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Local Scarcity of Women Predicts Higher Fertility among Married Couples and More Single Father Households

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Influences of the sex ratio on the intensity of mating competition and selectivity for partners produce different outcomes in female biased and male biased populations because the reproductive strategies of men and women are somewhat divergent. Male scarcity enhances male mating opportunities and incentives for long-term commitment are diminished, encouraging serial and simultaneous polygyny. Paternal investment is lower in these populations, as indicated by higher divorce rates, more out-of-wedlock births, and a greater proportion of single mother households. Scarce females are more effective at securing commitment from partners and obtaining higher levels of resource investment. Women marry earlier in male biased populations. Although single father households are relatively uncommon, we expect to see higher proportions of households with children headed by single fathers where women are scarce. We also expect to see higher fertility among married couples, both because women may have greater bargaining power in reproductive decision-making and the role of woman in childbearing may be more salient and more highly valued. Data from the U.S. Census 2009 American Community Survey across 318 Metropolitan Statistical Areas supported these hypotheses.

Keywords
operational sex ratio, fertility, sex differences, single parenthood

Introduction

Darwin (1871) recognized that a species' sex ratio is usually balanced because reproductive success is equivalent on average for males and females in a population. The advantageous production of the rarer sex generates a stable equilibrium on an evolutionary time scale. Sex ratios will be imbalanced at some times in some human populations (Darwin, 1871). When the ratio is imbalanced, the rare sex becomes more valuable in the mating market (Fisher, 1930).

Because men and women have somewhat divergent reproductive strategies and roles, there will be contrasting consequences for male biased and female biased human sex ratios. Across mammals, females are the limiting factor in reproduction because they provide almost all of the physiological investment and have much lower potential reproductive capacities than males. Thus, females are more discriminating in selecting mates and males expend comparatively more effort in securing mates (Trivers, 1972). Women attract partners through signals of fecundity and suggestions of sexual access. Men attract partners through signals of potential commitment to long-term relationships and resource provisioning (Buss & Schmitt, 1993), which is substantially larger in humans than in other primates (Geary & Flinn, 2001).

Male scarcity in a population enhances male mating opportunities and diminishes incentives for long-term commitment and paternal investment. In female biased populations, women are less likely to be married (Lichter, Kephart, McLaughlin, & Landry, 1992), marry later (Kruger, Fitzgerald, & Peterson, 2010), are more promiscuous (Schmitt, 2005), and have higher rates of teenage pregnancies (Barber, 2000). There are higher divorce rates, more out-of-wedlock births, more single mother households, and lower paternal investment (Guttentag & Secord, 1983; Trent & South, 1989).

Female scarcity in a population enhances women's effectiveness in securing commitment and obtaining higher investment from men. In male biased populations, there is greater male competition for signals of relationship commitment and paternal investment (Pedersen, 1991) and higher expectations for paternal care (Guttentag & Secord, 1983). Men with relatively lower resources have difficulty getting married (Pollet & Nettle, 2008). Women can more easily leave relationships and marry a man higher in status and wealth than their previous partner (Ardener, Ardener, & Warmington, 1960). Men exhibit greater protection and mate guarding, and attempt to constrain women's abilities to seek additional or alternative partners (Scott, 1970).

Although single father households are relatively uncommon, we expect to see higher proportions of households with children headed by single fathers in populations where women are scarce. Each child has both a mother and a father, so single father households often result from maternal departure, as women have greater ability to secure new high quality mates (Guttentag & Secord, 1983). Although some cases result from maternal mortality, this

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Table 1. Variable descriptives

Variable	*M*	*SD*	Range
Male:Female ratio	.98	.07	.80 - 1.25
Median household income in USD	36632	6815	17206 - 70243
% non-White	26	17	2 - 88
% HS Graduates	80	8	52 - 97
% 4-year College Graduates	22	10	8 - 74
% Single mother households out of families with children	26	9	10 - 55
% Single father households out of families with children	6.8	1.6	2 - 13
% of married couples who have children	45	6	22 - 65

Note. Excludes Jacksonville, NC

would not account for all single father households because male mortality rates are higher in general (Kruger & Nesse, 2006) and especially high when women are scarce (Kruger & Polanski, 2011). Thus, maternal mortality would be even less likely to account for this predicted relationship. Paternal investment is higher and men place greater value on reproductive opportunities when women are scarce. This may extend to the fostering of offspring, as male investment enhances offspring viability and reproductive success (Geary, 2005; Hill & Hurtado, 1996).

