ARE MORE MALES BORN IN WARTIME?

CONSTANTINE PANUNZIO[1]

THE belief that more "baby boys" are born during a period of war seems to be common. We cannot tell how far back it goes, but we do know that it prevailed during the last century, during the First World War, and that it is quite general at present. People frequently remark, "Oh, a baby? I bet 'twill be a boy"; or, "Several of our friends have had babies and of course they're all boys." A physician recently stated to this writer that he had attended at the birth of twelve babies during the last two months and that in every case "it was a boy." And the physician asked, "Is there any explanation for it?" The general implication of all these remarks is that a supernatural influence is at work compensating for the extraordinary loss of men in wartime by increasing the number of male births. In fact, the belief is often expressed in so many words.

During the latter part of the last century and the first part of the present one, a number of scholars made systematic inquiries into the matter.[2] Düsing seems to have initiated the investigation and to have stung several persons into studying the matter by boldly stating that the increase of male births in wartime was such a common phenomenon that no one even thought of questioning it. Naturally, several scholars did question it.

The data these early investigators had to work with were fragmentary, ordinarily covering brief periods and single countries. Düsing's studies, for instance, covered only the data for Sweden for the period of the Swedish-Russian War of 1789-1790. He did find that the male-female birth ratio was 1,048 to 1,000 for 1788, 1,047 in 1789, 1,051 in 1790, 1,058 in 1791, 1,051 in 1792, and 1,037 in 1793. But these findings were not conclusive. Comparable data for Russia

[1] University of California at Los Angeles.

[2] These included C. Düsing, P. Geddes, J. von Mayr, A. von Oettingen, A. Rauber, C. A. Revelli, Lexis, Carlberg, Meinzingen, Nixon, Gini, and von Fricks.

did not exist, nor did he have statistics for a sufficiently long period before or after that war to be able to make a convincing statement.

Oettingen's investigation, though, covering a longer period, dealt only with France. He found that the proportion of male births did increase all through the Napoleonic Wars to the end of 1816, that they declined steadily until 1830, and that, as a result of the revolution of July, 1830, the rate again rose, reaching 1,065.6 in 1831. In addition Oettingen found that while the ratio averaged 1,057.6 for the decade 1835-1845 in Holstein, during the wars of 1848 and the years following the ratio went as high as 1,066.7 male to 1,000 female births.

The validity of these findings was then questioned by Lexis who found that a rise in masculinity may occur in periods other than those of war. He found, for example, that the period 1831-1835, which was one of peace, had a high median ratio of 1,065 to 1,000. Moreover, his findings indicated that the Franco-Prussian War left no traces of an increase in masculinity in France. The median ratio of live births all through the period 1866-1875, which was 1,049 males to 1,000 females, was identical for the single years 1871 and 1872, and the ratio rose to 1,058 only in 1873, two years after the war had come to an end.

Von Meinzingen made a detailed study of the births of the Ebistal parish (lower Austria) for two earlier war periods, 1791-1800 and 1841-1850. He discovered that in the first case the masculinity rate rose to a maximum and that in the other the rate descended to a minimum. Carlberg investigated the results of the Turkish-Russian War of 1877-1878 as it affected the province of Livonia and found that the war had left no traces whatsoever in the sex ratio. Finally, Gini examined the birth data for Prussia, Austria, Bavaria, Saxony, and Italy, covering the war of 1866, the records of France and Germany for the period of the Franco-Prussian War of 1870-1871, and those for the Turkish-Russian War of 1877-1878 for Roumania. In all these cases he discovered no material differences in

Country	1876–1885	1886–1895	1896–1905	1906–1913
Austria	1,065	1,067	1,063	1,063
Belgium	1,058	1,056	1,057	1,053
Denmark	1,058	1,057	1,058	1,054
Finland	——	1,057	1,060	1,065
France	1,062	1,058	1,053	1,056
Germany	1,061	1,061	1,060	1,061
Holland	1,065	1,063	1,062	1,057
Hungary	1,056	1,057	1,061	1,061
Italy	1,069	1,066	1,065	1,062
Norway	1,065	1,069	1,063	1,062
Sweden	1,062	1,060	1,062	1,066
Switzerland	1,063	1,056	1,051	1,055

Table 1. Number of male births per 1,000 female births (live and stillbirths for both) in specified countries, 1876-1913.[1]

[1] Savorgnan, F.: Corso di Demografia (Pisa, 1936), p. 86.

the male-to-female birth ratios. Gini, however, did find that after the Serbian-Turkish War of 1876 there was an exceptional rise in masculinity: while the median was 1,068 males to 1,000 females in 1876-1880, in 1877, the year immediately following the war, the ratio stood at 1,076 male to 1,000 female births.[3]

The First World War produced a substantial body of data which permitted a more detailed inquiry. The data available for the period 1876-1913 showed that, broadly speaking, the trend of masculinity during that period was downward. The exceptions were Germany, where the ratio was the same in 1906-1913 as it had been in 1876-1885 and Hungary and Sweden, where the masculinity ratio had gone up. The data for this period, down to the time of the First World War, are presented in Table 1.

