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I. Introduction

In Canada, as in many Western countries, men's fertility has not been extensively studied as fertility or reproduction has been mainly taken as women's concern (Goldscheider and Kaufman, 1996). However, recent socio-demographic changes have put men's fertility to the fore. These changes include high divorce and cohabitation rates, increased participation of women in the labour force, and the shift from family to individual wage rates, each affecting gender division of labour that places more responsibility on men for children rearing. This paper aims at a better understanding of the roles that men play in reproduction and consists mainly of two parts. The first describes the levels and timing of men's fertility and the second explores factors affecting fertility. Before these two parts, we discuss the data and methodology. The final section mentions further research on men's fertility that we intend to do.

II. Data and Methodology

The study uses the 1995 General Social Survey of the Family that collected retrospective data on individuals and their families including marital and fertility histories from 10,750 men and women aged 15 and older residing in Canada, excluding residents of institutions and the Territories. In most of our analysis, we focus on the sample of men born in 1921 to 1970 (aged 25 to 74 as of the survey date) consisting of 3,930 respondents. We make use of both the main and children's public use micro-data files. The former contains information on the respondents and the latter has information on their children, in particular, the age of respondent at the birth of each child, the information necessary for estimating the levels and timing of fertility.

For estimating levels of fertility, we computed the **age-specific fertility** rates for each of the 10-year birth cohorts as follows: From the children's file, we obtained the number of births by 5-year age groups (15-19, 20-24 ..., 60-64) for each cohort of men and women. Since each respondent, regardless of marital status, was asked about his/her children, we divided the number of births in each age group by the number of respondents in each cohort (obtained from the main file) to get estimates of age-specific fertility rates for both men and women. The discussion of results focuses mainly on fertility of men with women's fertility used mainly for comparison of completeness of reported births.

For summary measures of the timing of fertility, we made **life tables of age at birth of first child** for each of the 10-year birth cohorts of men, which provided the median ages at first birth and the cumulative proportion surviving the risk of first birth. Sample weights were used for this procedure[1].

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[1] Weights were not used for the estimation of the age-specific fertility rates as no weights were included in the children's file.

To explore the effects of certain factors on the timing of first birth, we did **hazards analysis** (Cox regression procedure) of age at first birth using a set of explanatory variables, all of which are categorical, except for the factor score used to indicate family-oriented values. The theoretical framework, models and the variables are discussed below.

III. Fertility Levels and Timing

Gender Difference in Fertility

Figures 1 and 2 present estimates of age-specific fertility rates. These estimates are most likely under-estimated with under-estimation more serious for men than for women. About 5% of children had missing information on the age of respondent at birth of child. Moreover, like the survey data on fertility in Britain and the United States, the1995 General Social Survey (GSS) suffers from under-count particularly of non-marital births and births in unions subsequently dissolved (Rendall et al, 1997). Juby and Le Bourdais (1999) contend that the under-reporting in the 1995 GSS is greater than the 2% usually cited in the literature and that this is more severe in the case of fathers who do not have frequent contacts with non-(co)resident children. To get better estimates, we await the release of the more recent survey on the family, the 2001 GSS, which we expect to have more complete data on children.

In spite of this limitation, the results of our analysis are adequate for interpreting general trends. Figure 1 shows the age-specific fertility rates of men and women born in 1931-40 and the total fertility rates for three 10-year birth cohorts. The differences in the age-specific and total fertility rates between men and women reflect the undercount of children on the part of men but also what Coleman (1995) notes as the generally greater number of men than women (the denominators) at younger ages. As in other Western monogamous societies (for example, France and Denmark discussed by Coleman (1995)), Canadian men's age specific fertility rates peak at a later age and is more spread out over later age groups. These differences reflect the older age at marriage of men and the biological difference that allows men to have children at older ages. Would the increase in divorce rates coupled with men having higher propensity to remarry (and most often remarry women younger than they are) lead to larger gender difference in fertility rates at later ages? While this is possible, so far, among the 1951-60 birth cohorts with higher divorce rates, the gender difference is no greater than in the previous cohorts (results not shown here).

