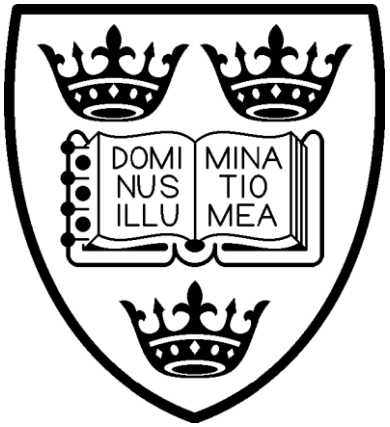

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WAR, BLOCKADES, AND HUNGER: NUTRITIONAL DEPRIVATION OF GERMAN CHILDREN 1914-1924

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Abstract

At the beginning of the First World War, the British imposed a blockade against Germany intending to prevent all imports from entering the country. Germans began to call the British naval action the *Hungerblockade*, claiming that it seriously damaged the well-being of those on the home front, namely women and children, through lack of adequate nutrition. These German claims that Britain used hunger as a weapon of war against civilians have sometimes been dismissed as propaganda. However, newly discovered anthropometric measurements made of German school children during the war gives credence to German contentions that the blockade inflicted severe deprivation on children and other non-combatants. Further, these data show that the blockade exacerbated existing nutritional inequalities between children of different social classes; working class children suffered the most profound effects of nutritional deprivation during the war. Once the blockade ended however, working class children were the quickest to recover, regaining their pre-War standards in weight by 1921. They surpassed their own pre-War height standards by 1923, and approximated the weight of middle class children by 1924. This recovery of working class children is likely due to the outpouring of international aid targeted at poor German children. These data also indicate significant gender inequalities starting at age fourteen in nutritional status, with male adolescents suffering far greater deprivation from 1914-1924.

[1] I would like to thank Deborah Oxley, Jane Humphries, James Fenske, Brian A'Hearn, Simon Smith, Steven Durlauf, Emma Rothschild, and Antonia Strachey. I am also thankful to the following archives and libraries: Staatsbibliothek zu Berlin, Stadtarchiv Leipzig, Deutsches Hygiene-Museum, Bayerische Staatsbibliothek, the Landeshauptstadt München Stadtarchiv, and Donald Davis at the American Friends Service Committee (AFSC) Archive for access to documents and records that were integral to this analysis. This paper was initially presented in April 2011 at the University of Tübingen Economic History Workshop. The paper also benefited from discussions with participants at the 2011 Economic History Association annual conference in Boston, the Economic History Society Conference in Oxford 2012, the Summer School on Socioeconomic Inequality at the University of Chicago in 2012, Institutions and the History of Health and Medicine at University College Dublin 2012, and the Economic History of Poverty Conference at the Massachusetts Institute of Technology in 2012. Research was supported, in part, with funds from the Economic History Society, the German History Society, and a research grant from the History Project and the Institute for New Economic Thinking.

At the advent of World War I, England quickly imposed a naval blockade against Germany. Before the War, Germany had imported 25% of all foodstuffs, in addition to needed chemical fertilizers required for the cultivation of crops in Germany. One of the greatest challenges during the War that Germany faced was a lack of food. When the imports stopped, hunger soon followed. Germans began to refer to the British naval action as the *Hungerblockade.* After the war, some German government officials claimed that the British blockade caused the direct starvation of hundreds of thousands of civilians.

> The *Blockade* imposed upon us the avowed purpose not only of cutting off supplies for the army, but of inflicting bodily and vital harm on Germany's civilian population, women, children, old people and all those unfit for military service…It is today possible to give our enemies a receipt for the grand total. 763,000 persons belonging to the civilian population has in Germany succumbed to the effects of the hunger-blockade.[2]

In the 1940s, the plight of German children during the *Hungerblockade* was seized upon by the National Socialists for propaganda purposes to justify their military assault on their old enemies. German military excesses could be excused, they claimed, since the British had already demonstrated their inhumanity by using hunger as a weapon against German women and children.[3]

Defenders of the British responded that the reports of starvation inflicted by the World War I blockade were exaggerated[4]. More recently some revisionists have claimed that the physical well-being of Germans was not greatly impacted by the blockade during the First World War. "Was Germany starved into defeat? The idea is one of the most tenacious in modern European historiography. Yet, it is almost certainly wrong."[5]

These debates about the effects of the blockade on German civilians have intermittently continued for nearly a century. At its core, the debate revolves around metrics. Statistics published by Germans after the war were deemed suspect. Critics claimed they were inflated. There has not even been agreement on civilian death tolls during the blockade.[6] Personal diaries and newspaper articles chronicling wartime hunger may be anecdotal and unrepresentative of the common German experience. At the advent of hostilities, diaries were typically kept by the elites of society, and not by normal citizens.[7] While such ethnographic evidence should not be rejected out of

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[2] Taken from the "Frankfurter Zeitung" January 19th, 1919. As quoted in Rubmann's *Hunger!* p. 50.
[3] Schaeffer, *Krieg Gegen Frauen und Kinder*.
[4] For an early example see Menn, *Armistice and Germany's Food Supply Study;* for a more recent criticism see Offer, *The First World War.*
[5] Ferguson, *The Pity of War*. p. 276.
[6] Menn, *Armistice and Germany's Food Supply*.
[7] The most widely published diary written in Germany during the First World War is by Princess Blücher, *An English Wife in Berlin.* Her account, while extraordinary,

hand, the inherent subjectivity of these accounts is difficult to overcome. The jury remains out on this vitally important question: did the British blockade of Germany result in nutritional deprivation of German children?

One way of approaching the question of the adequacy of diet is to examine human growth. A newly discovered data source that includes approximately 600,000 anthropometric observations of school children across Germany between 1914-1924 has recently come to light. Analysis of the weight and height of German children shows that significant nutritional deprivation occurred during and after the British blockade. Furthermore, the data demonstrate that nutritional deprivation varied significantly by year, by social class, by age, and by gender. Combined with other studies of smaller anthropometric data sets[8] these new data provide evidence that the blockade had a profoundly negative impact upon the physical well-being of children throughout Germany. Yet, these data also reveal the fast pace of nutritional recovery for children in the lowest socioeconomic class after the end of the blockade. This recovery coincides with a massive international aid effort by the British, Americans, and other nations after the war to relieve poor hungry German children—representing perhaps the first successful, large-scale international civilian aid program .

I

German children at the turn of the twentieth century were shorter than children in Western societies are today. Differences in height between modern children and German children prior to the advent of World War I are shown graphically in Figure 1.

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was written while living in the grand Esplanade Hotel, and should not be seen as typical.

[8] See Wall, "English and German Families in the First World War"; Blum, "Government decisions before and during the First World War".

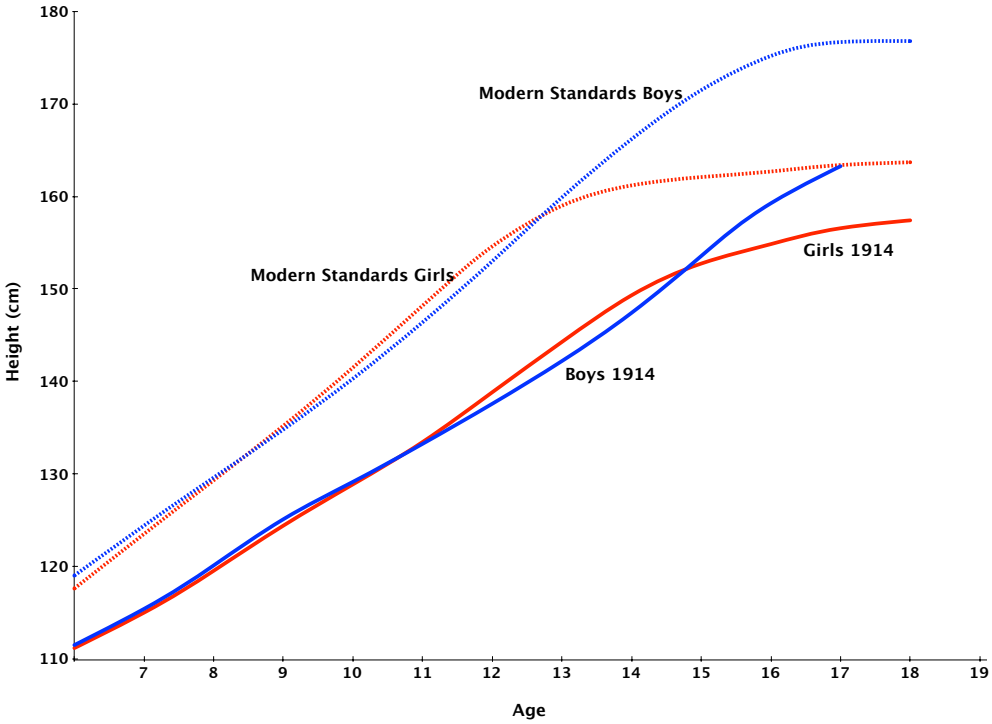

Figure 1. Heights of German Boys and Girls from 1914 Compared to Modern Standards[9]

Merely showing that differences exist in height or weight between modern populations of children and German children during the war is insufficient to demonstrate nutritional deprivation induced by the blockade. A more relevant comparison is to compare what happened to children during the War to pre-War standards.

II

Germany became a unified country on 9 November 1871, and in 1872, less than a year later, the *Kaiserliches Statistisches Amt*, or Imperial Statistical Office, was established. Soon, annual and monthly national statistics were compiled in large tomes.[10] By the turn of the century many statistics were routinely gathered in Germany, including anthropometric measurements.

> Anthropology constituted a type of national cultural anatomy. University professors of anatomy offered courses in anthropology as a free-lance activity. The public was gripped by a fever of measuring, mapping and digging in the cause of science and national identity. Anthropology was a public and participatory field of study.[11]

[9] German standards for 1914 collected by author. Modern standards taken from Steckel, "Percentiles of Modern Height Standards".
[10] See Tooze, *Statistics and the German State.*
[11] Weindling, *Health, race and German politics*, p. 54.