The masculinity trend, therefore, seems to have been more or less generally downward, the exceptions being due, Savorgnan believes, to changes in recording procedures. The downward trend, however, may or may not have had any relation to war or peace. It probably resulted from neo-Malthusian practices which, by increas-

[3] One investigator, von Fricks—the only one, so far as I have been able to discover—maintained that it is the proportion of female rather than male births that goes up in wartime. But his data deal only with Prussia and for too very brief a period to be significant.

ing stillbirths and abortions, decreased the ratio of masculinity at birth, since stillbirths and abortion seem generally to take a greater toll of males than females.

Whatever the cause of the previous decline, during the First World War the ratio of male births clearly increased in those countries for which we have records. Sir Bernard Mallet, Registrar-General of England and Wales, called attention to the phenomenon while the War was still going on. In his presidential address before the Royal Statistical Society in November, 1917, Sir Bernard presented figures which showed that male births had increased in England and Wales from 1915 on. The data which he exhibited showed that the ratio of male to female live births in England and Wales had been 1,038 males to 1,000 females for a period of forty years, but that for the period April, 1915 to September, 1917, the ratio had gone up substantially. "For the whole period covered by these 'war births' . . . , the proportion of male to female births was 1,046, or eight above the average of the previous forty years. It may be further remarked that at no period during those years has there been a succession of three quarterly records of over 1,040, while during this war period we have had ten such records."[4]

At the close of First World War other demographers looked into the matter. In April, 1919, de Jastrzebski reported findings covering over four million wartime births which had occurred during the War in Australia, Denmark, Finland, Great Britain, Hungary, Ireland, the Netherlands, and New Zealand. He found "in every case a rise in masculinity more or less marked."[5] In 1921, Franco Savorgnan re-examined all the available data covering the war period and came to substantially the same conclusion.[6] Finally

[4] Mallet, Sir Bernard: Vital Statistics As Affected by the War. *Journal of the Royal Statistical Society,* lxxxi (London, 1918) pp. 14-15.

[5] de Jastrzebski, S.: The Sex Ratio at Birth. *Eugenics Review,* xl (London, 1919-1920) pp. 14-16.

[6] Savorgnan, F.: L'aumento delle nascite maschili durante la guerra (The Increase of Male Births During the War). *Metron,* 1, no. 4 (Padua, 1921) pp. 137-160.

Gaetano Zingali assembled a more comprehensive body of data for the prewar, war, and postwar periods. Those for the prewar and war periods are set forth in Table 2. They clearly show an increase of masculinity during the World War in the specified countries. In Austria, there seems to have been a decline, but this is believed to be due to incomplete records. In Italy and Bulgaria, the ratios were about the same in both periods.

Table 2. Number of male births per 1,000 female births (live and stillbirths for both) for periods immediately preceding and during First World War, in specified countries.[1]

Country	1906–1914	1915–1918
Austria	1,063	1,061[2]
Bavaria	1,062	1,069
Bulgaria	1,070	1,071
England[3]	1,039	1,045
France	1,056	1,063
Germany	1,061	1,069
Hungary	1,061	1,071
Italy	1,062	1,062
Prussia	1,062	1,071
Saxony	1,060	1,068
Scotland[3]	1,042	1,050
Wurttemberg	1,050	1,057

[1] Based on Zingali, G.: La Natalita Speciale (Special Natality), Chapter V; Gini, C. and others, *Demografia* (Turin, 1930), p. 167. Zingali adds that for the Russo-Japanese War the Japanese ratios were 1,049 in 1891-1895, 1,050 in 1896-1905, 1,088 in 1906 and 1,048 in 1907-1914.

It should be added parenthetically that Vedel-Petersen held that in Germany masculinity not only did not rise but that it decreased during the First World War, from 105.8 in 1910-1914 to 103.8 in 1915-1917. His data, however, are fragmentary and inconclusive. *See* Dumas, S. and Vedel-Petersen, K. D.: Losses of Life Caused by War (Oxford, 1923), p. 175. For the United States no appropriate data existed before 1915. Ciocco has made a cursory examination of the phenomenon as applied to the United States, but comes to no definite conclusion. *See* Ciocco, A.: Variations in the Sex Ratio at Birth in the United States. *Human Biology*, X, No. 1 (Baltimore, February, 1938), pp. 36-64. Thompson also presents tabular data and makes a few remarks but does not undertake a serious examination of the basic phenomenon itself. *See* Thompson, W. S.: Population Problems. New York, McGraw Hill Book Company, 1942, pp. 48-49.