Trends over Cohorts: Continuing Decline of Men's Fertility

Figure2 shows that the transition to low fertility occurred with men born in the 1940s - the cohort that includes the baby boomers. Compared to the preceding birth cohort (1921-30), this cohort's fertility was higher in their early 20s but lower in all other age groups,

translating into fewer children per person. Many in the next cohort (1951-60) delayed fathering in their 20s but caught up with the 1941-50 birth cohort when they reached their 30s and 40s. The effect of serial monogamy on fertility would be best observed (hopefully, with data collected through the 2001 GSS) among these cohorts when they divorced, remarried and possibly had more children as they moved on toward their late 40s and 50s.

Men's fertility decline is greatest at peak ages of fathering; that is, at ages 25 to 34. The age specific fertility rate of the 1961-70 birth cohort at age 25-29, for example, is half that of the 1921-30. While the estimated rate for this youngest cohort will certainly increase (as some of these young men's fertility was curtailed by censoring), the rate will most likely not be higher than that of the 1951-60 birth cohort. It is however possible that birth recuperation will occur at older ages; that is, those who postponed fathering in their 20s may yet do so at later ages.

Postponement of Fatherhood: Increasing Age at First Birth

While the change in fertility is seen in the overall decline in levels, there has been a conspicuous change in the timing of fertility as well. Figure 3 presents men's median ages at birth of first child and cumulative proportion surviving the risk of first birth. Both indicators show that the timing of fatherhood has changed significantly for cohorts born between 1920 and 1970. As documented in the study of life courses of women, ages at marriage and consequently at birth of first child, were high early in the 20th century but subsequently declined until the mid 1960s (Gee, 1986; Ravanera, Rajulton, and Burch, 1998). This is the case with men as well - the age at first birth among the 1921-30 birth cohort was high (median age of 28.6) but decreased in the two succeeding birth cohorts with median age hitting the lowest of 27.0 among the 1941-50 birth cohort. However, a reversal of this trend occurred such that for the 1961-70 cohort, the median age has reached 31.2 years.

IV. Factors Affecting the Timing of First Birth

The Economic Influence on Fertility

In an extensive analysis of men's fertility, Kaplan, Lancaster and Anderson (1998) used a theoretical framework that combines life-history theory from Biology and human capital and fertility theory from Economics to explain industrial societies' low level and delayed onset of fertility. The theory draws on investment decision model depicting trade-offs that individuals make between current survival and future reproduction and between quantity and quality of children. To explain the dramatic decrease in fertility in European countries over the past 100 years, the "theory proposes that payoffs to investment in education increased radically with the emergence of labor markets and technological growth spurred by the industrial revolution. As a result, parents lowered fertility to invest in more skilled children" (Kaplan, 1997: 201). The empirical analysis of men's fertility in Albuquerque, New Mexico by Kaplan and associates shows negative impact of

education on fertility and that the effect has increased through time (Kaplan et al, 1998). They also showed that the timing of the onset of fertility is later for those with higher education.

In this study, we included three variables to capture the economic rationale for fertility – or, more specifically the timing of first birth. These variables are education of respondent's mother, respondent's own education, and respondent's personal income[2]. Mother's education[3] is a socio-economic status variable and is used as a proxy for parental investment while respondent's education indicates individual investment to acquire human capital. The latter could also be an indicator of parental investment as far as parents provide help for respondent's education. Following Kaplan's investment theory, mother's and respondent's education would have negative effect on fertility and in as much as education is positively related to personal income, the theory predicts that income would also be negatively related to fertility.

Before discussing our results, we take note that both investment theory and Cox hazard model require that covariates be measured as of the time of the event of interest but social surveys, including the 1995 GSS, often measure socio economic covariates as of the time of survey. Thus, we can make inferences only on the "association" rather than "effects" between socio-economic characteristics and the event of interest.

