THE HEIGHTS AND WEIGHTS

OF WAR- AND WELFARE

On the use of military records in anthropometric history and the study of socioeconomic correlates, with a case study of Finnish conscription data, 1918 – 1944

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INTRODUCTION

'AND there came out from the camp of the Philistines a champion named Goliath of Gath, whose height was six cubits and a span (±297 cm)'.[1] The story of David and Goliath does not merely impress because some man defeats some other. It is impressive – the biblical context notwithstanding – because a tall man is vanquished by one much smaller, against reasonable expectations. This attribution of height as a measure of vigour and fortitude has permeated human society: one cannot mention Napoleon without someone noting his actions being decidedly 'large' for someone so small, and a 2011 psychological study has argued that – due to evolutionary principles – people throughout history have had a considerable preference for leaders having a larger than average physical stature.[2]

Myth, militarism, and mental images have however certainly not been the only domain of differences in height. Even more so, variations in human stature have a wide range of unmistakeably real physical implications, as, among other things, 'short stature increases the risk of ill health and mortality, reduces economic opportunity, and negatively impacts psychological well-being through poorer educational and employment prospects, and low social mobility'.[3] All in all, human height signifies vastly more than mere symbolism.

Research into this relationship between stature and environmental factors is not an undertaking recently put into motion. Already as early as the 1700's, and even more actively in the century thereafter, statisticians and economists begun looking into the link between human health and socioeconomic conditions, a field now generally known as social epidemiology.[4] More specifically however, research into the ties between socioeconomic factors and human stature (including

[1] 1 Samuel 17:4, *King James Bible* (Oxford 2008).
[2] Gregg R. Murray and J.D. Schmitz, 'Caveman Politics: Evolutionary Leadership Preferences and Stature', *Social Science Quarterly* 92:5 (2011) 1215-35.
[3] Caroline Hancock, Silvana Bettiol, and Lesley Smith, 'Socioeconomic variation in height: analysis of National Child Measurement Programme data for England', *Archives of Disease in Childhood* 101:5 (2016) 422-6, at 422.
[4] Lisa F. Berkman and Ichiro Kawachi, 'A Historical Framework for Social Epidemiology: Social Determinants of Population Health' in: Lisa F. Berkman, Ichiro Kawachi, and M. Maria Glymour eds., *Social Epidemiology* (Oxford 2014) 1-16, at 1.

weight) as a standalone field, known as anthropometric history, only truly saw the light of day in the latter half of the twentieth century, when economists and historians the likes of John Komlos and Nobel laureates Douglass North and Robert Fogel actively started applying anthropometric methods to (socioeconomic) historical research.[5]

Nowadays, anthropometric history has found secure footing among historians and economists alike, and the field has come to flourish. The study of human stature has enabled scholars to research socioeconomic conditions of the past, without having to solely rely on the traditional ways of measurement, such as income inequality or GDP. Within this context, human stature has come to embody what many call the 'biological' standard of living, with 'average height as a key measure of physical welfare', enabling historians 'to analyze the overall distribution of welfare and thus to discover patterns of inequality among and within groups'.[6]

Some of the more widely acknowledged findings within the field paint a clear picture of this relationship between human stature and several socioeconomic factors, with the most universally agreed upon finding that, historically, humans with a higher socioeconomic status (SES) have a larger average stature.[7] Further findings (on which more in Chapter I) include educational status being a remarkably good predictor of height[8] and of differences therein; persons in higher

[5] Zenonas Norkus et al., 'The Estonian antebellum paradox: a venture into the comparative anthropometric history of the Baltic countries in the early twentieth century', *Journal of Baltic Studies* (online publication, 2022) 1-21, at 2. For a more in-depth overview of the history of social epidemiology and the contemporary 'birth' of historical anthropometrics, see James M. Tanner, *A History of the Study of Human Growth* (Cambridge 1981).

[6] Timothy J. Hatton and Bernice E. Bray, 'Long run trends in the heights of European men, 19th-20th centuries', *Economics and Human Biology* 8:3 (2010) 405-13, at 405; Tobias Schoch, Kaspar Staub, and Christian Pfister, 'Social inequality and the biological standard of living: An anthropometric analysis of Swiss conscription data, 1875–1950', *Economics and Human Biology* 10:2 (2012) 154-73, at 154-5.