[2] Confines of 1915.

[3] Live births only.

In order to test the data of the First World War, we need to discover what happened in the years immediately following that war. For only if masculinity decreased in the postwar period does the case for the increase during the War stand up. Savorgnan has assembled the data which answer that question. They are presented in Table 3.

From these data it will be seen that masculinity did decline in the postwar period. From a peak, reached in 1919, the number of male to 1,000 female births tends generally downward and continues to do so for about eleven years, when most of

the specified countries reach a ratio even lower than that for the period before the War. England and Wales reached the lowest point in 1926 and Belgium in 1929, France, Germany, Italy, and Scotland in 1930 and Hungary in 1932. On the whole, as Savorgnan remarks, the masculinity of all ex-belligerents diminished to a striking extent during the decade following the First World War, which lends added support to the hypothesis that war does increase male births. The present conflict will probably produce many additional data and afford an opportunity for a more careful examination of the phenomenon in question.

Those who have accepted it as a fairly proven fact that war does increase masculinity have sought to explain the phenomenon. Five main explanations have been suggested. The first may be called the natural-compensation explanation. This, of course, is the popular belief couched in pseudo-scientific language. Oettingen, who held to this belief, stated that more males are born in wartime for the simple reason that nature compensates for the greater risk and the

Table 3. Number of male births per 1,000 female births (live and stillbirths for both) for the period following the First World War, in specified countries.[1]

Year	Belgium	England[2] Wales	France	Germany	Hungary	Italy	Scotland[2]
1919	1,076	1,060	1,073	1,085	1,082	1,066	1,064
1920	1,069	1,052	1,072	1,077	1,078	1,069	1,043
1921	1,066	1,051	1,060	1,078	1,078	1,065	1,049
1922	1,064	1,049	1,060	1,075	1,074	1,060	1,046
1923	1,065	1,044	1,063	1,073	1,073	1,060	1,051
1924	1,058	1,047	1,056	1,073	1,068	1,063	1,057
1925	1,054	1,045	1,061	1,071	1,071	1,059	1,054
1926	1,053	1,041	1,053	1,068	1,066	1,057	1,045
1927	1,055	1,042	1,052	1,066	1,074	1,061	1,041
1928	1,055	1,044	1,059	1,067	1,067	1,068	1,050
1929	1,050	1,043	1,054	1,068	1,069	1,060	1,059
1930	1,060	1,044	1,049	1,066	1,067	1,054	1,034
1931	1,054	1,049	1,055	1,068	1,067	1,056	1,038
1932	——	1,050	——	1,068	1,064	1,056	1,049

[1] Savorgnan, F.: Corso di Demografia, (Pisa, 1936), pp. 96-97.
[2] Live births only.

higher death rate which males experience during war. He implies that we can no more determine the precise manner in which nature brings this about than we can explain one of the greatest enigmas of life, namely, the near-balance of the sexes at birth. This explanation, however, does not appeal to reason. It implies that nature, which has in the first place established the near-balance of the sexes at birth, upon the appearance of the man-made phenomenon of war, takes a daily census, as it were, of both births and deaths, and seeing that the near-balance is being destroyed enters into the reproduction organism to affect the fertilization of the male chromosomes.

H. Ploss advanced a second explanation, namely, that the increase of masculinity in wartime is due to the nutrition deficiency which accompanies such periods. This hypothesis does not seem to be supported by the facts. As Gini and Savorgnan have pointed out, there is no evidence that a correlation exists between the quantity of nutriment and sex at birth. In addition, during the First World War, an increase in masculinity occurred in such countries as England, Australia, and New Zealand where the decrease of nutriment was not great, as well as in Germany and France where the population at certain times came near to starvation. In fact, masculinity increased in England at the very time, as Sir Bernard Mallet pointed out in another connection, that a "generally diffused well-being" prevailed in that country. On the other hand, some support is found for the nutrition hypothesis in the fact that in some regions where nutrition is relatively low the rate of masculinity is exceptionally high. Thus, in Egypt, the rate goes as high as 1,083 males for 1,000 females (1916-1920), in British India to 1,085 males for 1,000 females (1921-1925), and in the Punjab it rises to 1,097 (1912-1914).[7] It is realized, however, that in these countries religion and the mores of the people may be conducive to the under-reporting of female births.

A third explanation is that masculinity increases in wartime be-

[7] Savorgnan, F.: Corso di Demografia (Pisa, 1936) p. 100; de Jastrzebski, *op. cit.*, p. 9.

cause during such times the number of first births increases. This hypothesis also is not supported by facts. While first births do produce a higher rate of masculinity than subsequent ones, first births decreased substantially rather than increased during the war period.[8]

Fourth, Huxley advances the hypothesis that the increase in masculinity in wartime births is due to the emotional excitement of war. The male chromosomes are fertilized at a greater rate than the female. This hypothesis also has no foundation in experimental data.

