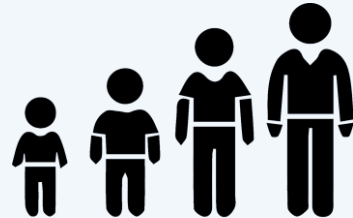


CHILDREN AND LONGEVITY

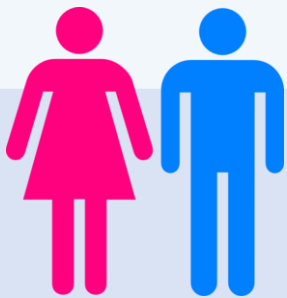


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INTRODUCTION

The original Swedish study aimed to quantify the association between **having children and death risks**, and how other factors (*sex, geographical distance between parents and child, marital status, number of children and education level*) interplay in this dynamic. Using national population registers, the **census study** identified all 1.4 million people born between 1911 and 1925 and tracked them over time. Overall, it was found that **having at least one child lowered death risks**, with **men experiencing greater benefits**. Here, we analyse the confounding effects of sex and verify the study findings using quantitative methods.

DATA ANALYSIS



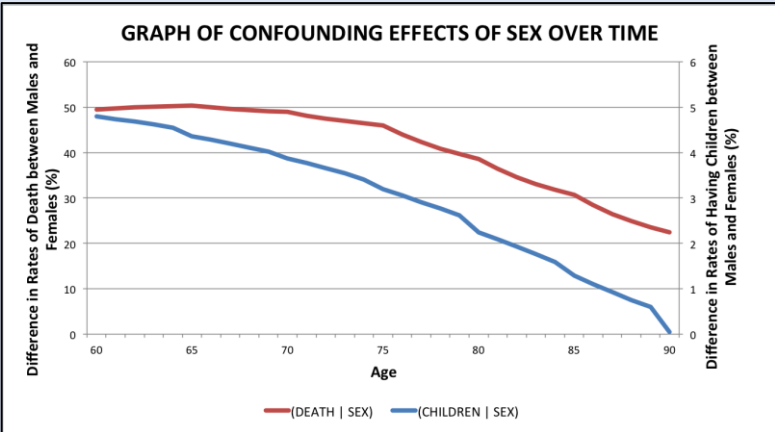
CONFOUNDERS

The original study claimed that male parents gained more in life expectancy than female parents. To verify that sex is indeed a **confounder**, we looked to see if sex was **associated** with both having children (“exposure”) and death (“disease”). A sample calculation at age 60 is shown in the table below.

GENDER AS A CONFOUNDER AT AGE 60			
EXPOSURE		DISEASE	
Rate (CHILDREN Male)	0.7528	Rate (DEATH Male)	0.0129
Rate (CHILDREN Female)	0.7889	Rate (DEATH Female)	0.0065
Sex is associated with having children.		Sex is associated with death.	

Indeed, sex is a confounder as men generally have lower rates of having children and higher rates of death. Our analysis also revealed that the **confounding effect of sex decreased with age**.

Nevertheless, sex still has a confounding effect in our analysis as we are considering the age range from 60 to 90 years. The data was then **sliced** by sex.



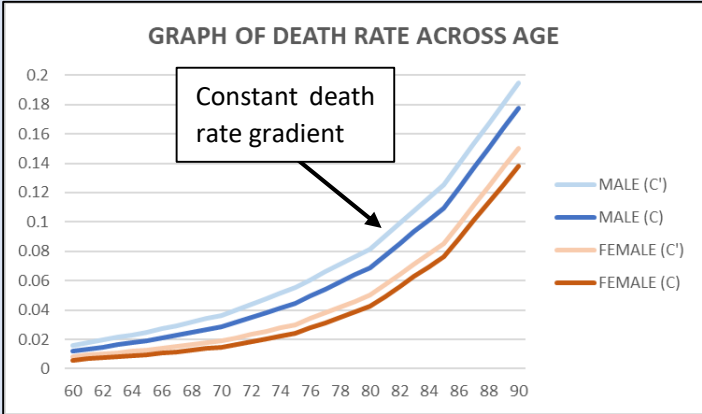
DEATH RATE

Using data from the study, we calculated the raw death rate, as:

$$\text{Death rate} = \frac{\text{Number of Deaths}}{\text{Total Number of People}}$$



As our reference data was incomplete, we **linearly interpolated** between the available data, assuming that death rate decreased at a constant rate every 5 years. The results of our interpolation showed a clear distinction in trends.



