



Exploration of the strength of family links

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HIGHLIGHTS

- Age-specific disability parallels strength of family ties.
- Husband–wife ties are weakened by a larger age-gap.
- Parent–children ties are strongest under the age of 5.

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ABSTRACT

Ever since the studies of Louis-Adolphe Bertillon in the late 19th century it has been known that marital status and number of children markedly affect death and suicide rates. This led in 1898 Emile Durkheim to conjecture a connection between social isolation (especially at family level) and suicide. However, further progress was long hampered by the limited statistical data available from death certificates. Recently, it was shown by the present authors that disability data from census records can be used as a reliable substitute for mortality data. This opens a new route to investigations of family ties because census information goes much beyond the limited data reported on death certificates. It is shown that the disability rate of adults decreases when they have more family links. More precisely, the reduction of the parents' disability brought about by the presence of a child reveals that the strength of ties between parents and child is highest in the first year after birth and then weakens steadily as the child ages. It will also be seen that the strength of the bond between husband and wife is highest when they are of same age and decreases fairly steadily when the age gap increases.

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1. Introduction

1.1. Influence of family links on death rates

This paper is a step forward in a story that started in the second half of the 19th century. At that time it was realized that in all countries where data were available the age-specific death rate of married people was 2 or 3 times lower than for non-married (i.e. single, widowed or divorced) people. This became known as the Farr–Bertillon law.¹ A high-accuracy

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¹ William Farr (1807–1883) and Louis-Adolphe Bertillon (1821–1883) were epidemiologists regarded as two of the founders of medical statistics. We use the term “law” (rather than “effect” or “rule”) to refer to its wide range of validity. Basically, it holds for all periods of time and all countries for which accurate data are available, including non western countries like China.

study of this effect was conducted by the present authors in 2016 [1,2] which showed in particular that for widowed persons a majority of the deaths occurs within a few months after the death of the spouse.

Subsequently in 1879, Bertillon [3,4] extended his 1872 study to include the influence of the number of children on the suicide rate.²

1.2. Durkheim's conjecture

From this work emerged the conjecture that greater social isolation due to a lack of short-range husband–wife or parent–children interactions produced higher death rates. This became one of the strongest arguments in favor of Durkheim's thesis that the underlying cause of suicide is social isolation. Later on it was shown [1,6] that marital status is a significant factor not only in suicide rates but actually in age-specific death rates *separately* for all major causes of mortality, e.g. heart, pulmonary, cerebrovascular, cancer diseases, accidents.

Incidentally, this observation provides an answer to an objection which is sometimes raised that “it is difficult to distinguish the beneficial impact of marital status on health from the confounding effect of selection into the married state” [7]. In other words, this argument means that a married person does not live longer because of the beneficial effect of being married, but that the person got married because of some inherent initial characteristics such as better health and more stable psychological condition. In this conception marriage is seen as a kind of selective filter which rejects fragile characters. However, how can a marriage-based selection affect the death rate due (for instance) to cerebrovascular attacks, a disease which occur several decades later? The conclusion that marriage-based selection plays a very limited role is also confirmed by studies involving twins [8] and by a study of the suicide rate among Chinese Americans between 1930 and 1950, a time when there was a huge (but decreasing) male–female imbalance in this population [9, chapter 9].

One can also observe that the conception according to which “marriage has a positive effect on health by altering preferences for risky behavior” [10, p. 50] may be correct in some cases (e.g. diseases due to smoking or death by accidents) but has only a limited validity for it cannot account for mortality by diseases whose causative factors are not well known, e.g. cerebrovascular attacks or many forms of cancer.

1.3. Biodemographical experiments in animal populations

In order to test Durkheim's thesis in a broader and more systematic way, it is of course tempting to make observations on animal populations. This idea was tried in an experiment done with ants and fruit flies at the “South China Agricultural University” It lasted over two years from 2012 to 2014 [11]. Ants were extracted from the rest of their population in two ways.

- Single individuals
- Groups of 10 individuals.

In both cases the extracted insects were given appropriate and identical living conditions in terms of temperature, hygrometry, light and food. Two observations were of particular significance.

- Firstly, the two or three days immediately after extraction were marked by a surge in death rates.
- Secondly, in the course of time the average death rates were higher among the “singles” than in the groups of 10. This was observed for the ants as well as for the fruit flies.

1.4. Need of more detailed statistical sources

However, for a better understanding of the connection between social isolation and death rates there was a major obstacle in the sense that statistical information about deceased people was limited to the data recorded on death certificates, i.e. age and marital status of the deceased and cause of death (immediate as well as underlying cause) as determined by a physician.

Many other data would be of great interest from the perspective of social isolation, particularly data about the children of deceased persons (e.g. number and age) for, apart from the husband–wife interaction, the parent–child interaction is certainly the most important social link. Because of this lack of data the conjecture of a connection between mortality and social isolation could not be tested further.

1.5. Work disability as a substitute for mortality data

Progress became possible when it was found that disability data from census records could be used as a reliable substitute for mortality rates [12].

² Bertillon's results are summarized in [1, p. 751]. Table 1 of this paper tells us that in France the suicide rate of married persons with children is nearly one half of the rate of married persons without child. In his book of 1897 Durkheim [5] gives additional data for families according to their number of children which show that (at same age) the more children, the lower the suicide rate.

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