Table 1 presents the result for birth cohorts grouped into 1921-40, 1941-60 and 1961-70 cohorts. Model 1 shows that both mother's and respondent's education have the predicted negative association on timing, that is, the higher the education, the lower is the risk of first birth (shown by the negative beta coefficient), which translates to a later timing of fathering. However, mother's and respondent's education have significant association only for the youngest cohort, 1961-70. For the next older cohort (1941-60), only the respondent's education has the expected association and for the oldest cohort, neither mother's nor respondent's education has a significant relation. This is consistent with the investment theory's proposition that effect of education on fertility would be greater in recent times than in the past mainly because of education's increasing return on investment.

Contrary to investment theory, personal income as measured at the time of survey has highly significant positive association on fertility in all three cohorts (Model 1). But, in Model 2, wherein we included the marital status variable, personal income no longer has a significant association whereas those of mother's and respondent's education persist. This is an indication that personal income's effect on the timing of first birth is not direct; rather it operates through family formation. Married men, who are more likely to have their first child earlier than the non-married (common-law, widowed/ separated/ divorced,

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[2] Initially, we also considered three other economic variables: father's education and respondent's types of occupation and work status (employed or unemployed), but found them to be unrelated or weakly related to the timing of birth of first child.
[3] There were many respondents who did not provide information on their mother's education; we therefore included a "missing" category in order not to exclude them from the analysis.

single), have higher personal income than those who are not[4]. Moreover, a hazard model of age at first marriage with only respondent's education and personal income as explanatory variables indicates that personal income increases the risk of marriage (results not shown here).

The story that the findings on education and income seem to tell is that fertility is postponed as men (and their parents) invest resources (time and financial capital) on accumulating human capital. But, having acquired a certain level of human capital (that is, having reached a certain level of education) men with more resources get to marry earlier, which then translates to earlier age at first birth.

Socio-Cultural Influences on Fertility

Thus far, we have discussed the economic variables and parts of results of Models 1 and 2. To proceed with the discussion of the results of the socio-cultural variables and the results of Model 3, we introduce a variable that we label "family-oriented values".

Investment theory assumes economic rationality in fertility-decision making. Fertility, however, is not just a product of rational economic calculation but is also influenced by non-economic factors such as norms and values. To explore this influence, we make use of information gathered on three attitudinal variables - importance of relationships, importance of having at least one child, and importance of marriage. Table 2 presents the results of factor analysis and shows that the three variables have high loadings on one component and that this component explains 62% of the variations, which makes the factor score derived for this component a reasonably good indicator of family-oriented values. The mean factor score by cohort and gender (also shown in Table 2) indicates that the importance of family has declined over cohorts of both men and women, which is most probably one reason for the decline of fertility over cohorts noted in the descriptive part of this paper. (While there are differences by gender as well, this will not be further pursued in this paper.)

Returning to the hazards model of analysis (Table 1), we have included religion and migration status to capture some of the socio-cultural influences on fertility[5]. Model 1 shows that compared to those who profess no religion, Roman Catholics and Protestants are more likely to have a first child at younger ages. Including marital status in the model (Model 2) decreases the effect of religion[6]. This is true for the two younger cohorts (1961-70 and 1941-60). For the oldest cohort, religion does not show a significant effect in Model 1 but indicates a negative though weak relation when marital status is controlled. For all the cohorts then, but more specifically for the two younger ones, this

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[4] This comes from the results of the cross-tabulation of personal income and marital status (not shown here).
[5] In our initial analysis, we included frequency of attendance in religious functions and the language first learned, but found that they did not contribute much to the explanation of the risk of first birth.
[6] We use the term "effect" here in the assumption that not many would have changed religion between first birth and the survey.

indicates that compared to those with no religion, Roman Catholics and Protestants are more likely to be married, which consequently means a higher risk of fathering a first child.

The effect of religion is mediated through family-oriented values as indicated by the results of Model 3 but mainly for the older cohorts, the 1941-60 and 1921-40 birth cohorts that show a change in the sign of the coefficient of the religion variable. However, the magnitude of the coefficients of the marital status variables changed between models 2 and 3 for all three cohorts, signifying that some of the effect of family values on fertility occurs through family formation.

Taking together the results in all three models for the variables religion, marital status, and family-oriented values, the socio-cultural influences may be summed up as follows: Catholics and Protestants tend to marry and thus to have their first child at younger ages than those who profess no religion. Religion also affects fertility through family values; that is, compared to those with no religion, Catholics and Protestants place greater importance on families that translates to earlier age at having a first child. Moreover, family values have direct positive impact on fertility regardless of religion or marital status.