Anthropometric measurements of children were initiated during this general enthusiasm for statistics. Usually local doctors, who were often assigned to more than one school, took and recorded the anthropometric measurements. If a doctor was not available then the main teacher could take anthropometric measurements after having been trained. Though anthropometric measurements of German children were common, the results were not analysed or published in the national statistics volumes and have thus been an untapped source in the debate about the *Hungerblockade*. Indeed the anthropometric data used in the current study remained unknown and unanalysed for nearly a century. Although the original compilers seem to have noticed patterns and been aware of some of the changes that occurred in the heights of German children during the war, econometric and statistical tools developed since that time allow for a far more robust analysis than would have been possible when the data were originally assembled.

These German height and weight data are taken from a rediscovered source that I found during my search of German archives and libraries.[12] Measurements of individuals were made by doctors, or teachers, between 1914 and 1924 (1915 missing), with weights and heights collected on a yearly basis for boys and girls aged six to twenty in different types of school. The book records the summary statistics in detail. The study includes the average height and weight for school classes of children of a specified gender, age, school type, and location. It also includes the class size. Some records even include standard deviations. There are 2,426 of these averaged rows, and in all, the sample sizes for each row of observations correspond to 590,088 observations of individual children during the war. Most major German states are reflected in the data set.

At the time these measurements were taken, German society was strictly hierarchal. This social stratification shaped the lives of children in multiple ways, including the type of school they attended. Affluent parents could afford to send their children to *Höheren Schulen* or "higher" schools, while working class parents would instead send their children to *Volksschulen* (schools primarily for the working classes) and then later, if the child showed sufficient interest, to a trade school or *Fachhochschule*. Terms such as *Höheren Schulen* and *Volksschulen* are still in use in German schooling today, but their meanings have shifted over the last century. *Volksschulen* in early twentieth century Germany could include children up to age 18. Today, *Volksschulen* only include elementary aged school children. Likewise, *Höheren Schulen* in early twentieth century Germany included children from ages 8 – 20, rather than from age 15-19 as they do today. To simplify, and better represent the classes as a whole, my analysis uses contemporary sources to divide the original ten types of schools represented in the data into just three classes: upper, middle, and working class. [13]

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[12] *Grösse und Gewicht der Schulkinder und Andere Grundligun der Erhnährungsschaft*.

[13] School definitions were taken from *Brockhaus' Konversations-lexikon* and *Der Große Brockhaus Handbuch des Wissen*.

In the data set, 350,695 observations represent the working class, 142,625 the upper class, and 82,134 the middle class. The remaining 14,634 observations represent data based on more than one school and could not be assigned socioeconomic class. By far the most data are for children of working class parents.

As various school doctors or teachers in different parts of Germany collected statistics, some measurements vary in terms of the level of detail given. For example, the majority of children's ages in the data were presented by year. However, some school doctors from different cities chose to record ages with more precision, in some instances recording age by half and even quarter years. Another unusual feature of these data is that children's ages were sometimes represented as a range rather than as a single chronological age, such as 6 – 7, 7 – 8, etc. For analysis, I represented all such age ranges as a cohort based on the lower integer.

The data were carefully collected and precise. Most students were measured to the closest millimeter, but some were measured to the half-centimeter. Weight measurements were similar, with most, but not all, results given to the nearest gram.

III

I regressed measures of child health, such as height, on sex, year of measurement, age, social class, interactions of social class with sex, and interactions of social class with year. I clustered standard errors by school type.

$$y_i = \alpha_m male_i + \sum_{s=1}^{9} \beta_s \, (state_i = s) + \sum_{y=1916}^{1924} \gamma_y \, (year_i = y) + \sum_{a=6}^{19} \delta_a \, (age_i = a) + \sum_{c=1}^{2} \theta_c \, (socialclass_i = c) + \sum_{a=6}^{19} \zeta_a \, (age_i = a) \times male_i + \sum_{c=1}^{2} \sum_{y=1916}^{1924} \eta_{c,y} \, (socialclass_i = c) \times (year_i = y) + \epsilon_i$$

y_i is a measure of child health such as height (cm),weight (kg), height-for-age z-sores (HAZ) and weight-for-age z-scores (WAZ). Results are shown in the appendix in Tables 1-4.

Figure 4 shows changes in male height controlling for social class, age, and location. Heights of German children were significantly reduced during the First World War. Compared with 1914, before any impacts of the war or blockade could have occurred, children in 1917 to 1922 were significantly shorter, See Table 1. This pattern of reduced height continued each year through 1922, well after the war had ended. The mean stature of children diminished most in 1918, with overall height being 1.8 cm less than it had been in 1914. These results in height for children correspond to a time lag of at least a year between acute nutritional deprivation and stunted height. Further, height diminishment is cumulative: children stunted one year will begin the next year shorter. Thus the 1920 mean height, for example, reflects not only the inadequate nutritional resources for the previous year, but also reflects accumulated nutritional deprivation. When the body receives few calories, it allocates

those calories to maintain bodily organs rather than to accelerate growth in stature. This is clearly the case in children in Germany during the years 1917, 1918, 1919, 1920, 1921, and 1922. Surprisingly, children were significantly taller in 1923 and 1924 than they had been in 1914. By 1923 and 1924 there was rapid and significant growth (Figure 2).

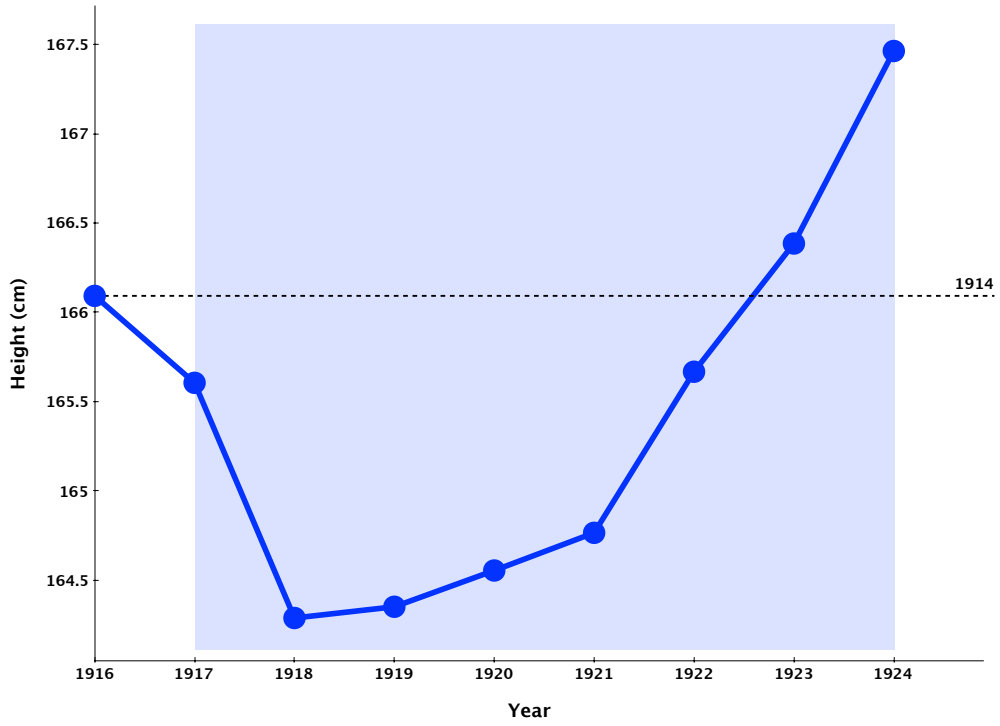

Figure 2. Change in male heights. Years of statistical significance are shaded in blue.

At its lowest point in 1918, overall height loss for German boys from 1914 was 1.804 cm. And at its highest point in 1924, height gain relative to 1914 was equal to 1.37 cm. These differences are even greater when differences such as social class is taken into account.

Weights of children reveal a similar pattern. Table 2 shows OLS estimates of child weight, which is a more immediate measure of nutritional status than height. In the absence of adequate nutrition, a child first slows in weight gain, and finally, if deprivation is intense enough, stature is also affected. German children suffered the greatest amount of weight loss in 1919; children weighed .570 kilograms less in 1919 than they did in 1914.

IV

In the years 1922, 1923 and 1924 German children exhibited significant weight *gain* compared to pre-War standards, with .017 kg in 1922, .654 kg for 1923 and 2.898 kg for 1924. The regression of weight on years of measurement, controlling for sex, age, location, social class, and interactions of social class with year, shows 1922 as statistically significant with a small positive value. With the regression of height, children's average weight change for 1922 was small and negative. Weight should anticipate height. Weight is more elastic, and more closely reflects recent

nutritional exposures than height does. A child will not lose height from one year to the next, but they can lose weight. When the blockade was lifted in 1919 and foreign imports resumed, calories became available allowing stunted children to increase in weight before they increased in stature. Still, for children to surpass their pre-War weights and heights so significantly and so quickly in a time of major changes in the government and economy implies that living conditions for children immediately following World War I were better than they had been before the war. Foreign aid targeted at children that was sent to Germany after the War may explain this, a hypothesis that will be explored in more depth later.

My analysis shows that heights differed in German children relative to their socioeconomic background before the First World War.[14] At the start of the War, wealthier children were taller than middle and working class children. For example, heights of ten to ten and a half years old children from Stuttgart show significant differences between social classes. Children who attended upper class schools were initially taller than children from middle class backgrounds, who in turn were taller than children who attended working class schools. The initial height differences between children of different socioeconomic backgrounds in 1914 are not surprising. However, as Figure 4 and Figure 5 show, children who attended working-class schools in Stuttgart not only started out much shorter than their higher class peers in other schools, they also exhibited the greatest decreases in stature between 1918-1919, a trend symptomatic of significant nutritional deprivation. The War exacerbated nutritional status between social classes.[15]

It is interesting to note that the red lines, representing children who attended middle class schools, follow a different trajectory than the lines for either upper or working class children. In Figure 4, female stature for the middle class children improved from 1916 through 1917, while it remained constant for both upper and working class children at the same time. Figure 5 shows that middle class boys on average lost a cm in height between 1916-1917, however both upper and working class children lost an average of two cm that same year.