We also expect to see higher fertility among married couples in populations where women are scarce. There are three converging reasons underlying this prediction: 1) Women may have greater bargaining power in reproductive decision-making and men will be more likely to agree to have offspring in order to retain their mates; 2) The role of women in childbearing may be more salient to and valued by men as male reproductive success becomes more skewed; 3) Women may value procreation relatively higher compared to other goals, recognizing that they are the limiting factor in reproduction and have higher mate value compared to those in less male biased populations. Male biased populations place greater emphasis on female virginity at marriage, a wife's sexual fidelity, and mothers' roles in childcare, all related to the recognition of women as a scarce reproductive resource (Guttentag & Secord; 1983; Scott, 1970).

Materials and Methods

We calculated the male:female ratio for ages 18-64 in the 319 Metropolitan Statistical Areas (MSAs) included in the 2009 American Community Survey (ACS) conducted by the U.S. Census Bureau. MSAs are urban areas or urban clusters with relatively high population density at their core and close economic ties throughout the area. For example, the Detroit–Warren–Livonia MSA includes the populations of six counties located in the Detroit metropolitan area, including urban, suburban, and rural areas. The mean population size is 652,494 with a range from 52,457 to 18,323,002. For more information, see: http://en.wikipedia.org/wiki/Metropolitan_Statistical_Area. The ACS provides results for geographic areas with populations of 65,000 or more.

We calculated the proportions of households with children that were headed by single mothers and single fathers, and the proportions of married couple households who have children out of all married couple households. We conducted partial correlations between the sex ratio and family composition variables controlling for median household income, the high school graduation rate, the (4-year) college graduation rate, and the proportion of individuals who are non-White. See Table 1 for variable descriptives.

Results

Greater proportions of women were associated with greater proportions of households with children headed by single mothers, $r(319) = .229$, $p < .001$. Greater proportions of men were associated with greater proportions of households with children headed by single fathers, $r(319) = .201$, $p < .001$, as well as the proportion of married couple households who have children out of all married couples, $r(319) = .196$, $p < .001$. We excluded Jacksonville, North Carolina, an MSA largely comprised by two military bases and with an extreme sex ratio (193 men:100 women). This did not eliminate the relationships between the sex ratio and households with children headed by single mothers, $r(318) = .203$, $p < .001$ (See Figure 1), households with children headed by single fathers, $r(318) = .311$, $p < .001$ (See Figure 2), or married couple households who have children out of all married couples, $r(318) = .203$, $p < .001$ (See Figure 3). See supplementary information for figures including Jacksonville, NC.

Discussion

Our findings demonstrate the influence of the sex ratio on American family dynamics. We replicated the association between female biased populations and higher proportions of households with children headed by single mothers. We find a parallel

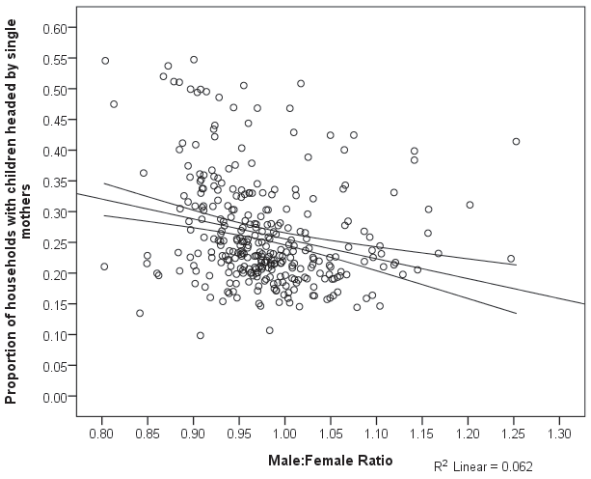

Figure 1. Proportions of households with children headed by single mothers. Excludes Jacksonville, NC. Regression line with 95% confidence interval depicted.