Fifth, the most reasonable hypothesis is that of Savorgnan, who has made the most complete study of the masculinity phenomenon. This may be called the birth-interval hypothesis. Briefly stated, Savorgnan maintains that masculinity in births increases in wartime on account of the greater intervals between births, which, in turn, produces greater rest in the female reproductive system and thereby brings about the birth of a larger number of males.

Although Savorgnan presents no evidence that greater intervals between conceptions do occur, he offers the following considerations in support of the assumption that they do. Greater intervals occur, first, because of the wartime absence of males from their homes; second, because of the wider and more prolonged employment of natural lactation during war, which in turn retards the reoccurrence of menstruation and thereby increases the interval between conceptions; and third, because wartime difficulties and bewilderments restrict procreation among certain elements of the population.

But how do greater intervals influence the rate of male births? Savorgnan replies, by producing more prolonged rest and recovery in the female reproductive organism, which, in turn, reduces the rate of abortions and stillbirths; and since the proportion of males in abortions and stillbirths is always higher than that of females,

[8] Savorgnan: *ibid*, pp. 81-82.

the reduction of abortions and stillbirths increases the proportion of males actually born. The effect of stillbirths and abortions in reducing the rate of male births is well-established in some countries, especially in Germany and Hungary.

Savorgnan supports his hypothesis by the following considerations. First, during the First World War the increase in masculinity occurred only, or mainly, in the belligerent countries in which the prolonged absence of militarized men took place. Second, the increase in masculinity begins only in 1916, that is, when the factors producing greater intervals between conceptions came into operation. Third, masculinity gradually increased after 1916 and reached a maximum in 1918-1919, approximately a year after the time when most men were in the war zones, and therefore the interval between conceptions reached its maximum. Finally, as we have already pointed out, there is a marked decrease in masculinity in the postwar period.

Students who have examined the data in detail seem to accept Savorgnan's hypothesis, with qualifications or modifications. Wurzburger accepts the fundamental premise that rest on the part of the reproductive system is mainly responsible for the increase in wartime masculinity. He also grants that the absence of males is mainly responsible for that fact. However, he maintains that the greater maternity care given by states in wartime, at least in Germany, was also partly responsible for bringing a larger number of conceptions to maturity, which, in turn, increased the masculinity rate. Zingali also adds that factor. In other words, resorting to clinics at a greater rate may have also reduced stillbirths and abortions and thereby increased masculinity at birth. Burkhardt adds that the masculinity increase in wartime is due also, if not mainly, to the rest which occurs in wartime in the male reproductive system. He shows that in Germany, and more so in Prussia and Bavaria, masculinity reached the highest rate in 1919 in consequence of the return of soldiers at the close of the war.

This hypothesis also has loopholes. The main one is that rest in the reproductive organism increases masculinity. This is far from proven. In fact, as we have seen, peoples like those of Egypt and India have a very high masculinity ratio along with a very high frequency of births. Moreover, as Gini has pointed out, if reproductive rest were the determining factor, the human race would have at its disposal one of the most far-reaching of techniques. By reproductive rest sections of mankind could increase the male population at will and thereby have an enormous effect upon their own destiny.

Concluding this examination of the available data and the various explanations, the most that can be said is that there seems to be some evidence that war does increase the ratio of males at birth. The data, however, fairly substantial though they are, are not sufficiently comprehensive to permit broad conclusions.

Insofar as conclusions have been reached, they differ considerably. Gini, who examined the findings of the last century, dismissed the whole matter with the statement that "it is more than doubtful whether there is any relation between war and the sex ratio at birth," and therefore, "the coincidence observed . . . may be regarded with tranquillity as an accidental one."[9] On the other hand, Sir Bernard Mallet, referring to the increase which occurred in England and Wales in 1915-1917, remarked that "A rise in the sex proportion so marked and sustained over so long a period can hardly be dismissed as accidental coincidence."[10] De Jastrzebski, on the basis of a considerably larger body of data, concludes that "So far as the present evidence goes war raises the ratio of masculinity."[11] And Savorgnan comes to the same conclusion.

The present war will no doubt produce a considerable body of data and thereby permit a more careful study of the whole matter.

Assuming that it will be found that war does increase masculin-

[9] Gini, C.: Il Sesso (Palermo, 1908) p. 240.

[10] Mallet: *op. cit.*, p. 15.

[11] de Jastrzebski: *op. cit.*, p. 16.

ity, the explanation of the phenomenon itself will call for painstaking investigation and experimentation before sound conclusions can be drawn. Or it may be that this phenomenon will defy the human mind, even as the phenomena of life itself and of the sex balance at birth remain unravelled enigmas.