Figure 4 shows that after the initial decrease in height for ten to ten and a half year-old girls from all socioeconomic backgrounds that occurred between 1914-1916, working class girls continued to decrease in heights as the war went on while middle and upper class girls saw no change. However, the heights of working class girls recovered first after the war, one year ahead of either the middle or upper classes. Observe that while middle class girls from Stuttgart on average eventually reached their initial pre-War heights by 1924, girls from the upper and middle classes were still one cm shorter than they were in the pre-War period.

Figure 5 shows the data for males of the same age. There was an initial improvement in heights for all social classes between 1914-1916. From 1916 to 1917, average heights for both upper and middle class children dropped back down to the pre-war level. The mean heights of working class boys from 1916-1917 dropped down 1 cm lower than their average before the War. From 1917-1918 heights of working class boys continued to decrease, while middle and upper class boys

[14] Cox, 2011; 2012.
[15] Ibid.

maintained consistent height until 1919. Similar to working class girls, working class boys were the first to show a steady recovery starting from 1920. In 1922, ten to ten and a half year-old boys had the same average height as boys of the same class and age did before the War. And by 1923 they surpassed their pre-War heights. Middle class boys in 1922 also had the same height as middle class boys in 1914. They too had an average height improvement of 1 cm compared to their pre-War 1914 standards. Like the working and middle class boys, upper class boys in Stuttgart were the same height as those measured pre-War by 1922. However, unlike the working and middle class boys, they were not any taller then they were pre-War by 1923 or 1924.[16]

I also regressed child height on social class. Middle class children were on average 2.63 cm taller than working class children and 1.325 kg heavier. Upper class children were 5.089 cm taller and 3.02 kg heavier than working class children.

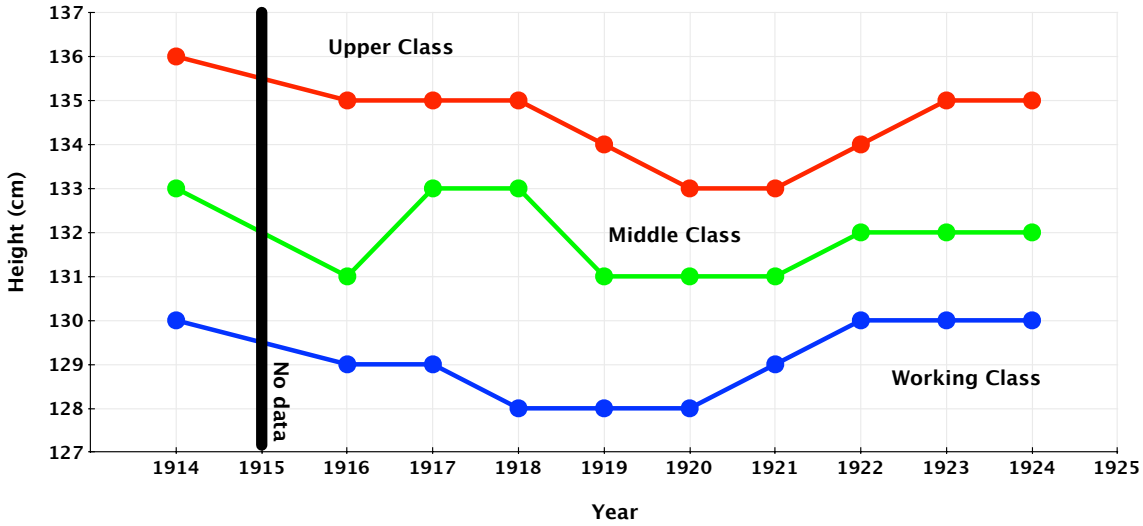

Figure 4. Heights of 10 – 10.5 year-old girls from Stuttgart, 1914 – 1924. Raw data.

[16] The extremely large sample size rules out the possibility of a bias. Working class girls in Figure 4 had a sample size range between 574-858 for each year. Middle class girls had a sample size range of 245-357. The sample size of upper class girls from the period ranged from 211–386. Sample sizes for working class boys in Figure 5 ranged from 459-703 for each year of observation. Middle class boys ranged from 204-339 in sample size. Upper class boys ranged from 183–462 in sample size.

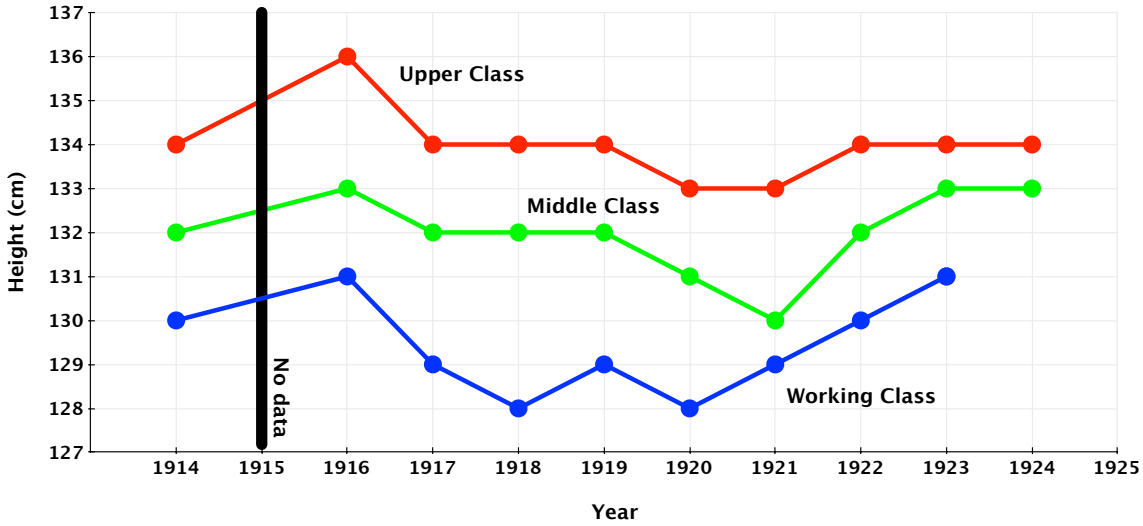

Figure 5. Heights of 10 – 10.5 year-old boys from Stuttgart, 1914 – 1924. Raw data.

Growth patterns of boys and girls are slightly different since girls tend to reach their pubescent growth spurt several years earlier than boys. Further, in general, boys overall attain greater height than girls. Thus, the raw comparison of strict heights and weights in cm and kg without consideration of the contributions of age and sex to the results can be misleading. Instead, development economists and policy-makers looking at child and infant inequalities use Height-for-Age z-scores (HAZ) and Weight-for-Age z-scores (WAZ) as part of their analysis. By measuring the average distance from the median height or median weight of a reference population, children of different ages and different sexes can be fairly compared.[17] However, as the data are based on mean heights and weights of school classes and not on individuals, the full distribution cannot be captured.

Table 3 shows OLS estimation of HAZ scores. Interactions of social class with year have been charted in Figure 6. The black dotted horizontal lines show the average HAZ score for working, middle, and upper classes in 1914, before the effects of the blockade. These lines are drawn to facilitate the comparison between changing HAZ-scores over time relative to their own pre-War standards as well as other socioeconomic groups. Notice first that in 1916, two years into the War, all else being equal, upper-class children were taller than they had been before the war. Notice too that in 1916, children from middle class backgrounds were .1079 less than they had been before the War, and that working-class children were barely below what they had been previously. Data for 1915 are not included because these data were not recorded at the time, a singular lapse in the collection of children's measurements that reflects the exigencies of the war. It is important to recall that when interpreting heights or HAZ scores over time, a time lag of roughly one year must be considered. Further, height is cumulative. Heights are less elastic than weights, and it takes some time before changes in nutrition in an individual or a population will be manifest in increased stature. Thus the HAZ scores for 1916 for the upper and working classes indicate that as late as 1915, the effect of the blockade on children's nutrition was small. As shown by the HAZ scores, the year 1916 was highly significant, being small and negative. (-.0108). By 1917, upper class children experienced their biggest

[17] O'Donnell, "Analyzing Health Equity."

drop in HAZ scores, and working class children too began to lose stature. All things equal, the drop was -.0984 overall and highly significant. Middle class children were the least affected, since their HAZ scores were slightly increasing. These data give evidence for black market participation for the upper classes. During a time of rationing upper class children's weights and heights fared better than the lower classes. The difference in height and weight are especially marked as higher rations were given to factory workers, particularly those involved in the arms industry. Sometimes workers would even be fed at work. Given these nutritional data, the plight of poor children is even more startling, and the use of anthropometrics as a means of measuring black market participation becomes even more significant.

The turnip winter

Of particular interest to historians is the winter of 1916/1917, a period known as the "turnip winter" due to the severe food shortages across Germany. Turnips, a foodstuff that had been primarily used to feed livestock including pigs, were one of the few remaining items available for human consumption. Low HAZ scores for 1917 and 1918 could be a reflection of the turnip winter. Indeed by 1918 HAZ scores for the working class were at their lowest, at -1.207. Yet HAZ scores for the middle and upper classes improved slightly, indicative of the possibility of securing food sources beyond the highly volatile rations. After 1918 working class children experienced a slow and steady improvement in their heights. By 1923 they surpassed their pre-war standard. The upper and middle classes did not obtain their previous 1914 heights, although the middle class got close. Both upper and middle class children began to lose stature relative to their working class peers starting in 1919; while the stature of working class children improved, upper and middle class children lost in height. It is possible that whatever outside supplements to their diets these children might have had at the beginning of war, many of the upper and middle classes were no longer capable of participating in black markets[18], perhaps due to lack of availability of goods, increased enforcement of prohibitions against black market activity, or the continued high prices foodstuffs must have commanded. Yet, nutritional recovery after the war was far more rapid for working class children than it was for middle and upper class children. While HAZ and WAZ scores decreased in 1920 relative to 1919 for the upper and middle classes, they increased for the working class. From 1918 onwards, working class children showed a steady recovery.