The association between fertility and migration status (that is, Born in Canada or Immigrants) is mainly seen in the oldest and youngest cohort but the coefficients are opposites. Among the 1961-70 birth cohort, immigrants have higher risk of having a first child whereas for the oldest cohort (1921-40), immigrants have lower risk (Model 1). The introduction of marital status variable (Model 2) alters the coefficients of migration status but the inclusion of family-oriented values (Model 3) barely alters the coefficients in Model 2. The opposite effects between the youngest and eldest cohorts likely reflect the origins of migrants. In the past (captured by migration status among the 1921-40 birth cohorts), the main sources of immigrants were the European countries, with traditionally higher ages at marriage. The more recent immigrants are from "non-traditional" sources mainly from Asia (such as India, China, and the Philippines), Latin America, and the Caribbean, who may have the tendency to marry and subsequently have a first child at younger ages than those born in Canada.

In addition to economic and socio-cultural variables, we also have included cohorts and region as control variables. The coefficients of cohort variables capture the differences already seen in Figure 3. As for the region, its inclusion recognizes the regional differences in economic and socio-cultural conditions in Canada. The Atlantic region stands out in that its economy is the least vibrant and family orientation, the strongest. It is therefore not surprising that men's risk of having first birth is higher in this region than any other part of the country particularly in the two younger cohorts.

V. Conclusion

Some of the findings of this study are not unique to men. From studies of women's fertility and marriage patterns, we know that fertility has significantly declined over cohorts and that younger cohorts have substantially delayed the onset of parenthood. Nevertheless, it is important to study men's fertility for the implied message that men are as important as women are in the reproductive process. Moreover, bringing one's attention to the under-reporting of children by men underscores issues pertaining to children of non-marital unions and non-intact families.

The study of factors affecting men's fertility highlights the importance of economic rationale in the decision-making process and the socio-cultural influences bearing upon the timing of the onset of fathering. However, we still have a long way to go in understanding men's fertility in Canada. The factors affecting fathering of first child may not be the same as those for the second and subsequent children. These may differ as well among orders of cohabiting unions or marriage; say between first marriage and re-marriage. Finally, trajectories leading to births of children through domains of education, work, and marital unions need to be examined as well.

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Figure 1: Age-Specific Fertility Rates by Gender
1931-40 Birth Cohort, 1995 General Social Survey