[7] The number of sources one might cite here is overwhelmingly large, but to name some of the more prominent ones, one must certainly mention John Komlos, *Nutrition and Economic Development in the Eighteenth-Century Habsburg Monarchy: An Anthropometric History* (Princeton 1989), and Jörg Baten, 'Heights and Real Wages in the 18th and 19th Centuries: An International Overview' *Jahrbuch für Wirtschaftsgeschichte/Economic History Yearbook* 41:1 (2000) 61-76; or, for more recent impressive undertakings: Richard H. Steckel, 'Heights and human welfare: Recent developments and new directions', *Explorations in Economic History* 46:1 (2009) 1-23; Jörg Baten and Matthias Blum, 'Growing Tall but Unequal: New Findings and New Background Evidence on Anthropometric Welfare in 156 Countries, 1810–1989' *Economic History of Developing Regions* 27:1 (2012) 66-85.

[8] Ying Huang, Frans van Poppel, L.H. Lumey, 'Differences in height by education among 371,105 Dutch military conscripts', *Economics and Human Biology* 17:1 (2015) 202-207, at 203-5; Halina Kolodziej, Alicja Szklarska, and Robert M. Malina, 'Young Adult Height of Offspring Born to Rural-to-Urban Migrant Parents and Urban-Born Parents', *American Journal of Human Biology* 13:1 (2001) 30-4, at 33.

occupational posts being on average of larger stature, even when controlling for SES and educational level[9]; larger sibship size having a negative effect on average attained height[10]; and either rural or urban populations being significantly taller than the other[11].

However much these studies might differ in scope, they very often have one major factor in common: most of these studies (at least those studying periods before roughly the 1950's) rely on anthropometrical data gathered by the military.[12] The fairly simple reason for this being the fact that in the past, humans were not regularly measured on a large scale, except in a military context (there are of course exceptions, with some studies for example using data from hospitals, travel registrations or prison populations. These however tend to suffer from severe selection bias).[13] Even though these military samples embody a major goldmine for anthropometrical historians, they tend to suffer from several maluses. Granted that historians in many cases have found ways to work around these (which I will address more in detail in Section I.3), it remains important to briefly discuss them.

The first of these limitations concerns the – rather straightforward – omission of any data on the female population, as they historically were not eligible nor conscripted for any fighting role, and thus not measured.[14]

[9] A. Schumacher, 'On the Significance of Stature in Human Society', *Journal of Human Evolution* 11:8 (1982) 697-701, at 698.
[10] Stefan Öberg, 'Sibship size and height before, during, and after the fertility decline: A test of the resource dilution hypothesis', *Demographic Research* 32:1 (2015) 29-74, at 54; Norkus et al., 'The Estonian antebellum paradox', 9-10; Michel Poulain et al., 'Anthropometric traits at military medical examinations associated with demographic family characteristics in Sardinia at the turn of twentieth century', *The History of the Family* 22:2-3 (2017) 310-22, at 311.
[11] For a study showing taller average rural population, see Kolodziej, Szklarska, and Malina, 'Young Adult Height of Offspring Born to Rural-to-Urban Migrant Parents and Urban-Born Parents', 31. For studies showing taller average urban populations, see Daniel Franken, 'Anthropometric History of Brazil, 1850-1950: Insights from Military and Passport Records', *Journal of Iberian and Latin American Economic History* 37:2 (2019) 377-408, at 391; Liudmila Dregval and Ramutė Vaičaitienė, 'Anthropometrical data and physical fitness of Lithuanian soldiers according to the sociodemographic characteristics', *Medicina* 41:1 (2006) 57-63, at 58-9.
[12] Baten and Blum, 'Growing Tall but Unequal' 69-70; Hatton and Bray, 'Long run trends in the heights of European men, 19th-20th centuries' 406; Björn Quanjer and Jan Kok, 'Drafting the Dutch: Selection Biases in Dutch Conscript Records in the Second Half of the Nineteenth Century', *Social Science History* 44:1 (2020) 501-24, at 501. For more in-depth reading on the history of the gathering of military anthropometrical data, see Heinrich Hartmann, *The Body Populace: Military Statistics and Demography in Europe before the First World War*, transl. Ellen Yutzy Glebe (Göttingen 2011).
[13] See for example Franken, 'Anthropometric History of Brazil, 1850-1950', where at length he describes how these populations are often heavily skewed towards a particular level of SES (i.e. people that can afford travel being of higher average SES, and prison populations being of decidedly lower average SES).
[14] Helena Carreiras, *Gender and the Military: Women in the Armed Forces of Western Democracies* (London, New York 2006) 1-4.