[18] Cox, (2011) suggests that individuals and groups that exhibit greater weight and height in times of rationing, such as World War I, can be used as evidence for black market participation.

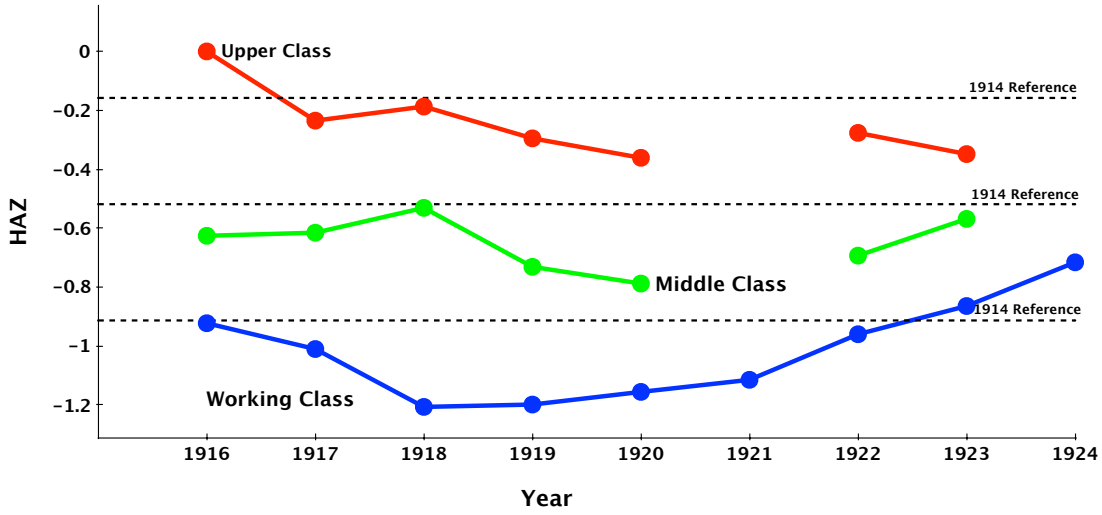

Figure 6. Changes in HAZ scores for social class by year.

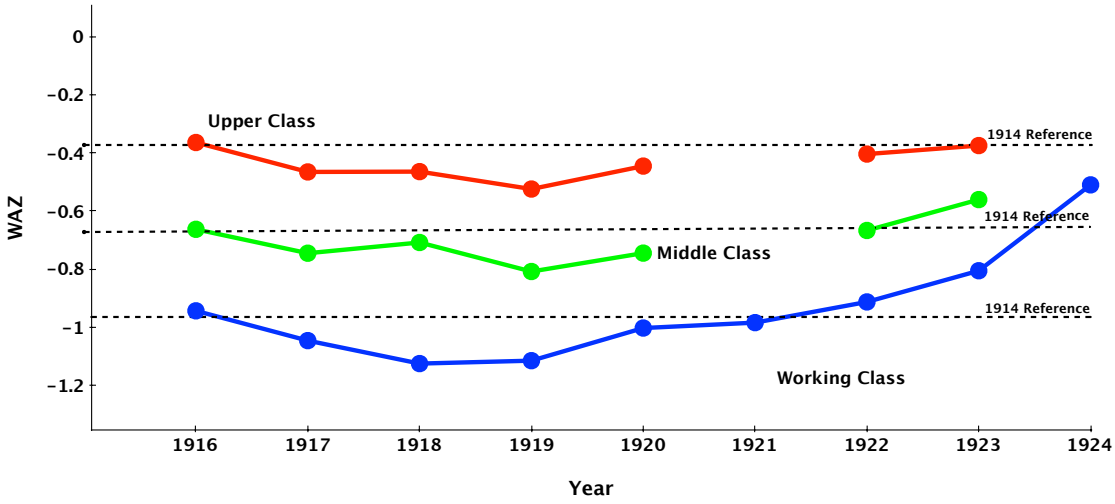

Figure 7. Changes in WAZ scores for social class by year.

An examination of WAZ scores by social class confirms those shown by the HAZ-scores, and adds a bit more detail. Recall that weight is much more elastic than height, and changes in nutritional status will first be reflected in weight than in height.[19] Weight shows a more immediate picture of nutritional status. But weight alone is not a perfect snapshot. Weight-for-Height z-scores (WHZ) are a better indicator of immediate health conditions than Weight-for-Age z-scores. However, WHZ for older children are not included as part of the reference standards for either U.S. National Center for Health Statistics (NCHS) reference group, or the World Health Organization (WHO) reference group. For this study I have to rely on WAZ rather than WHZ scores. Though still a snapshot of more immediate body mass for age, WAZ is a composite measure of HAZ and WHZ scores.

[19] Costello, for example, shows that stunted children gain weight at the expense of height.

Consider the WAZ scores in Figure 7, keeping all things equal, for 1916 compared to the HAZ score for 1916 in Figure 6. While HAZ scores for the upper class in 1916 were higher than they were before the war, WAZ scores for the upper class in 1916 were about the same as they were in 1914. This means that while upper class children may have enjoyed a brief influx of food resulting in an increase in their heights relative to 1914, their weights weren't increasing by the same amount. Unfortunately, data for 1915 are lacking, but may have shown an increase in WAZ above the 1914 standard. Otherwise it would be unlikely to find a jump in HAZ scores that profound for 1916. That said, whatever boon came to the upper class soon after the war began in 1915 was dissipated by 1916 as their weights went back down to their 1914 standard. Heights however, less elastic, were slower to change and remained at their higher position.

Continuing to consider 1916 and moving down Figures 7 and 8, it seems strange that WAZ scores were roughly the same for the middle class as they were in 1914 while their HAZ scores had decreased. This indicates that their nutritional status the year previous would have been compromised, with lower weights in order to decrease heights the following year. Yet whatever loss there was in terms of weight in 1915, middle class children regained their weight in 1916.

Continuing down the line for 1916, working class children had very close to the same HAZ and WAZ scores in 1916 as they did in 1914. It was not until 1917 that working class children had large decreases in their WAZ scores. This is similar for the upper and middle classes as well. The slope of HAZ scores for working class children between 1916 and 1917 is slightly steeper than it was for the middle and upper class children. Between 1917 and 1918 WAZ scores for the working class continued to plummet, reaching their lowest point at -1.207. This was not the case for the middle and upper classes, which, while still below their 1914 standards, increased their WAZ scores relative to the year before. From 1918-1919 the working classes made a slight improvement, with the average WAZ-score at -1.199, while the middle and upper classes both declined. Upper class WAZ scores stayed about the same between the years 1917-1918. They improved for the middle class, but decreased for working class children.

There is a limit to how much weight can be lost and how much stunting can occur in children. From 1918-1919 weights for the working classes were stable, while at the same time weights decreased for middle and upper class children. This does not necessarily indicate an improvement in nutritional status for working class children in comparison to their middle and upper class peers. If all groups had been receiving similar amounts of nutrition, then you would expect to see the weights of working class children jump to closer approximate that of middle and upper class children. This is not the case in 1918 or 1919.

Perhaps the most interesting detail to emerge from Figure 7 of WAZ-scores is the constant improvement in WAZ scores for the working class between 1918 and 1924. By 1921 they almost regained their 1914 levels, and by 1922 they surpassed it. By 1924, working class children increased their WAZ-scores, surpassing even the WAZ standards that the middle class held at the beginning of the war in 1914. These changes were significant, and quite large, especially for such a short period of time.

Improvements occurred for upper and middle class children during this period as well, however not to the same degree and not at the same rate as for the working class. By 1923 middle class children surpassed their 1914 WAZ standard before the war, and upper class children just about reached their previous 1914 levels. In terms of HAZ scores however, middle and upper class children had not yet approximated the norms they had held pre-war in 1914.

V

Nutritional deprivation also varied for males and females. This is apparent from the sex indicators of HAZ and WAZ scores, which show that females did significantly better than boys. The full results of these regressions are found in Tables 3 and 4. Figures 9 and 10 below show a clear lead in female heights and weights. They also show the importance of age in determining overall height and weight.

