Extended Kinship Networks, Socioeconomic Resources, and Reproductive Behavior during the Demographic Transition

Heidi A. Hanson1[1,2]
Thomas N. Maloney[3]
Ken R. Smith[2,4]

We wish to thank the Pedigree and Population Resource of the Huntsman Cancer Institute, University of Utah for providing the data and valuable computing support. This work was also supported by NIH grant AG022095 (Early Life Conditions, Survival and Health; Smith PI).

[1] Department of Sociology, University of Utah. Email address: Heidi.hanson@hci.utah.edu
[2] Huntsman Cancer Institute, University of Utah
[3] Department of Economics, University of Utah
[4] Department of Family and Consumer Studies, University of Utah

Introduction

Classic demographic transition theory argues that industrialization and urbanization leads to a decline in mortality that ultimately results in fertility decline. However, demographers generally agree that fertility decisions have varied over time and space and that the initiation and rate of fertility decline may be the result of a combination of prevailing forces that include economic imperatives (changes in wages and in wealth flows), ideational change, and the influence of cultural settings and diffusions. This study will take advantage of a unique database with information about kinship structure and measures of fertility and socioeconomic status to develop an innovative approach to understanding the relationship between reproductive behavior and social interaction and social resources available in kinship networks during a period of fertility transition on the American Frontier.

Kohler has suggested that reproductive behavior of actors in a community are interdependent and that studies of fertility transition should incorporate the role of social networks (Kohler, 2001). Kinship networks are among the possible social networks that may play a role in fertility decisions. The family is a social institution that not only shapes values, choices, and behavior, but shares economic constraints and resources. It has been described as the "primary locus" for the transmission of fertility-determining behavior (Anderton, Tsuya, Bean, & Mineau, 1987) and is an intermediate level variable that mediates between the macro-level of modernization and development and the micro-level of utility maximization. Many studies of intergenerational transmission of fertility behavior find weak positive associations between the fertility of parents and their children and this relationship may increase over time (Anderton et al., 1987; Murphy, 1999). However, little attention has been given to the role of

extended kinship networks, including in-laws, aunts/uncles, parents, cousins, and siblings, and their socioeconomic resources in determining reproductive behavior over time.

The Utah Population Database (UPBD) has proven to be a unique resource for describing family formation and change from the 19th century to the present time. Early studies of fertility transition in this population focused on the relationship between changing socioeconomic environments across the state and fertility transition (Bean, Mineau, & Anderton, 1990). More recent studies have adopted a more micro-level analysis in an attempt to further describe heterogeneity between groups in the timing, method (i.e., delayed marriage, birth spacing, and truncation), and rate of fertility decline.

Jennings et al. (2012) investigated the intergenerational transmission of reproductive behavior during the 19th century for this population. This study is based on the importance of kin in the transmission of fertility related attitudes and behaviors. Through this framework, fertility practices and attitudes are thought to be transmitted directly from mother to child through learning of ideas, norms, and behaviors that affect fertility or indirectly through the intergenerational transmission of socioeconomic status and education. This study yielded interesting results supporting the intergenerational transmission of reproductive behavior and evidence that mothers and mothers-in-law in close geographical proximity lend social support and increase the odds of giving birth in each birth interval. However this study did not address the role of socioeconomic status or extended kin networks.

We recently presented evidence of variation in the onset and rate of fertility decline by occupational status during the mid-19th and early 20th century in Utah (Maloney et al. 2012). In this micro-level approach we suggest that the demand for children, and the change in the utility function over time, varies by occupational status of the husband. We found that cohort trends in

the reproductive behavior of white-collar workers deviated significantly from those of farmers. During the fertility transition, white-collar workers had faster increases in the age at first birth and time to first birth, faster declines in age at last birth, and faster rates of decline in number of children ever born compared to farmers. While these results are intriguing, they do not account for the role kinship networks in determining reproductive behavior.

The purpose of this paper is to address the following questions:

1) Do socioeconomic resources in extended kin networks affect reproductive behavior during a period of fertility transition in Utah?
2) Does this effect vary by geographic proximity of kin?