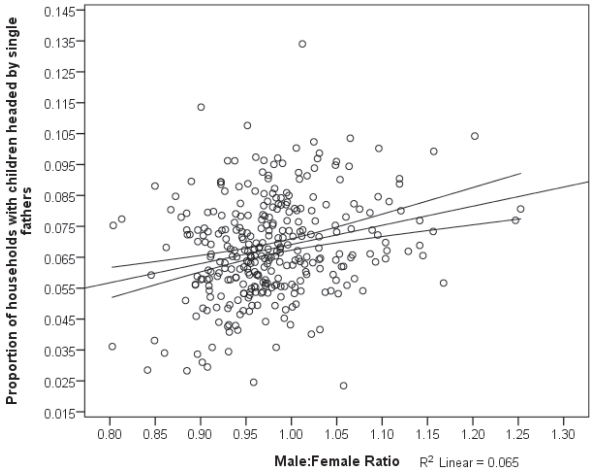

Figure 2. Proportions of households with children headed by single fathers. Excludes Jacksonville, NC. Regression line with 95% confidence interval depicted.

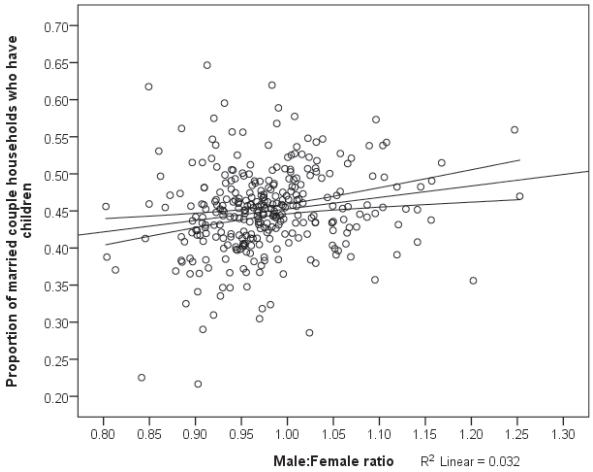

Figure 3. Proportions of married couple households who have children out of all married couple households. Excludes Jacksonville, NC. Regression line with 95% confidence interval depicted.

phenomenon between male biased populations and higher proportions of households with children headed by single fathers, as well an association between male biased populations and greater fertility within married couples. Socio-demographic factors with potentially strong influences on family structure did not account for these results. As seen in the figures, these relationships are linear and continuous. Trends in male biased populations are the inverse of those in female biased populations, even relative to balanced populations as a neutral comparison.

There were nearly four times as many single mother headed households as single father headed households, despite a nearly balanced average sex ratio and similar ranges of male and female bias in the population. This indicates that differences in the likelihood of male and female single parenthood are not just a numerical artifact and the difference is consistent with sex differences in reproductive strategies. This pattern also indicates that men and women are not so qualitatively different that men would not take on primary parental responsibilities.

Life history dimensions of mating effort and parental effort show aggregate sex differences, but may simultaneously exhibit substantially overlapping ranges. Women have assumed the role of resource provider in female biased populations both prior to and during the 20th Century (Guttentag & Secord, 1983) and the current results indicate that men will also assume the role of primary caretaker in male biased populations. Both men and women appear to have higher returns on mating effort when they are relatively scarce, and thus may increase mating effort at the expense of parental investment. When maternal investment is relatively lower on average, men apparently compensate by raising paternal investment to protect their reproductive success.

Imbalanced sex ratios also affect married couples, those in female biased populations are less likely to have children, and those in male biased populations are more likely to have children, compared to those in sex-balanced populations. Our secondary analysis of population level data cannot determine the psychological bases for this pattern, yet we offer three mutually compatible explanations that could be tested in future research. When women are scarce, their value as a reproductive resource may be more salient to both women and men, and their leverage in romantic relationship negotiations may enable them to obtain desirable outcomes. Women faced with partners who resist their desires may more easily secure a more compatible mate than their peers in female biased populations. Familial and social pressures may also emerge, influencing individual level behaviors.

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