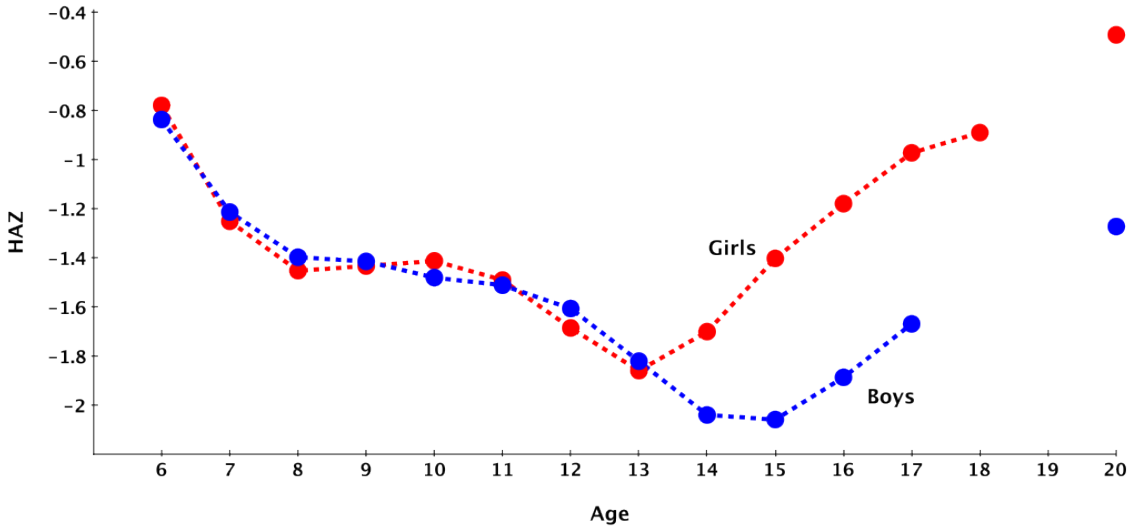

Figure 8. HAZ Scores by Gender and Age

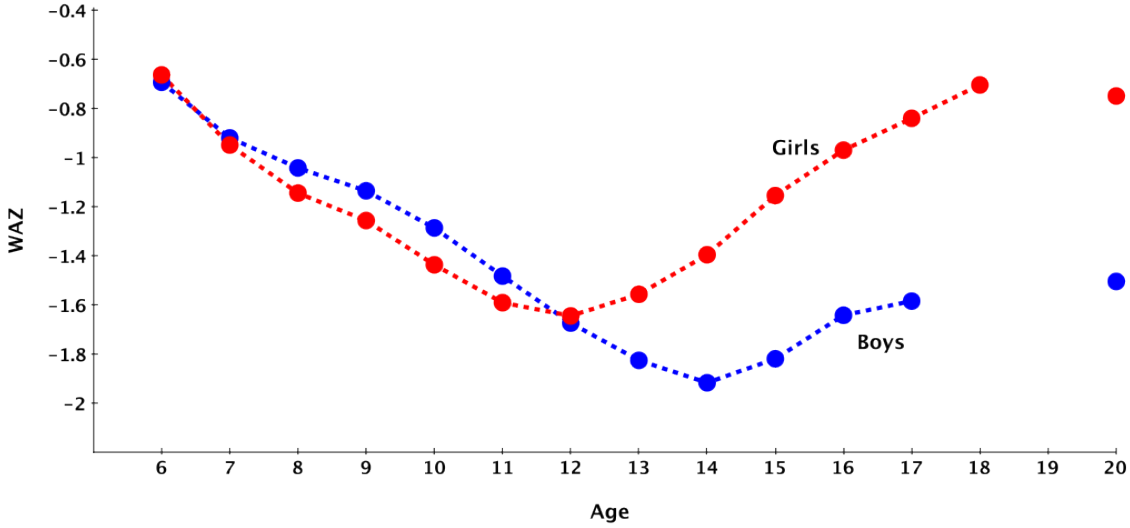

Figure 9. WAZ Scores by Gender and Age

As Figure 8 shows, HAZ scores were higher overall for females than they were for males, but not until age fourteen. Until then, males and females shared similar HAZ scores by age. Examining the WAZ scores in Figure 9 reveals a similar pattern. Males and females shared similar WAZ scores, with males slightly heavier, until age thirteen, when they diverged and females again took the lead. From ages eight through eleven boys were slightly heavier than girls, while boys and girls shared a closer height relationship between those ages.

That girls fared significantly better than boys (accounting for age they have a .715 higher WAZ and .494 higher HAZ overall) is at first a surprising result. They imply that within family structures sisters did better than their brothers.

Previous studies often show that in times of need, household division of resources tended to favor individuals in a household who bring in the highest income through their labor, thus ensuring a family's continued survival. More calories are needed to sustain work and physical labor. For example, in Philadelphia in the 1880s, Haines found that male children received a higher allocation of food then female children within the same household.[20] This fits into the economic paradigm of bargaining power. The logic is that intrahousehold allocation favors those who contribute, or will contribute, more to overall household incomes. Even as women and children entered the workforce in increasing numbers thanks to specialization with inventions directly targeted for their job entrance[21], wages for women and children were much less than they were for men.[22] Household caloric allocations continued to favor the male patriarch. As men, including boys, tended to have higher wages than women and girls, it made economic sense for a family to favor them and thus secure future higher earnings.

There are also physical arguments in favor of expending more household resources on men rather than women. Men in heavy industry require more physical energy to complete their work than a woman not engaged in such intense physical activity. Often however, even when accounting for differences in caloric need and expenditure, many men still receive higher ratios of household goods than females. This simplicity of the bargaining logic often ignores the intricacies of historical detail. Boys have not always received a large piece of the familial household pie, even when their potential earnings were much greater.[23]

Patriarchal advantage over increased female bargaining power was not universal. Horrell and Oxley show several examples of locations where older female matriarchs, beyond childbearing age, received a large percentage of household goods

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[20] Haines, "Poverty, Economic Stress, and the Family". p. 251.

[21] Humphries, *Childhood and Child Labour in the British Industrial Revolution*.

[22] Humphries, "The Lure of Aggregates and the Pitfalls of the Patriarchal Perspective".

[23] Horrell and Oxley (1999) show that children expected to earn higher wages did not necessarily receive more household expenditure; Logan (2007) cannot fail to reject any statistical hypothesis that shows that household allocation between male and female children in the late 19th c. was equitable.

regardless of their direct economic contribution of wages brought in by the rest of the family.[24]

What then, if anything, can this analysis—which demonstrates equitable nutritional status between male and female children until adolescence—add to our understanding of household allocation? It is important to note, again, that in terms of caloric consumption, unequal intrahousehold allocation is only an issue in times of need and deprivation. Wartime Germany from 1914-1924 was certainly one of these times, as has been shown.

The relative distribution of calories between males and females can be shown by examining height-for-age z-scores (HAZ) and weight-for-age z-scores (WAZ). Refer to Tables 3 and 4 and Figures 9 and 10. It appears at first glance that females were systematically favored over boys during the War. However, a more nuanced analysis that separates not only by gender but also by age reveals a more complex story. On the workforce, German boys at the time earned more than their sisters which could have added to the families overall food supply. Furthermore, boys would have gone off to become soldiers. Wouldn't that be an adequate reason to give the extra food to boys? Or, to take the opposing side of the future soldier example, perhaps the pending departure of sons in circumstances as soldiers, where they would have been fed better than civilians at home, meant they could afford to take a little less of the family pie before they left. Or, depending on the individual's view of the War, perhaps mothers thought the fighting would end soon and took little account of their sons' future enlistment.

But, when looked at this issue in terms of physiology rather than just economics, the reasons for this gender disparity becomes clearer. Boys and girls need roughly the same amount of nutrition from birth. However, beginning a little before puberty, boys require far more calories to maintain their growth then females do. For instance, modern nutritionists assert that for healthy bodies to grow, girls on average between the ages of 14 and 18 need 2368 calories per day. Boys between the ages of 14 and 18 however need 3152 calories per day.[25] The difference in caloric need to maintain adequate health between adolescent boys and girls is significant. At puberty, boys require 33% more calories. These ages serve only as an indicator, however, because they reflect chronological age, and not biological age. Further, this rough estimate of caloric needs does not take into consideration any of the essential vitamins, minerals, or proteins that are necessary for growth.

In addition to a greater need for calories for boys than for girls at puberty, physiological differences that are more apparent during and after puberty also affect the ways in which different genders handle food shortages. In additional to the development of sexual organs in puberty, girls begin to store fat deposits. At the same time that girls increase their overall fat composition boys begin increasing in lean muscle mass.[26] When the body is under stress due to insufficient nourishment, females lose their fat deposits before they lose muscle. Males in adolescence on the

[24] Horrell and Oxley, "Bringing home the bacon?"

[25] Stang and Story, eds. "Nutrition Needs of Adolescents". p.22.

[26] Roche and Sun, *Human Growth Assessment and Interpretation*.

other hand have less fat reserves and their bodies are more susceptible to large decreases in caloric intake.

Further to physiological differences in terms of caloric need and response to adverse conditions, there is also another historical example which shows boys to be more negatively impacted nutritionally than girls during times of nutritional disaster. Tanner, for example, points out in reference to the famine in Brussels in 1816 and 1817, that "in such circumstances [puberty] boys are almost always worse affected than girls…"[27]

The counterintuitive impacts of food shortages on gender in World War I Germany are perhaps not as surprising when human physiology is into account. There are additional possibilities for the gender-based disparities found in this study. The first is the recognition that World War I was not a time of normal family economy. Rather, German families were operating under severe disruption to their food supplies. The normal patriarchy system had been disrupted, with large numbers of working men away from their families and fighting at the front. There would have still been old or disabled men at home, plus normal aged men that were retained to work in the factories, mines, and on farms. But the overall number of males shrank dramatically. This changed fundamentally who controlled the bulk of familial expenditures. Women, particularly mothers, had a much higher discretion than before as to how they divided household goods and foodstuffs. Furthermore, the historical record details the long hours working women spent in lines in order to redeem their food rations and pick up basic necessities. This was primarily a female activity, and not one that men at home entered into. Women's ability to wait in line and to negotiate needed social outcomes may have thus contributed more to the caloric content of the family diet than the traditionally male-dominated spheres of farming and manufacture. Women were much more involved and closer to their family's food supply than they had been previously. With no husband at home to then dictate how those goods should be allocated, women took the lead.

Did mothers favor their female children more than they did their male children, once they entered their teenage years? As has been previously mentioned, different physiological requirements for overall food intake begins to increase at puberty, just when we see HAZ and WAZ scores for German children in the study diverge. It could be that equal access by gender to scarce food supplies continued in absolute terms—families could have continued to give children the exact same amount of food—but that this "even divide" was not actually fair. To fulfill basic caloric requirements, boys at adolescence needed to consume at least a third more than girls at puberty did. This may not have seemed very fair to those mothers who tried to divide their insufficient food supplies equally. Perhaps boys did get more than girls did, but no one received enough. The physical constraints on adolescent boys with their lean muscle was greater than it was on adolescent females who could rely on some fat deposits.