Data

This study relies on data drawn from the UPDB, a comprehensive health research database containing linked demographic, medical, and genealogical data spanning the Utah population over the last two centuries. The 1880 Census of Utah Territory provides information on socioeconomic status (SES) and geographic location for the entire population at a fixed point in time and has been linked to the UPDB, a source of rich genealogical data. Approximately 70 percent of individuals reported in the household census link to family records, allowing us to construct detailed information on the SES and geographic proximity of kin. For this study we selected 23,216 once married, parous individuals between the ages of 15 and 50 that completed fertility (lived to age 50) and had sufficient familial, occupation, and follow-up information.

While the data held within UPDB are extensive, given the historic period under investigation, birth information will be based on genealogical records. Measures of fertility history will include parity, age at first birth, age at last birth, and birth spacing for males and females.

In 1880, the enumerators were instructed to report a detailed occupation and industry for all individuals over the age of ten. Individuals were asked to report their profession, occupation, or trade as well as the number of months of unemployment during the census year. Usual occupation and industry information from the 1880 US Census have been converted to Nam-Powers socioeconomic index scores (NP-SES) (C. Nam & Boyd, 2004; C. B. Nam & Powers, 1983), with scores ranging from 0 to 100. This score can be interpreted as the percentage of individuals in the labor force with occupations having a combined level of education and earnings below that occupation. SES at the individual level was operationalized as the maximum reported SES between husband and wife pair. NP-SES was mean imputed for individuals missing or uncodable occupation with a dummy variable for missing NP-SES (15% of the female sample and 11% of the male sample were missing NP-SES. A large number of men over the age of 15 were farmers during this period (26.4%), resulting at a large heaping at these values. Accordingly, we have created a dummy variable identifying farmers.

The genealogical information in UPDB allows us to identify the first and second degree relatives of individuals in our sample. Several measures of SES in the kinship network will be considered including the average, maximum, and variation in socioeconomic resources of first and second degree relatives over the age of 15. Information from the 1880 Census also allows us to construct measures of geographic proximity of kin. Using household number and enumeration district and location, we are able to construct measures of SES of kin weighted by geographic proximity.

In addition to SES, we are able to control for other potential confounders including affiliation with the Church of Jesus Christ of Latter-day Saints (LDS), urban/rural residence, birth year, and number of children deceased before age 18.

Analysis

The results presented in this extended abstract are preliminary and largely descriptive. Table 1 shows the sample means by sex (N_{Female}=13,039, N_{Male}=10,262). The average age in 1880 is 28.9 for females and 27.9 for males. On average, individuals in this sample had 8.7 children. For individuals with a NP-SES, the average score is 28.9 for females and 25.9 for males. Approximately 5% of females and 4% of males did not have any siblings over the age of 15 at the time of the 1880 Census.

We used linear regression models to examine the association between sibling NP-SES and reproductive behavior. Figures 1 and 2 shows the average number of children ever born (CEB) by gender and quartile of average sibling SES when controlling for own SES and birth year. We find that females with high NP-SES kin (Q4) have significantly lower number of CEB than females with low NP-SES kin (Q1) (p<0.01). We find similar results for the men. While males with relatives in Q2 or Q3 have higher average CEB compared to Q1, these differences are not significant. Poisson models with robust standard error to correct for familial clustering were also estimated and the results support the findings presented in Figure 1. These results show that the socioeconomic resources of kin affect fertility independently of individual level NP-SES.

Figure 3 shows the average age at first and last birth for females and males for individuals in the bottom 25% (Q1) and top 25% (Q4) of the distribution of kin NP-SES when controlling for own NP-SES and birth year. We find that females with high SES kin on average have a later age at first birth and a younger age at last birth, *ceteris paribus.* For males, SES of kin does not affect age at first or last birth.

Table 2 shows the geographic proximity between an individual in this sample and their mother in 1880. We find that approximately 20% of females and 34% of females in this sample live in the same house as their mother.

For the PAA conference we plan to further investigate how extended kinship networks and the socioeconomic resources of kin affect reproductive behavior during a period of fertility transition on the American Frontier. We will use Cox Proportional Hazard models to test the effect of socioeconomic resources of kin on timing and spacing of children. We will expand our analysis to include SES of parents as well as second degree relatives. We will also test for differences in the size of the effect of socioeconomic resources of kin by geographical proximity.

References

Anderton, D., Tsuya, N., Bean, L., & Mineau, G. (1987). Intergenerational transmission of relative fertility and life course patterns. *Demography, 24*(4), 467-480. doi: 10.2307/2061386

Bean, L. L., Mineau, G. P., & Anderton, D. L. (1990). *Fertility change on the American frontier: Adaptation and innovation* (Vol. 4): University of California Press.

