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Original Article

Sex differences in the relationship between status and number of offspring in the contemporary U.S.

Rosemary L. Hopcroft *

University of North Carolina at Charlotte, Charlotte, NC, USA

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ABSTRACT

Sociobiology predicts that among social species individual social status will be positively correlated with reproductive success, yet in modern societies the opposite appears to be true. However, in the last five to ten years, a sex difference in the association between some measures of personal status on number of children has been documented in many countries, such that status is positively associated with number of children for men only. Much of this research utilizes European data and there has been little use of data from the U.S. In this paper, analysis of U.S. data from the 1979 National Longitudinal Survey of Youth shows that personal income is positively associated with number of offspring for men, and this is true for men at all levels of education. This is mostly because of increased childlessness among low income men. For women, personal income is negatively associated with number of offspring, and this is true for women at all levels of education. Other measures of status (intelligence and education) are negatively associated with number of offspring for men and women, although the negative association is less for men.

Sociobiology predicts that among social species, individual social status will be positively correlated with reproductive success, as social status gives individuals resources and perquisites (including desirability as a mate) that facilitate reproduction (Wilson, 1975 [1980], p. 141). There is much evidence that this is the case among humans in pre-industrial societies, at least for men (see table in Hopcroft, 2006). Yet in modern societies the opposite appears to be true. Census studies continually show that women in high income households have fewer children than women in lower income households (Dye, 2008). This has been christened the "central theoretical problem of human sociobiology" (Vining, 1986, 2011) and seemingly implies that sociobiology is not relevant to modern humans.

Yet a growing number of studies of modern societies in Europe and elsewhere show that for males (but not females) status is positively associated with number of offspring. Different studies have used different measures of individual social status, but common measures of status include personal income and education. Results differ somewhat across national contexts. In the U.S. and the U.K., for men personal income is positively associated with number of offspring for men while it is negatively associated with number of offspring for women, while education is negatively associated with number of children for both men and women (Hopcroft, 2006; Huber, Bookstein, & Fieder, 2010; Nettle & Pollet, 2008; Weeden, Abrams, Green, & Sabini, 2006). Also in the U.S., Fieder and Huber (2012) show that holding a supervisory position within an organization is associated with more offspring for men but not women. In Sweden, both income and education are positively associated with number of offspring for men only (Fieder & Huber, 2007; Goodman & Koupil, 2010). In Norway, Lappegård and Rønsen (2013) find that both education and income increase the probability of additional children for men only. In Finland, Nisén, Martikainen, Kaprio, and Silventoinen (2013) find more highly educated men have more children than less educated men. Fieder, Huber, and Bookstein (2011) find using data from Brazil, Mexico, Panama, South Africa, USA and Venezuela that the lowest income men and the highest income women are least likely to have one of their own children in the household.

Lappegård and Rønsen (2013) show evidence that part of the mechanism for the relationship between socioeconomic status and number of offspring for men in Norway is multipartner fertility by high status men (see also Forsberg & Tullberg, 1995 for Sweden; Bereczkei & Csanaky, 1996 for Hungary; Jokela, Rotkirch, Rickard, Pettay, & Lummaa, 2010 for the U.S.). However, it appears that the primary driver of the relationship between socioeconomic status and reproductive success for men in Europe is the greater likelihood of childlessness among low status men (Barthold, Myrskylä, & Jones, 2012; Fieder & Huber, 2007; Fieder et al., 2011; Goodman, Koupil, & Lawson, 2012). These findings are consistent with theory from both sociobiology and evolutionary psychology, which suggests that women are more likely than men to prefer good financial prospects in a mate (Buss, 1989; Buss, Shackelford, Kirkpatrick, & Larsen, 2001; Henry, Helm, & Cruz, 2013; Wiederman & Allgeier, 1992). If high income men are more desirable as mates than other men, then this may explain why low income men are more likely to remain childless.

Much of the research on the relationship between male status and reproductive success uses data from European populations. There has been comparatively little research on the relationship between male

* Corresponding author. Department of Sociology, UNC-Charlotte, Charlotte, NC 28223, USA.
E-mail address: rlhopcro@uncc.edu.

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personal income (as opposed to household income) and other measures of male status and reproductive success using U.S. data (exceptions include Fieder & Huber, 2012; Fieder et al., 2011; Hopcroft, 2006; Weeden et al., 2006). This comparative lack of studies is in part a data problem—most demographic data on fertility in the U.S. are data on female fertility, not male fertility, and social surveys typically do not differentiate between the biological and the non-biological children of respondents. Many surveys also do not distinguish between the income of an individual's household and their personal income, despite the fact that there are theoretical reasons (above) why personal income may affect the mating and marital prospects of men and women differently.