It could also be the case that food was divided equally at home, but that teenage boys began to work after school, expending more calories than girls did. Thus even if

[27] Tanner, *A History of the Study of Human Growth*. p. 132.

boys had received a third more of the calories at puberty than their sisters did this would not have been sufficient. Ute for example, writes about teenage boys being employed after school and contributing to the family income.[28] How much of an overall effect this had, and the percentage of employed male teenagers overall, is still uncertain however. Thus, mothers may not have been complicit in assuring that their daughters had a higher nutritional status than their sons did.

Recall that human growth rates speed up during puberty for both boys and girls, giving rise to the pubescent growth spurt. During and preceding the pubescent growth spurt, more calories are required for the body to sustain growth. Knowing this, and seeing that girls still take a very large lead, before and during puberty, makes this a very interesting case. Girls would have needed more calories early.

More research is necessary to test these hypotheses. What is not in question, however, is that teenage girls were less deprived in World War I Germany than boys.

VI

What might be the reasons for improved heights and weights of the working class from 1919 onwards? Though wartime hostilities ceased in November of 1918 due to the armistice, the Allies maintained the blockade until July of 1919 and the Treaty of Versailles. The German diplomats who agreed to the draconian terms of the armistice (though the record shows that they did not do so without a fight) found that their political careers were finished. And although Germany had surrendered, the German people continued to suffer from the lack of food.

One gets a sense of the rigidity of the Entente in regards to the food blockade and the concomitant desperation of Germany from an examination of the armistice negotiations themselves. "The existing blockade conditions set up by the Allied and Associated Powers are to remain unchanged," Commander-in-Chief of the Allied Armies, Marshal Foch declared, even though Germany had already called for a cease-fire. "German merchant ships found at sea remain liable to capture."[29]

The German Armistice Commission disagreed with this pronouncement, since a continued blockade of Germany would continue to inflict suffering on an already hungry people. Foch responded, "The Allies are of the opinion that once the armistice has been concluded the continuation of the blockade will not hinder the provisioning of Germany as shall be found necessary." [30]

The final demands of Marshal Foch in regard to the blockade contained minor consolations from his first two suggestions and was signed by both Allied and central powers representatives on November 11, 1918 at 5 a.m. The German delegates who signed the document, Secretary of State Matthias Erzberger, Ambassador Count Oberndorff, General Major Von Winterfeldt, and Captain Vanselow would be later be termed the "November Traitors" on their return to Germany. Secretary of State

[28] Ute, *The War From Within.*
[29] *The Blockade of Germany After the Armistice*, p. 3.
[30] Ibid. p. 4.

Erzberger, would later pay for it with his life when he was shot point blank in 1921 by a disgruntled citizen.[31] After considerable discussion and objection these German leaders signed their names to the following treaty:

> The existing blockade conditions set up by the Allied and Associated Powers are to remain unchanged, German merchant ships found at sea remaining liable to capture. The Allies and the United States contemplate the provisioning of Germany during the armistice as shall be found necessary. [32]

This concession, marginal at best, obligated the Allies and the United States to "contemplate the provisioning of Germany" while in reality still keeping the blockade intact. Thus the creation of a stable food supply in post-war Germany was totally dependent on the largesse of the Allies, a largesse which, given the extreme bitterness of the previous hostilities, and the massive number of Allied casualties, was not soon to materialize. Marshall Foch represented a country that, while not as destitute as the Germans, had also come out of a major war with a weakened economy and smaller food supply. The impact of sustained blockade on German children is reflected by the WAZ of the middle class for the years 1918 and 1919 on Figure 7.

Meanwhile the German economy, which had suffered during the War, continued to struggle. Germany underwent a major change of government. Kaiser Wilhelm II went in exile to the Netherlands in November 1918. Governmental political bodies were reorganized or destroyed though some national institutions, such as the Reichstag, were created. Hyperinflation of the Reichsbank mark hit a high in 1923 before the currency was replaced with the more stable Rentenmark.

In addition to a new government, there were other political consequences of the end of war. National boundaries changed, and Germany lost much of its former land, some of which was quite fertile and which previously had been considered centers of agriculture. Former German farmlands were instead ceded to France, Belgium, and Poland. "The peace settlement of 1919 transferred a fifth of Germany's rye lands and a smaller fraction of the wheat, barley, and oats fields to Poland, France, Belgium, or Denmark. The potash and phosphoric fertilizers of Alsace-Lorraine went to France. Germany lost about one-eighth of her rural productive capacity."[33]

VII

This alienation of German agricultural lands and appropriation of domestic sources of German fertilizer supplies by the victors of World War I had a significant impact on the food supply for German civilians. Taken together, these events perpetuated the wartime disruption of the German food supply, resulting in inadequate nutrition for German children. The continued blockade of Germany until the signing of the Treaty of Versailles, in addition to a law that prohibited Germans from fishing in the oceans, made the period from November 1918 until July 1919 very difficult.

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[31] Evans, *The Coming of the Third Reich*.
[32] *The Blockade of Germany After the Armistice,* p. 4
[33] Heaton, *Economic History of Europe*. pp. 449-450.

The Allies saw continuation of the blockade after the armistice not as an act of vengeance, but instead as a mechanism to prevent German rearmament and to force German compliance with later peace terms. The operative clause of the Armistice that permitted continued disruption to German food supply, "the Allies contemplate the provisioning of Germany during the Armistice as shall be necessary" was drafted during heated discussions on Germany's surrender. England, France, Italy, and the US met in December of 1918 and argued as to which of the victorious powers should be in charge of distributing food across war-torn Europe. Much of the fight had to do with political power as food was seen as a very good motivator for compliance. Furthermore, export of foodstuffs could help stabilize domestic agricultural prices within the exporting country.

As head of the US Food Administration, and through his prior experience in supplying food to millions of Belgians during the War, Herbert Hoover was placed in charge of US aid in Europe. To the chagrin of other US politicians, Hoover was given the financial, shipping, naval power, and other supplies necessary to execute those duties. At his request, President Wilson secured an appropriation of $100,000,000 in February, 1919, that could be used through direct loans or through charitable organizations to assist with European recovery. A problem for Germany with this legislation, however, was that before the bill passed, US Senator Henry Cabot Lodge from Massachusetts tagged on an amendment that no funds from this appropriation could be used to feed civilians from enemy countries.[34]

Hoover maneuvered around British and French political and bureaucratic regulations, declaring in effect that America would remain in control of her own donations and would ship food wherever its leaders deemed necessary without asking permission.[35] With considerable political adeptness he included the allies in an ongoing discussion on how aid might be delivered in future. During these discussions, however, he unilaterally executed with the backing of the United States his own aid initiatives. In fact, Hoover bypassed the U.S. congressional restriction against using the allotted funds to feed "enemy civilians" by arranging loans to Britain to provide food aid, loans which were never intended to be repaid.

Hoover and his colleagues confronted other problems beyond mere political considerations. The topography of Europe changed during the War with much of European infrastructure, ports, railways, and communication lines destroyed. Transport of foodstuffs once unloaded from the shipyards became very difficult. Rather than waiting for these lines to be fixed, Hoover and his group initiated needed repairs themselves, or, when no alternatives were available, built entirely new lines. Hoover hired servicemen who had recently fought in the War and needed jobs as well as his former Belgian relief workers. He told the veterans to wear their old army and navy uniforms during their relief efforts, something which encouraged others to show them deference to and to obey their orders.

[34] Hoover. p. 304
[35] Burner, pp. 114-136.

Thus, although shipments of food from the United States began arriving into London ports by mid December, 1918, it took four months longer, until March 14th, until their contents reached Germany. Further, it took until March before Hoover again secured fishing rights for Germans in the Baltic Sea which had been forbidden as part of armistice. It took some time longer before Germans were allowed to fish in the North Sea.

As shown in Table I, the mean height of German children reached its lowest point in 1918 and 1919. Similarly, Table 2 shows that children's weights were at their worst in 1918 and 1919. The gallant efforts of Hoover not withstanding, the blockade of Germany that had occurred during the War continued in effect through the winter of 1918 and 1919 without mitigation until shipments of US food finally began to be distributed in March of 1919. Qualitative sources also assert that the food crisis continued after armistice than it had been during the War.[36]

In all, Hoover asserted that under his direction Germany was supplied (either through donation or purchase) with 1,298,025 tons of food, not including other supplies such as clothing, from the United States, the United Kingdom, France, Argentina, the Netherlands, and Switzerland.[37]

With the signing of the Treaty of Versailles, the legal duty of the allied forces to consider helping Germany as noted in the phrase "the Allies contemplate the provisioning of Germany" was absolved. Hoovers' official government role to assist with the feeding of Europe ended. Germany was now free to trade and receive goods from any who would send them. Although the political mandate to support German civilians, including German children, was over, Hoover understood the continued need for German civilians to receive aid. German-Americans in particular were eager to help their relatives. As soon as mail service to Germany was restored in 1919, anxious family members and relatives sent packages of food. From the Milwaukee post office alone (a city with a large number of German immigrants) 100,000 packages were sent to Germany by the end of November 1920.[38] Politics were involved with some German-Americans vocal in proclaiming "American responsibility" for the state of Germany children due to the treaty of Versailles. In an attempt to separate philanthropic consideration from this negative, almost anti-American rhetoric, Herbert Hoover approached the Quaker American Friends Service Committee. This new endeavor was Hoover's response to being absolved of his duties. His linking of the American Relief Administration with the Quakers was strategic, as the Quakers were seen as quintessentially American, with deep roots stretching back to the formation of the country. The Quakers also benefitted from the broader perception of them having the requisite political leanings of peace. The idea, which was slow to take root, was that giving the face of international aid to Germany to the Quakers rather than to the angry or dissatisfied German-Americans would give the cause of the German people wider appeal.

[36] Richter.
[37] Hoover. p. 391
[38] Strickland, "American Aid to Germany".