Estimated Total Fertility Rates

Cohort	Men	Women
1951-60	1.5	1.7
1941-50	1.8	2.1
1931-40	2.4	3.0
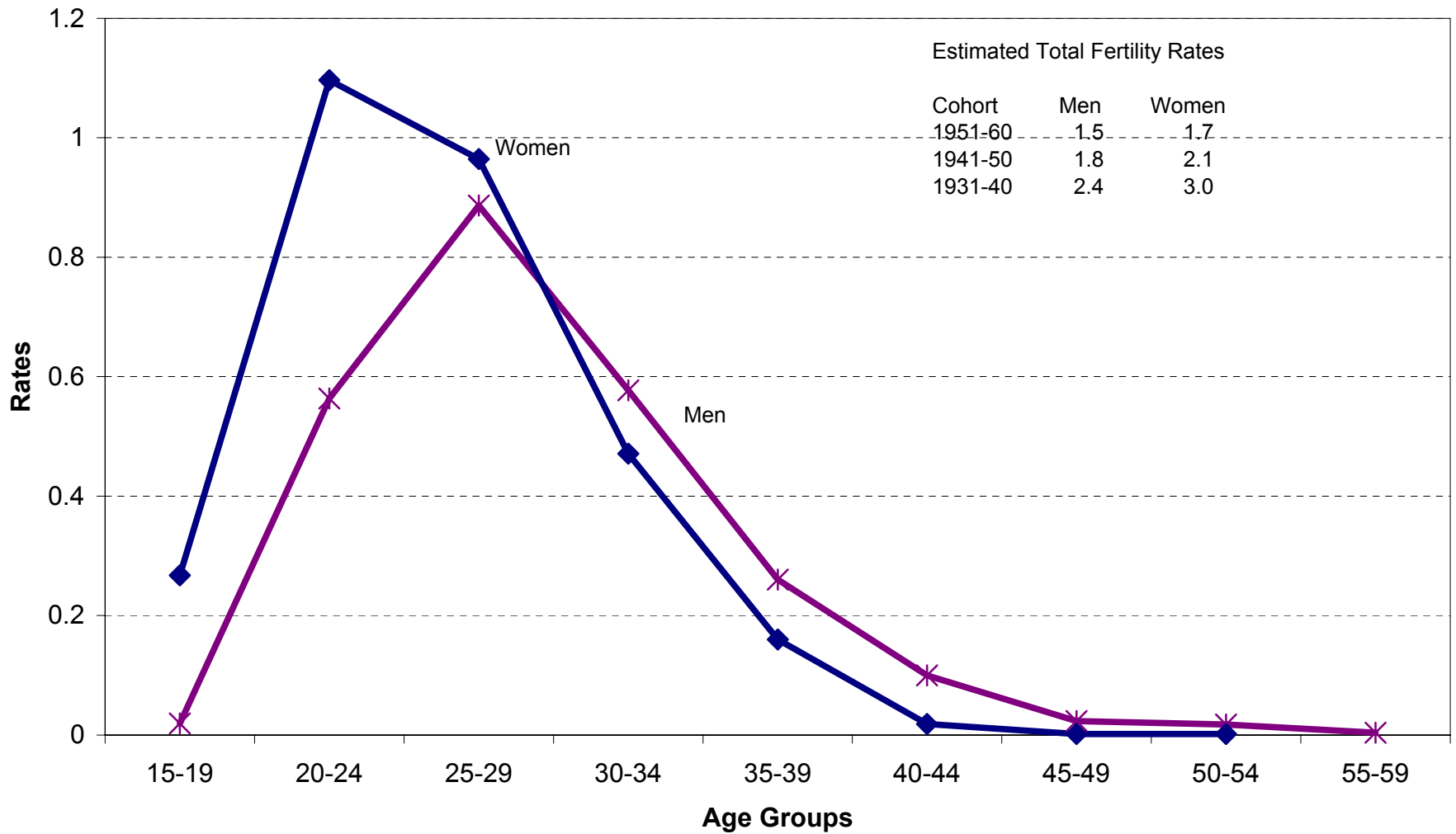
**Figure 2: Men's Age-Specific Fertility Rates by 10-Year