Jennings, J. A., Sullivan, A. R., & Hacker, J. D. (2012). Intergenerational Transmission of Reproductive Behavior during the Demographic Transition. *Journal of Interdisciplinary History, 42*(4), 543-569. doi: 10.1162/JINH_a_00304

Kohler, H.-P. (2001). *Fertility and social interaction: an economic perspective*: Oxford University Press, USA.

Murphy, M. (1999). Is the relationship between fertility of parents and children really weak? *Biodemography and Social Biology, 46*(1-2), 122-145. doi: 10.1080/19485565.1999.9988991

Nam, C., & Boyd, M. (2004). Occupational Status in 2000; Over a Century of Census-Based Measurement. *Population Research and Policy Review, 23*(4), 327-358. doi: 10.1023/B:POPU.0000040045.51228.34

Nam, C. B., & Powers, M. G. (1983). The socioeconmic approach to status measurement: With a guide to occupational and socioeconomic status scores. *Cap and Gown Press: Houston*.

Table 1. Descriptive Statistics by Sex

Variable	Female			Male		
	N	Mean	Std Dev	N	Mean	Std Dev
Age in 1880	13,003	28.94	9.86	10,213	27.94	9.73
Birth Year	13,003	1850.45	10.00	10,213	1851.45	9.85
Number of Children Ever Born	13,003	8.72	3.20	10,213	8.71	3.31
Age at First Birth	13,003	21.19	4.06	10,213	26.01	5.20
Age at Last Birth	13,003	39.15	5.30	10,213	43.93	6.58
SES: Nam-Powers 1950	11,090	28.85	21.98	9,139	25.88	20.14
Number of Siblings Age 15+ in 1880	13,003	1.96	1.92	10,213	2.16	1.94
Average Sibling SES	12,328	27.92	17.65	9,819	26.76	16.88
Maximum Sibling SES	12,328	37.98	24.62	9,819	36.93	24.11
Minimum Sibling SES	12,328	20.35	17.47	9,819	19.28	16.55

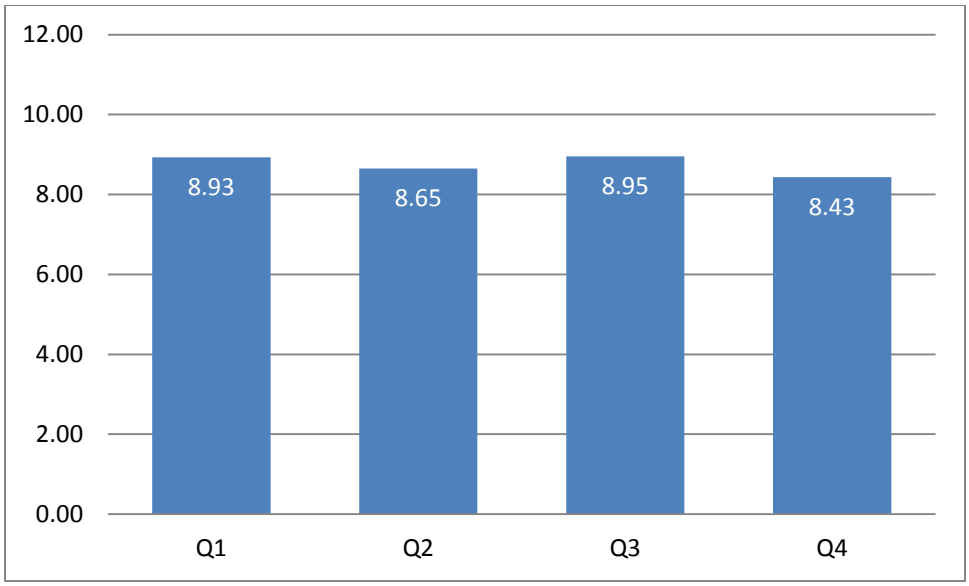

Figure 1. Female: Number of Children Ever Born by Quartile of Kinship NP-SES controlling for own NP-SES and birth year.