Other religious groups in the US, particularly those that had a high percentage of German-American in them such as the Lutherans, raised $800,000 to send to Germany within two years of Armistice in addition to their personal contributions. The personal donations of individual German Americans were generous, but unfortunately some donors were publicly reviled due to anti-German sentiment in the early aftermath of the War. Donations and aid from the United States increased as time went on and as sympathies began to sway in favor of Germany. The American Relief Committee for German Children collected $266,000 by March of 1920, with many single donations of $1,000 to $10,000 being made by famous Americans. By securing support from well-known, non-German Americans, Hoover hoped that more Americans would donate. In December of 1920, Hoover, unhappy that more had not been donated to the Quaker American Friends Service Committee, quietly transferred $4,000,000 of his own money for the relief of German children.[39] Hoover would continue to fight for the German children, a fight that would eventually include them as one of aid the targets for the European Relief Council, which had access to $33,000,000. He famously declared, "The United States is not at war with German infants."[40]

The AFSC was approached by Hoover in November of 1919, and by January of 1920 the first Quaker missionaries arrived in Germany. The first feeding of German children began on February 26th, 1920. By June 1st of 1920, they had served 44.6 million hot meals to German children and pregnant women or nursing mothers. Their reports show that food imported to Germany for this purpose was the equivalent of 756 tons of lard, 527.5 tons of cocoa1, 125 tons of sugar, 7,770 tons of milk, 802 tons of rice, 4,793 tons of flour, 873.5 tons of beans, 926.5 tons of peas, and 146 barrels of oil. Total expenditures on this food cost (not including shipment, overhead or any other costs) were approximately $2,650,000.

For the period of June 1st 1920 through May 31st 1921 data on food expenditures or shipments are not available.

From June 1st, 1921, the tonnage of total food distributed by the Quakers in Germany is not listed, however expenditures on food was $4,748,080.00. Given that food expenditure of $2,650,00.00 previously produced 44.6 million meals, this suggests that nearly twice the amount of meals were provided from 1921-1922.

In 1922 the largest amount of children being fed in any one day equaled 1,010,000 children. The AFSC decided to remove their services and turn over aid to German charities. They continued to provide provisioning for 500,000 children to receive a daily meal.

In January 1923 the Ruhr was invaded and the AFSC decided to return to Germany. Previous plans were adopted and implemented, and again by June 1924 1,000,000 German children were being fed daily.

Hoover's tact in working with different political and religious groups and with wealthy Americans, as well as his personal tenacity and direct contributions in

[39] Ibid, p. 264.
[40] Ibid, p. 264.

securing funds for German children is nothing short of heroic. This aid, specifically targeted towards poor German children, was undoubtedly reflected in the steady improvement of working class children from 1918 through 1924 as reflected in their HAZ and WAZ scores seen in Figures 7 and 8.

The AFSC represented the largest single aid group sending charity from the US. Their efforts were highly organized. Solicitation and contributions were centralized through bulletins, food centers, and letters. It's quite incredible that with so much food, so little of it apparently went astray in a land that had previously been characterized by illegal food markets. Measures and weights were taken of food before it was distributed, as well as the number of meals that had been served. Precise recipes were also given, as well as serving size.[41]

Internal reports and instructions sent to cooks included special instructions on how food could not be burnt and must taste delicious so that children would eat and nothing was would wasted. There were strict recipes to be followed, the most popular being a sort of chocolate soup consisting of condensed milk, rice, sugar, lard and cocoa. Children also received a piece of bread, and sometimes beans or peas. This diet seems to have been very popular with the children, especially the chocolate or "Quaker" soup. A typical meal was carefully measured and consisted of between 670 and 750 calories.

In order to receive one of these special meals, German children would line up outside the feeding centre with their feeding card. The feeding card had each child's name and description and was signed by the local head of the feeding committee. The card was carefully checked, and then punched before they could get inside the centre, which was typically located in a school or a hospital or other working place. The formality of checking the cards, with each card punched for each meal consumed allowed great precision in ensuring that the children were receiving nourishment. It also prevented or at least mitigated the role that black markets had played during the War in distribution.

There were strict instructions on the timing that meals would be served. They were to be an additional, and not a substitute meal, served at times other than lunch times. Children fortunate enough to have a feeding card were initially fed for one month, after which their health and status would be reassessed. From the start, the Quakers used a triage system to determine which children would receive food cards. Children were categorized in classes between 1 and 4, with first class being an individual with no apparent nutritional deficit, and class 4 being a child with severe rickets or tuberculosis or other serious disease as a result of malnutrition. Though children in class 2 were still considered to be "undernourished" the AFSC had only enough supplies to feed children classified in classes 3 and 4. Assignment of a child to a nutritional category was determined by medical examination performed by doctors and other professionals, and not by the Quakers themselves. Once selected, a

[41] All information taken on food distribution practices of the AFSC, including total food quantities, expenditures, child classification systems, caloric content of meals, instructions to missionaries, and food transportation, is taken from papers in a series of boxes from the years 1918 - 1926 in the American Friends Service Committee Archive in Philadelphia.

child would receive a daily additional meal, except for Sundays, from the Quakers for one month at which point their health would be reassessed. If they needed additional help and still fit into class 3 or 4 then they would be given a new meal card and the process would begin again.

Aid was preferentially given to children between ages 2 – 14, and to impoverished nursing and pregnant women. In an internal report in 1920 the cutoff age of 14 for participation in the feeding program was discussed. AFSC members were of the opinion that children beyond the age of 14 were also in desperate need of food; however they didn't have enough food to serve them as well.

How Food was distributed

Food was cooked in large central food stations for distribution to individual feeding centers throughout the communities. Measurements of food were taken before and after feeding. The feeding program was so large that the AFSC relied on, and worked closely with, German volunteers. At one point, instructions were given to members of the AFSC assigned to open a new city or area (after it had been approved) to ask heads of each important organization- including a head of every major religion and political group in the area, so that one member of each could join in the committee of food distribution for children and mothers for that area. This was done to ensure impartiality of distribution. Nevertheless the Quakers continued to encourage and remind its missionaries and servicemen that they were giving not only food, but brotherly love, and that their missions were primarily religious. Sharing food was an expression of their faith in Jesus Christ and in building human peace.[42]

Likewise, the participants were instructed strictly to give no consideration to a participant's gender or religious affiliation when parceling out aid. As far as I can determine, this seems to have been the case. There are records of food being distributed to Jewish, Catholic, and protestant children, as well as to poor and even a few upper class schools.

The Quaker system of using a highly organized triage to feed children who were suffering the most nutritional deprivation explains the increases in height and weight for working class children from 1919 - 1924. Children from working class backgrounds, who are shown to be the worst off during the War, increased substantially in both weight and height after the War. As they suffered the most, they would have been the targets for aid and fit into categories three and four.

Evidence indicates that charity organizations in the UK, particularly the Save the Children Foundation, sent considerable aid to feed German children in the early 1920s. Eglantyne Jebb founded Save the Children foundation as a response to what she viewed as the immoral treatment of German children during the war, particularly since the British blockade continued after the War had ended. Jebb printed pamphlets with pictures of hungry-looking German children and babies as a way to wake up her country and secure sufficient donations. Despite being arrested at one of her demonstrations, Jebb continued to speak out for the cause of needy children. Well

[42] This message is reproduced on most internal AFSC documents that give instructions to aid workers.

connected, and from a privileged aristocratic background, Jebb used her social standing and personal tenacity to garner support and donations from British elites and to manage the ever growing Save the Children Foundation. Her efforts eventually won her an audience with Pope Benedict XV, who immediately responded to her plea with a personal donation of £25,000.00, and, later, with a special worldwide letter requesting that all Catholics, regardless of their location, donate to the Save the Children Foundation so that needy German children might be fed. This was the first instance in which the Church had supported a non-denominational cause. Collections for the poor children in Germany were acquired from as far away as Samoa, a former German colony in the Pacific.[43]

The plight of German children did not go unnoticed on the international stage. Immediately after the War, books, posters, and pamphlets depicting hungry German children were published in English,[44] German,[45] Swedish,[46] and Spanish.[47] Within Germany itself, posters, including one particularly grim one which depicted a skeleton against a background of red carrying a scythe with the words "Ein Volk, Eine Not! Grauenhafte Not kam über Kinder, Schwache u. Greise."[48] were circulated. The message was consistent: German children had suffered greatly during the War and were in need of immediate help. Different groups across the world began shipping food aid to Germany specifically targeted towards poor children—working class children. Charity and aid to help children was sent to Germany from governments and private organizations in Mexico, Argentina, Brazil, Peru, Australia, Japan, Cuba, Egypt, Iran, South Africa, the Netherlands, Switzerland, Austria, Hungry, Czechoslovakia, Romania, Spain, Italy, Sweden, Norway, and Finland.

While precise statistics as to the amount of food sent from these countries has not yet been acquired, the provisional data from the AFSC records alone suggests it was very likely that these international efforts at relieving German children of their suffering manifested themselves in the steady improvement of heights and weights of working class German children, as shown in Figures 7 and 8. As foreign aid was targeted towards children of most need, working class children improved their overall heights and weights in the post-war period of limited trade and an unstable currency, while upper and middle class children continued to flounder immediately after the War. Statewide control of foodstuffs and rationing during the War were not administered equally to hungry German children due to contraband and incompetence, but foreign aid after the First World War ensured that working class children received food. These data evidence the success of one of the earliest instances of international philanthropic aid.

Contemporary anthropometric measurements of children's heights and weights show that when the War and blockade began, Germany children began to

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[43] Mulley, *The Woman Who Saved the Children.*
[44] Rubmann, *Hunger! Effects of Modern War Methods*.
[45] Siegmund-Schultze, *Die Wirkungen der englischen Hungerblockade auf die deutschen Kinder*.
[46] Johansson, *Om Tysklands folknäring under kriget och för närvarande.*
[47] Guervos, *Un pueblo en la miseria.*
[48] American Friends Service Committee, [*poster*].

lose in stature and in weight. The effects of the War on childhood nutrition continued for a time after the war stopped. International aid in the form of foodstuffs targeted towards poor children began arriving in Germany just as inflation was at its worst. The negative impacts of the British blockade, ruined German economy, alienated German lands, and currency inflation, all could have been predicted to have worsened the nutritional status of German children. But what the data reveal is that despite these circumstances, nutrition of poor children's health in Germany, as shown by their HAZ and WAZ scores, improved significantly. These data now clearly show the truly massive beneficial effect additional food in Germany had on the welfare of its poor working class children.