Birth Cohort
1995 General Social Survey**
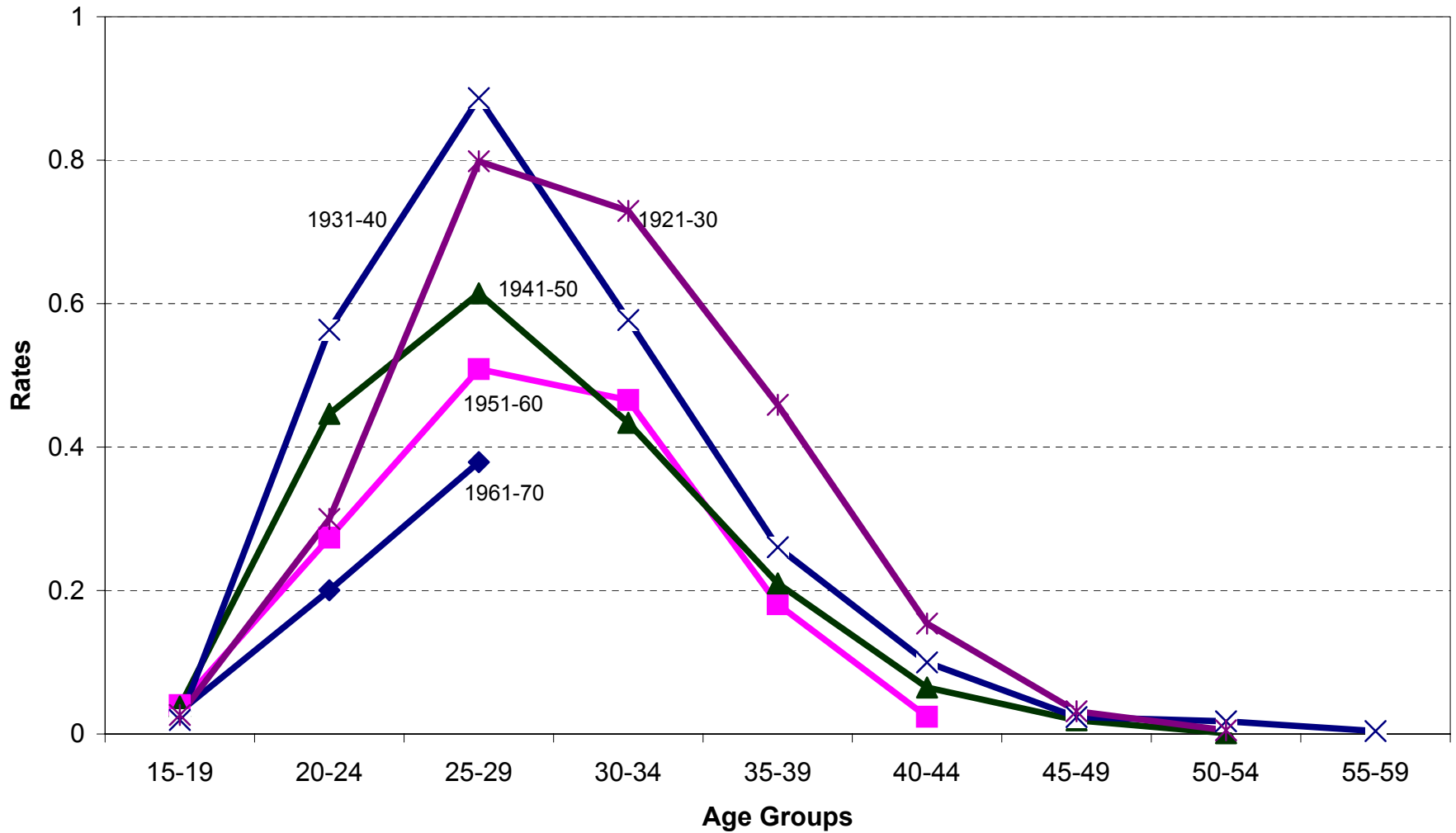
**Figure 3: Cumulative Proportion Surviving Risk of First Birth
By Birth Cohorts, Men, 1995 General Social Survey**

