

Influence of age gap and parents' ethnicity on the sex of the first born child

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ABSTACT

The influence of parents' age gap and their ethnicity in the determination of the sex of the first born child is provided. A descriptive analysis was undertaken and χ^2 test, association measures and logistic regression were applied to verify the relationship between variables. The chance that a male first child is born from a mother one to ten years older than the father is twice the chance of parents whose age gap ranges between 0 and 5 years, the father being the older. Further, the chance of a male first child born from an ethnically white male parent is approximately five times higher than that of an ethnically yellow one.

Key words: ethnicity; age; Odds Ratio; sex.

1- INTRODUCTION

Manning et al. (1997) hypothesized that a high relationship exists between the sex of the first child and age gap between parents (age of male parent minus age of partner). In their analysis of data from post-war England and Wales the authors reported a high rate of males born of parents in which males were older than their female partners. Hakko et al. (1998) and Astolfi and Zonta (1999) disagreed and refuted the hypothesis. A sampling of Brazilian children born in Maringá PR Brazil was investigated to test the correlation of variables on the subject: sex of first child, age gap between parents and their ethnicity. The association rate between the variables was also estimated.

2 - METHODOLOGY

Study was undertaken at the Marista College in Maringá in 1997 by means of a questionnaire sent to the students' mothers. Three hundred and forty answers to items below were obtained:

1. sex of the live born child of first birth;
2. age of parents at the time of birth of child;
3. parents' ethnicity.

Only couples with a live born child on first birth were chosen. Data were organized, correlated and processed by different computer packages such as EPI-INFO, SAS (PROC LOGISTIC) and STATISTICA. Logistic regression and non-parametric: χ^2 (Mantel-Haenszel) test was applied and Odds Ratio (OR) on probability of occurrences under analysis was calculated to verify whether variables were associated. Age gaps (in years) between parents (D_i = age of male parent minus age of female parent) were classified as below:

- D_0 = -10 to -1 years;
- D_1 = 0 to 5 years;
- D_2 = more than 5 years.

3 – RESULTS AND DISCUSSION

Similarly to data obtained by Manning et al. (1997) from 301 couples with children at a secondary school, our research involved a sample of 340 couples who fathered children at a Brazilian high school. Whereas in the report by Manning et al. (1997) the number of male children is higher than that of female children when the father is older than the mother (D_1 and D_2 , Table 1), in our investigation there is a significant higher number of male children when the mother is older (D_0 , Table 2). In their analysis of 2,677 live born children from first birth Hakko et al. (1998) showed that the probability for a male child being born is not significantly related to gap in parents' age. Astolfi and Zonta (1999) used data from 151,124 birth certificates and failed to verify a significant relationship between parents' age gap and the birth of a male first child. However, they recorded an excess of boys in a sub-sample with parents' age gap higher than 15 years, the male parent being the older.

Table 1. Frequency of children's sex for levels of age gap in parents, according to Manning et al. (1997)

D_i	Sex		Total (%)
	Female	Male	
D_0	29	14	43 (14.28%)
D_1	84	117	201
D_2	20	37	(44.78%)
			57 (18.94%)
Total	133	168	301

Table 2. Frequency of children's sex according to levels of age gaps between their parents

D_i	Sex		Total (%)
	Female	Male	
D_0	12	24	36 (10.58)
D_1	104	106	210 (61.76)
D_2	41	53	94 (27.68)
Total	157	183	340

The application of χ^2 test for possible association between age of parents and child's sex showed a non-significant result (Mantel-Haenszel verified that $\chi^2 = 0.1643$ and $p = 0.6853$). When Tables 1 and 2 are compared, values were almost homogeneous, with the exception of values on Table 2 in which the number of male children in D_0 is higher.

A predominance of the male sex is suggested when the sex of the first born child is analyzed without taking into account the parents' age gap (Table 3). Astolfi and Zonta (1999) have also verified that, independently from parents' age gap, ratio of birth of male children was predominant.

Table 3. Sex of first child

Sex	Frequency (%)
Female	157 (46.17)
Male	183 (53.82)

Total	340
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When possible influence of parents' ethnicity on the sex of the first live born child was analyzed, male parent's ethnicity was reported to be significantly associated, since the Mantel-Haenszel test verified that $\chi^2 = 9.835$ and $p = 0.0017 < 0.005$ (Table 4). On the other hand, the mother's ethnicity was not significantly associated, since $\chi^2 = 2.6461$ and $p = 0.1038$ (Table 5).

Table 4. Sex of children according to father's ethnicity

Et _f	Sex		Total
	Female	Male	
Et _f W	132	171	303
Et _f N	7	7	14
Et _f J	18	5	23
Total	157	183	340

Et_f = father's ethnicity; Et_fW = white ethnical father; Et_fN = Negro ethnical father; Et_fJ = Japanese ethnical father.

Table 5. Sex of children according to mother's ethnicity

Et _m	Sex		Total
	Female	Male	
Et _m W	141	174	315
Et _m N	4	1	5
Et _m J	12	8	20
Total	157	183	340

Et_m = mother's ethnicity; Et_mW = white ethnical mother; Et_mN = Negro ethnical mother; Et_mJ = Japanese ethnical mother.

The mother's ethnicity was excluded from analysis and from the general model due to its non-significance in determining sex of first child. The model was thus readjusted with only two variables, or rather, D_i and Et_f. Independent co-variables were represented by two indicating variables: D₀ = 0 and Et_f = 1. H₀ = adequacy of model verified its adjustment and tests in Table 6 were applied.

Table 6. Tests for model adjustment

Method	χ^2	DF	P
Pearson	4.839	4	0.304
Deviance	6.444	4	0.168
Hosmer-Lemeshow	0.255	2	0.880
Brow			
General Alternative	0.255	2	0.880
Symmetric Alternative	0.243	1	0.622

Table 6 shows that adjusted model is adequate since "P values" in all methods were higher than the significance level of 5%. Such research with these variables is unknown in the literature. Astolfi and Zonta (1999) verified gaps in parents' age, birth order, educational level of parents and/or parents' age and their interaction with birth order or

mother's age and their interaction with birth order. They found that no individual variable and its interactions contributed significantly in the probability of the birth of a male first child.

Table 7. Analysis of logistic regression

	Coef.	SD	Z	P	OR	CI (95%)	
Cte	0.79	0.3610	2.20	0.028			
D ₁	-0.67	0.3857	-1.74	0.082	0.51	0.24	1.09
D ₂	-0.43	0.4169	-1.04	0.298	0.65	0.29	1.47
Et _f W	-0.25	0.5917	-0.43	0.664	0.77	0.24	2.47
Et _f J	-1.53	0.5207	-2.95	0.003	0.22	0.08	0.60

Table 7 shows significance only in D₁ ($P = 0.082$) with Et_fJ ($P = 0.003$). Further, Odds Ratio in D₁ (Table 7) is $1.96 (1/0.51) \cong 2$. In an analogous way for Et_fJ Odds Ratio $4.54 \cong 5$. Thus

1. The probability of a male child as the first born of parents in which the mother is older than the father (D₀) is twice that between parents whose age gap lies between 0 and 5 years, the male partner being the older (D₁).
2. The probability of a male child as the first born of a white ethnic father (Et_fW) is approximately five times that of parents in which the father's ethnicity is yellow (Et_fJ). It is surprising that yellow ethnicity positively influences the female sex.

We may conclude that in our sample the parents' age gap associated to the father's ethnicity affects the sex of the first live born child, with special and explicit emphasis on the male sex.

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