VIII

Nutritional deprivation of children existed in Germany before the War began, largely determined by a child's socioeconomic class. Analysis of contemporary anthropometric data on German children refutes claims that the effects of the British blockade and War on Germany did not result in significant nutritional deprivation for German children during the First World War. Indeed, the data show that children across Germany suffered significant losses in their heights and weights during the war. These data also show that deprivation varied significantly for different groups across society, based on class and gender. Differences in nutritional status by social class were amplified during the First World War. The lowest class children, already lighter and shorter than middle and upper class children, became even smaller compared to the middle and upper classes, yet their recovery was the quickest and most robust. An analysis of children's nutrition during the War shows that girls were less nutritionally deprived than boys of the same age starting at puberty. At adolescence German girls from 1914-1924 were on average taller and heavier compared to modern standards than boys were. Total caloric consumption may have been similar between genders in the household, but the male requirement for additional calories at adolescence compared to females meant that in proportion to need, the divide was unequal. These results gives new insights into how wartime family economies, or economies without traditional patriarchy, may allocate nutritional resources during times of stress. Finally, widespread international relief targeted at poor German children explains the recovery of working class children from 1919-1924.

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APPENDIX

TABLE 1
OLS REGRESSION: CHILD STATURE, GERMANY 1914-1924
Dependent variable: Height, cm

Independent Variables		
LOCATION DUMMIES		YES
DATE		
Year: 1916	-0.000139	(-0.0139)
Year: 1917	-0.487***	(-0.0139)
Year: 1918	-1.804***	(-0.0191)
Year: 1919	-1.741***	(-0.0138)
Year: 1920	-1.538***	(-0.0119)
Year: 1921	-1.327***	(-0.0102)
Year: 1922	-0.425***	(-0.0122)
Year: 1923	0.293***	(-0.0104)
Year: 1924	1.371***	(-0.0717)
AGE DUMMIES		YES
INFLUENCE OF MALES BY AGE INTERACTIONS		YES
SOCIAL CLASS		
Upper Class	5.089***	(-0.0121)
Middle Class	2.63***	(-0.0136)
DATE AND SOCIAL CLASS INTERATIONS		YES
OTHER		
Sex: Male	9.092***	(-0.084)
Constant	157***	(-0.402)
Observations	587018	
R-squared	0.986	

* = Significant at the 90 percent level, ** = Significant at the 95 percent level., *** = Significant at the 99 percent level.
Notes: Robust standard errors are in parentheses. Standard Errors were clustered by school type. Observations for which social class could not be determined were dropped. Reference categories: Date, Year = 1914, Location, State = Baden, Sex = Female, Age = 19, Social Class = working class, 18 year-old x female, 1914 x working class. 1915 not included in sample as data are not available.

TABLE 2
OLS REGRESSION: CHILD WEIGHT, GERMANY 1914-1924
Dependent Variable: Weight, kg

Independent Variables		
LOCATION DUMMIES		YES
DATE		
Year: 1916	0.107***	(0.0096360)
Year: 1917	-0.292***	(0.0096754)
Year: 1918	-0.558***	(0.0132686)
Year: 1919	-0.570***	(0.0095923)
Year: 1920	-0.127***	(0.0082363)
Year: 1921	-0.119***	(0.0070697)
Year: 1922	0.017**	(0.0084438)
Year: 1923	0.654***	(0.0072374)
Year: 1924	2.898***	(0.0498409)
AGE DUMMIES		YES
INFLUENCE OF MALES BY AGE INTERACTIONS		YES
SOCIAL CLASS		
Upper Class	3.020***	(0.0083843)
Middle Class	1.325***	(0.0094376)
DATE AND SOCIAL CLASS INTERACTIONS		YES
OTHER		
Sex: Male	4.126***	(0.0583732)
Constant	51.417***	(0.2793246)
Observations	587,018	
R-squared	0.9826	

* = Significant at the 90 percent level, ** = Significant at the 95 percent level, *** = Significant at the 99 percent level.
Notes: Robust standard errors are in parentheses. Standard Errors were clustered by school type. Observations for which social class could not be determined were dropped. Reference categories: Date, Year = 1914, Location, State = Baden, Sex = Female, Age = 19, Social Class = working class, 18 year-old x female, 1914 x working class. 1915 not included in sample as data are not available.

TABLE 3
OLS REGRESSION: Height for Age z-scores (HAZ) GERMANY 1914-1924
Dependent Variable: Height for Age z-scores (HAZ)

Independent Variables		
LOCATION DUMMIES		YES
YEAR DUMMIES		YES
AGE DUMMIES		YES
INFLUENCE OF MALES BY AGE INTERACTIONS		
Age 6 x Male	0.436***	(0.0136)
Age 7 x Male	0.532***	(0.0128)
Age 8 x Male	0.549***	(0.0128)
Age 9 x Male	0.513***	(0.0128)
Age 10 x Male	0.426***	(0.0128)
Age 11 x Male	0.473***	(0.0128)
Age 12 x Male	0.573***	(0.0128)
Age 13 x Male	0.533***	(0.0128)
Age 14 x Male	0.155***	(0.0128)
Age 15 x Male	-0.162***	(0.0130)
Age 16 x Male	-0.213***	(0.0132)
Age 17 x Male	-0.202***	(0.0140)
Age 19 x Male	0.25***	(0.0656)
Age 20 x Male	-0.286***	(0.0918)
SOCIAL CLASS		YES
DATE AND SOCIAL CLASS INTERACTIONS		
Year: 1916 x Middle Class	-0.0971***	(0.00377)
Year: 1917 x Middle Class	0.00102	(0.00372)
Year: 1918 x Middle Class	0.282***	(0.00552)
Year: 1919 x Middle Class	0.0737***	(0.00362)
Year: 1920 x Middle Class	-0.0261***	(0.00340)
Year: 1922 x Middle Class	-0.127***	(0.00348)
Year: 1923 x Middle Class	-0.0981***	(0.00289)
Year: 1916 x Upper Class	0.17***	(0.00338)
Year: 1917 x Upper Class	0.0226***	(0.00335)
Year: 1918 x Upper Class	0.267***	(0.00513)
Year: 1919 x Upper Class	0.151***	(0.00332)
Year: 1920 x Upper Class	0.042***	(0.00286)
Year: 1922 x Upper Class	-0.0692***	(0.00275)
Year: 1923 x Upper Class	-0.237***	(0.00231)
OTHER		
Sex: Male	-0.494***	(0.0127)
Constant	-0.912***	(0.0606)
Observations	587,018	
R-squared	0.716	

* = Significant at the 90 percent level, ** = Significant at the 95 percent level., *** = Significant at the 99 percent level.
Notes: Robust standard errors are in parentheses. Standard Errors were clustered by school type. Observations for which social class could not be determined were dropped. Reference categories: Date, Year = 1914, Location, State = Baden, Sex = Female, Age = 19, Social Class = working class, 18 year-old x female, 1914 x working class. 1915 not included in sample as data are not available.

TABLE 4
OLS REGRESSION: Weight for Age z-scores (WAZ), GERMANY 1914-1924
Dependent Variable: WAZ

Independent Variables		
LOCATION DUMMIES		YES
YEAR DUMMIES		YES
AGE DUMMIES		YES
INFLUENCE OF MALES BY AGE INTERACTIONS		
Age 6 x Male	0.685***	(0.0116)
Age 7 x Male	0.744***	(0.0110)
Age 8 x Male	0.817***	(0.0109)
Age 9 x Male	0.836***	(0.0109)
Age 10 x Male	0.865***	(0.0109)
Age 11 x Male	0.823***	(0.0109)
Age 12 x Male	0.686***	(0.0109)
Age 13 x Male	0.446***	(0.0109)
Age 14 x Male	0.194***	(0.0109)
Age 15 x Male	0.0503***	(0.0111)
Age 16 x Male	0.0429***	(0.0113)
Age 17 x Male	-0.0287**	(0.0119)
Age 19 x Male	0.283***	(0.0560)
Age 20 x Male	-0.0397	(0.0783)
SOCIAL CLASS		YES
DATE AND SOCIAL CLASS INTERACTIONS		
Year: 1916 x Middle Class	-0.0109***	(0.00322)
Year: 1917 x Middle Class	0.00928***	(0.00317)
Year: 1918 x Middle Class	0.125***	(0.00471)
Year: 1919 x Middle Class	0.0153***	(0.00309)
Year: 1920 x Middle Class	-0.00433	(0.00290)
Year: 1922 x Middle Class	-0.0455***	(0.00297)
Year: 1923 x Middle Class	-0.0466***	(0.00246)
Year: 1916 x Upper Class	-0.0117***	(0.00288)
Year: 1917 x Upper Class	-0.0105***	(0.00286)
Year: 1918 x Upper Class	0.0695***	(0.00438)
Year: 1919 x Upper Class	-0.000354	(0.00284)
Year: 1920 x Upper Class	-0.0336***	(0.00244)
Year: 1922 x Upper Class	-0.082***	(0.00235)
Year: 1923 x Upper Class	-0.16***	(0.00198)
OTHER		
Sex: Male	-0.715***	0.0108
Constant	-0.963***	0.0517
Observations	587,018	
R-squared	0.759	

* = Significant at the 90 percent level, ** = Significant at the 95 percent level, *** = Significant at the 99 percent level.
Notes: Robust standard errors are in parentheses. Standard Errors were clustered by school type. Observations for which social class could not be determined were dropped. Reference categories: Date, Year = 1914, Location, State = Baden, Sex = Female, Age = 19, Social Class = working class, 18 year-old x female, 1914 x working class. 1915 not included in sample as data are not available.

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