**Median Ages at Birth
of First Child**

1921-30 28.6
1931-40 27.4
1941-50 27.0
1951-60 29.6
1961-70 31.2

Proportion

Age

1961-70   1951-60   1941-50   1931-40   1921-30
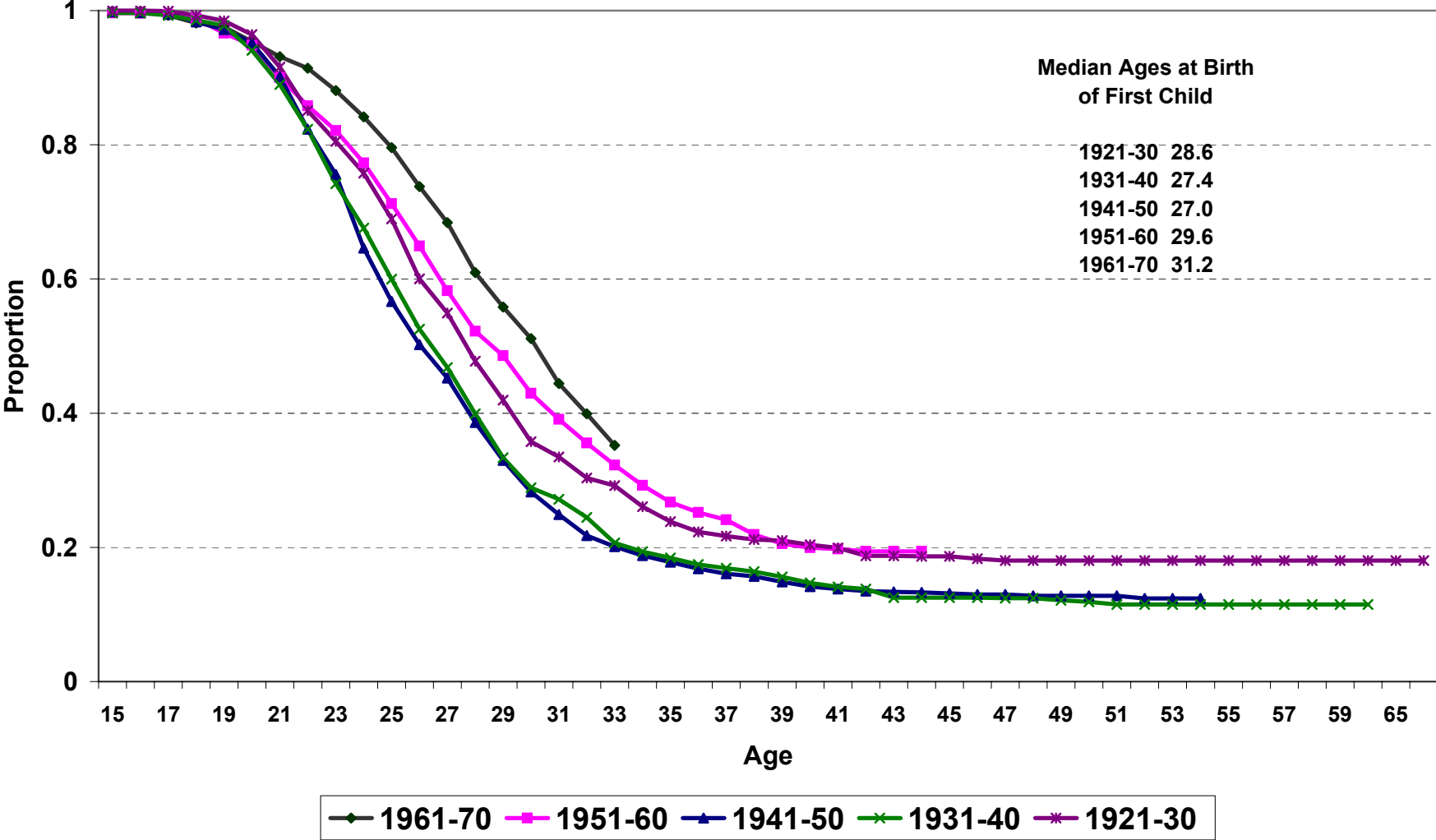
Table 1: Results of Hazards Analysis of Timing of First Birth by Birth Cohorts
Men, 1995 General Social Survey