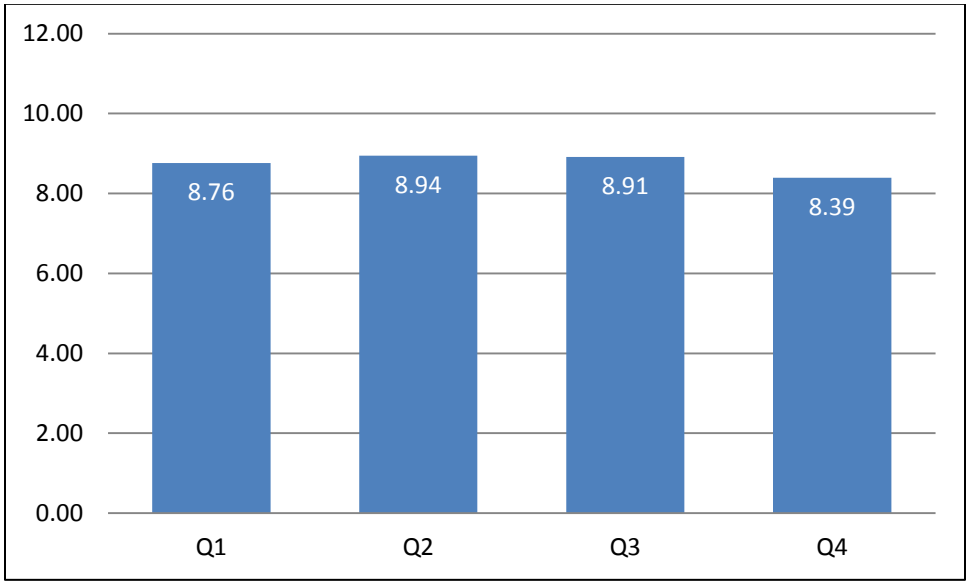

Figure 2. Male: Number of Children Ever Born by Quartile of Kinship NP-SES controlling for own NP-SES and birth year.

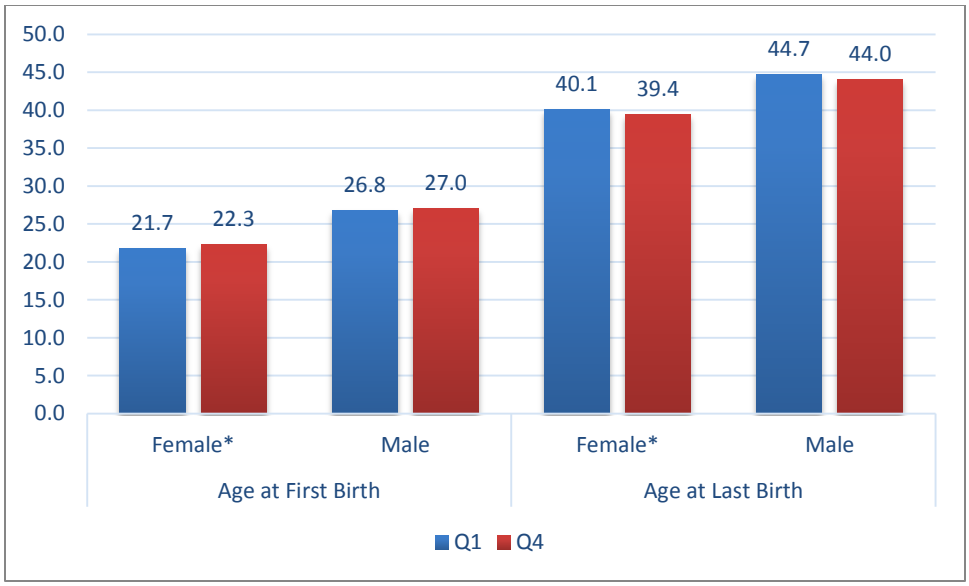

Figure 3. Average Age at First and Last Birth by Quartile of Kinship NP-SES controlling for own NP-SES and Birth Year.

*** p<0.05**

Table 2. Geographic Proximity of Individual in our Sample to their mother.

	Live in in Same House		Live in Same Neighborhood**		Live in Same District		Live in Same City		Live in Same County	
	N	% of Total	N	% of Total	N	% of Total	N	% of Total	N	% of Total
Female	2562	19.70%	500	3.85%	1245	9.57%	159	1.22%	371	2.85%
Male	3438	33.66%	425	4.16%	754	7.35%	77	0.75%	179	1.75%

*All categories are mutually exclusive. All categories are not shown in this table.

** Neighborhood is defined as within 5 houses of relative.