The previous U.S. studies cited above have solved these data problems in various ways, some more satisfactorily than others. In this paper, I use longitudinal U.S. data from the 1979 National Longitudinal Study of Youth (NLSY79) to examine the relationship between different measures of personal status (income, education and intelligence) and reproductive success for men and women in the U.S. This is the largest and most recent data set that includes direct measures of both male fertility and personal income used to examine the issue to date. I use intelligence as a measure of status in addition to income and education because sexual selection reasoning suggests that more intelligent individuals may be disproportionately selected as mates (Miller, 2001). Because previous studies using European data have shown that the positive relationship between status and number of offspring for men is explained by the childlessness of low status men, I also examine the role of childlessness in mediating the relationship between status and reproductive success in the U.S.

1. Data

Data are from the 1979 National Longitudinal Survey of Youth 1979 (NLSY79). The NLSY is a longitudinal survey of a sample of American youth born between 1957-64 fielded by the Bureau of Labor Statistics. The cross sectional survey sample I use here was designed to represent the entire population born in 1957 through 1964. The sample includes 6,111 respondents who were ages 14-22 when they were first interviewed in 1979 and were subsequently aged 45-53 in the 2010 follow up study (note that I excluded the two oversamples in the NLSY79 from this analysis).

2. Measures

2.1. Baseline measures (1979)

2.1.1. General cognitive ability (g)

Basic cognitive abilities were assessed with the Armed Services Vocational Aptitude Battery (ASVAB). The ASVAB is comprised of 10 tests that assess knowledge and skills in general science, arithmetic reasoning, word knowledge, paragraph comprehension, numerical operations, coding speed, auto and shop information, mathematics knowledge, mechanical comprehension, and electronics (Center for Human Resource Research, 2012). For this study, recommendations by Jensen and Weng (1994) were followed to obtain a *g*-score. Specifically, I used principal component analysis to extract the first unrotated principal component factor based on scores from the 10 tests. This component, which accounted for 67.0% of the observed score variance, is reported in a *z*-score metric with a mean of 0 and standard deviation of 1. Prior research has shown that this method of estimating *g* produces estimates that correlate almost perfectly with estimates derived from other methods when sample sizes are over 400 (Reeve & Blacksmith, 2009).

2.2. Follow-up measures (2010)

2.2.1. Educational attainment

The highest degree received was self-reported by participants in 2010. This variable was coded as a 6-level ordinal variable as follows: 0) < high school, 1) high school diploma or GED, 2) associate's degree, 3) bachelor's degree, 4) master's degree, or 5) terminal degree (e.g., PhD, JD, MD).

2.2.2. Adult income

Participants reported their annual personal income in 2010. This variable was rescaled to units of $10,000.

2.2.3. Number of offspring

Based on participant self-report of number of biological offspring.

3. Methods

All analyses were completed using SPSS v. 21. Means, standard deviations and correlations were found for all variables. To formally analyze the unique and potential joint association of each form of status and sex with number of offspring, Poisson regression analyses were performed. Poisson regression is preferable to OLS regression with count data such as these (number of offspring) with a low mean (Coxe, West, & Aiken, 2009). The Poisson regression model expresses the natural logarithm of the event or outcome of interest as a linear function of a set of predictors, as follows:

$$\mathrm{Ln}\left(\hat{\mu}\right) = b0 + b1\,x_1 + b2\,x_2 + b3\,x_3 + \ldots b_p x_p$$

The Poisson regression predicts not counts of predicted offspring, but the natural log of the count of predicted offspring. Coefficients (b) can be interpreted as the change in $\mathrm{Ln}\left(\hat{\mu}\right)$ given a one unit change in x.

For illustrative purposes, the relationships between income and predicted number of offspring for men and women were also calculated using OLS regression and graphed. In addition, the predicted numbers of offspring by personal income within educational categories were calculated using OLS regression and graphed for men and women separately. The calculation for the graphs is based on OLS regression, which is less suitable than the Poisson regression analysis for the type of count data utilized here. However, Poisson regression predicts outcomes as natural logs, which can be exponentiated to create predicted count outcomes and these outcomes graphed, but the results are curvilinear and resulting graphs are less clear.

4. Results

Descriptive statistics and zero-order correlations among primary variables in the NLSY79 are shown separately for males and females in Table 1. As expected, males report a higher annual income on average,

Table 1
Descriptive statistics and zero-order correlations among primary variables, NLSY79.

	Females		Males						
	M	SD	M	SD	1	2	3	4	5
Baseline measures									
1. *g*	−.13	.90	.14	1.03		.15	.57	.30	−.15
Outcomes in 2010									
2. Age	48.66	2.23	48.51	2.27	.20		.02	−.02	.02
3. Education level	1.66	1.17	1.57	1.21	.58	−.01		.38	−.15
4. Income	3.15	3.89	5.93	6.82	.39	.01	.49		−.15
5. NoO	1.86	1.37	1.65	1.43	−.06	.01	−.03	.08	

Note. '*g*' = general cognitive ability (in *z*-score metric). NoO = Number of offspring. Income has been re-scaled to units of $10,000. Education level was coded as a 6-level ordinal variable as follows: 0) < high school, 1) high school diploma or GED, 2) associate's degree, 3) bachelor's degree, 4) master's degree, or 5) terminal degree (e.g., PhD, JD, MD). Correlations for female sample are above the diagonal; correlations for males below the diagonal.