecified | 0.923 | 0.903 | |
| | (-.790) | (-1.240) | |
| Mother is Native American | 1.926 | 1.735 | |
| | (-1.930) | (-1.870) | |
| Observations | 8942 | 8942 | 8942 |

Robust z statistics in parentheses
* significant at 5%; ** significant at 1%