	Birth Cohorts 1961 - 1970			Birth Cohorts 1941-1960			Birth Cohorts 1921-1940		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff
Mother's Education									
Elementary ®									
High School	-0.2051	-0.2456 *	-0.228 *	-0.0314	-0.0652	-0.0482	-0.0157	-0.0615	-0.0689
College / University	-0.414 ***	-0.3552 **	-0.3412 **	-0.098	-0.1969 **	-0.1881 **	-0.08	-0.0903	-0.1151
Missing	-0.0821	-0.13	-0.0827	0.0721	0.0029	0.0272	-0.0224	-0.0549	-0.0333
Respondent's Education									
Some High School ®									
High School Graduate	-0.5045 ***	-0.3882 **	-0.3945 **	-0.0437	-0.1088	-0.1043	0.1678	0.1938	0.2097
Some College	-0.4856 ***	-0.3681 **	-0.3934 **	-0.1802 **	-0.2319 ***	-0.2381 ***	0.1186	0.0661	-0.0021
College/University Grad	-0.6675 ***	-0.5852 ***	-0.6216 ***	-0.2353 ***	-0.2845 ***	-0.2855 ***	-0.0706	-0.0612	-0.0532
Personal Income									
Less than $20,000 ®									
$20,000 - $49,999	0.5712 ***	0.059	0.1043	0.1933 **	-0.05	-0.0409	0.3421 ***	0.162	0.136
$50,000 or higher	0.7296 ***	0.1064	0.1567	0.4304 ***	0.0398	0.0439	0.3014 **	0.1568	0.1298
Missing	0.3282 *	-0.0668	0.0179	0.0668	-0.1461	-0.1503	0.1643	-0.0169	-0.039
Religion									
No Religion ®									
Roman Catholic	0.2764 *	0.1617	0.1141	0.2926 ***	0.186 **	0.1318	0.176	-0.2848 *	-0.3242 **
Protestant	0.4323 ***	0.2166	0.1977	0.3077 ***	0.1997 **	0.1385	0.2302	-0.269 *	-0.3257 **
Other Religion	-0.2305	-0.4831	-0.4665	0.0811	-0.0555	-0.1335	-0.1422	-0.4777 **	-0.5198 **
Migration Status									
Born in Canada ®									
Immigrant	0.2956 **	0.1539	0.1805	0.0236	-0.0391 0.63	-0.0244	-0.1792 *	-0.2794 ***	-0.2872 ***
Region									
British Columbia ®									
Atlantic	0.3939 **	0.2672	0.2446	0.3217 ***	0.1931 **	0.2017 **	-0.1106	-0.1026	-0.0854
Quebec	-0.1524	0.0487	0.0821	-0.019	0.0177	0.0659	-0.2797 *	-0.2703 *	-0.2083
Ontario	0.0641	0.079	0.0589	0.1647 *	0.0823	0.1098	-0.273 *	-0.2388 *	-0.1548
Prairies	0.1861	0.1963	0.1641	0.0879	0.077	0.0966	-0.264 *	-0.2247	-0.1883

Table 1 (Cont'd): Results of Hazards Analysis of Timing of First Birth by Birth Cohorts
Men, 1995 General Social Survey of Families

	Birth Cohorts 1961 - 1970			Birth Cohorts 1941-1960			Birth Cohorts 1921-1940		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff	B Coeff
Cohort									
1951-60 ® 1931-40 ®									
1941-50 1921-30				0.1686 ***	0.0794	0.096 *	-0.2433 ***	-0.2914 ***	-0.3093 ***
Marital Status									
Married ®									
Common-Law		-0.6664 ***	-0.4927 ***		-0.5258 ***	-0.3807 ***		-0.3651 *	-0.1934
Wid/Sep/Div		-0.0724	0.1274		-0.2723 ***	-0.121		-0.1179	-0.1062
Single		-2.2378 ***	-2.0413 ***		-2.7758 ***	-2.5405 ***		-3.2343 ***	-2.7181 ***
Family-oriented Values			0.1849 ***			0.1586 ***			0.2105 ***
N	1045	1045	1009	1876	1876	1811	831	831	782
Percent Censored	54.6%	54.6%	52.2%	22.9%	22.9%	21.4%	16.4%	16.4%	14.2%
-2 Log Likelihood	5741.13	5490.59	5339.07	19806.46	19258.35	18651.68	8315.89	8123.86	7690.65

Table 2: Results of Factor Analysis of Family-Oriented Values
Men and Women, 1995 General Social Survey

Panel A: Factor Extraction
Total Variance Explained

Component	Initial Eigenvalues Total	% of Variance	Cumulative %
1	1.874	62.466	62.466
2	0.668	22.257	84.723
3	0.458	15.277	100

Panel B: Factor Loadings
Component Matrix

	Component 1
Importance of having relationship	0.7680
Importance of being married	0.8465
Importance of having at least one child	0.7533

Extraction Method: Principal Component Analysis.

Panel C: Mean factor score for family-oriented values

Cohorts	Male Mean	N	Female Mean	N
1971-80	-0.12	426	0.00	462
1961-70	-0.05	989	-0.01	1156
1951-60	-0.11	989	-0.07	1188
1941-50	-0.02	732	-0.10	864
1931-40	0.17	481	0.08	580
1921-30	0.31	374	0.17	495
1920 or earlier	0.29	101	0.25	169
Total	0.00	4091	0.00	4913