Nevertheless, this is insignificant (<1%) in light of the data involving 1.4 million people.

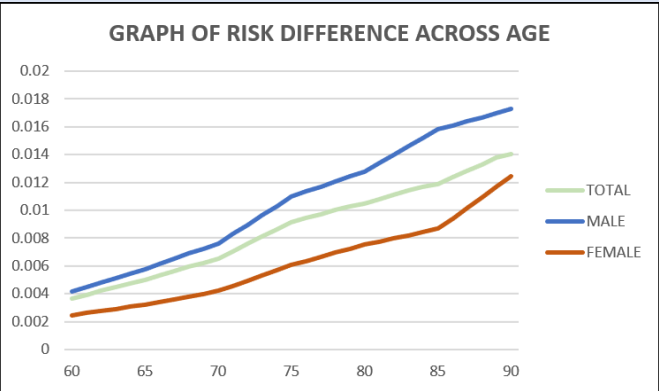
Unfortunately, our assumption of a constant death rate gradient yielded both positive and negative interpolation errors of up to 12 000 people.

RISK AND ODDS RATIOS

We then constructed **2x2 contingency tables** for each age, for males and females separately. The **risk ratios** and **odds ratios** were computed.

MALES - AGE 60	Children (C)	No Children (C')
Death (D)	6 318	2 800
Alive (D')	520 041	171 322

We found that the risk and odds ratios were very similar, corroborating with the fact that the study was a **prospective** one that followed participants over time. We analysed this trend in risk ratios across age but found a weak relationship. We modelled the study and countered the issue of increasing death rates with time by using **absolute risk differences**.



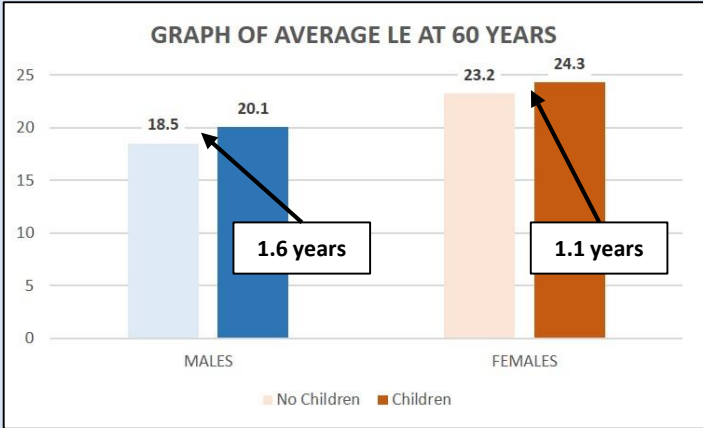
Having children generally led to a lower death risk. Our results are consistent with the study’s findings, that the effect of having children in reducing death risks **increases with age** and is **more prominent among males**.

LIFE EXPECTANCY

Death risk is a vague quantifier that is *not easily understandable for the general public*, so we calculate the life expectancy at 60 years of age. We assumed that everyone who lived past age 90 died, on average, at age 95. (The maximum years lived was 103). This 5 years was to factor in the number of males and females alive after the study.



$$\text{Average LE at 60} = \frac{\sum (\text{Age of Death} - 60)}{\text{Total Number of People}}$$



Our method of analysis concludes that, in comparison to their childless counterparts, **males with children live 1.6 more years** and **females with children live 1.1 more years**. However, the diminished effect of having children among females could be numerical, as females tend to live longer than males.

CONCLUSION

In a nutshell, having children is **associated** with an increase in life expectancy in old age. However, the underlying causal relationships remain unknown. Be that as it may, we have to be careful to make **ecological fallacies** and **extrapolating** the results to other countries and even Sweden’s current population, as trends may change over time. Hypothesis tests can also be done to verify the applicability of our results in other populations. Our analysis on sex as a confounder has produced interesting and important results. Further analysis (both quantitative and qualitative) the role of sex and other confounders in the relationship between having children and lowering death rates. Given the shrinking population in many developed countries worldwide, a study on the effects of having children is indeed valuable.