A second, and for conscription records the main issue, is the risk of certain people not being registered. For this, three main causes exist. The first one of these causes is childhood mortality: if a man dies before reaching conscription age, he is never registered. Because people stemming from a lower SES background have a higher risk of childhood mortality, less men of lower SES end up being registered, skewing the data.[15] The second cause is men deemed unfit for service, who were oftentimes omitted from the record. Again, because this was more often the case for people of low SES, it too can lead to left truncation of the data.[16] The last cause is draft dodging. Evading conscription was undertaken throughout all layers of society but was nevertheless more commonplace (and easier) for the middle and higher classes, through (political) influence, or simply through bribes. This, as opposed to the left truncation discussed above, can lead to right truncation, due to men with higher SES (who are on average of larger stature) missing from the data.[17]

A last issue pertains to the fact that, usually, men at conscription age (differs historically and per country, but usually between 17 and 22), have not fully grown yet, as growth ceases only between the ages of 20 and 25.[18] This means that at the time of measurement, some conscripts will not be at their maximum attainable height.

Irrespective of the above limitations, the use of military data has remained omnipresent in historical anthropometrics, courtesy of its defining advantage of providing a sample that is, to cite Schoch and colleagues, 'representative in that they enable us to analyze the country's young male population as a whole, since the subpopulation of conscripts is almost identical with that of the entire (male) population', and because 'intergenerational social mobility in the late 19th and early 20th centuries was limited, the social status of a conscript is a good proxy for his

[15] Schoch, Staub, and Pfister, 'Social inequality and the biological standard of living', 159; Quanjer and Kok, 'Drafting the Dutch', 502, 521.
[16] Left truncation meaning the sample being 'thinner' on the left side of the normal distribution, thus shifting right. See Hatton and Bray, 'Long run trends in the heights of European men, 19th-20th centuries' 406; Schoch, Staub, and Pfister, 'Social inequality and the biological standard of living', 156, 160; Quanjer and Kok, 'Drafting the Dutch', 504.
[17] Quanjer and Kok, 'Drafting the Dutch', 501-2, 512, 518; Franken, 'Anthropometric History of Brazil, 1850-1950', 401.
[18] Komlos, 'Anthropometric history', 343.

social background', making military data – and especially conscription records – an invaluable resource for historical (socioeconomic) anthropometrical research.[19]

However, that does not absolve us from scholarly vigilance, or from staying critical. It is paramount that more research is done into these pitfalls of conscription data, and that we further expand our knowledge of the relationship between human stature and socioeconomic factors, both with the aim of either providing evidence for confirming, or refuting, the conclusions (economic) historians have already made, and for gaining fresh insights that might better our understanding of the subject.

Thus, this thesis, broadly stated, has the following three goals: furthering the understanding of the limitations (and their mitigation) and the usefulness of military (anthropometric) data; adding to the scientific body that is anthropometric history, with a specific focus on its socioeconomic context; and to augment our scientific knowledge of the unique (see Chapter II) socioeconomic history of Finland.

To attain these goals, this thesis therefore sets out to answer the question of in what way conscription records are able to accurately reflect, predict, and interlink factors of socioeconomic status – with a case study of historical Finnish conscription records as our guide. In order to come to an adequate answer, we will firstly perform a literature analysis of anthropometric historiography and its use of military data, to get an even clearer picture than painted above of its history, its findings, and the challenges presented. Secondly, we will take a look at the historical context of our data set, in which we will discuss Finland's military and socioeconomic history, to get a precise understanding of the circumstances from which these data spawned. Lastly, we will move onto the actual statistical analysis of the data set, in order to test several hypotheses, described later, and to hopefully shed more light on the usefulness of conscription data, all the while learning more about the socioeconomic variables of early twentieth century Finland.

Since the data set is bound to be brought up both in Chapters I and II, as a means of constructing several of the hypotheses that are to be tested, as well as in

[19] Quotes taken from Schoch, Staub, and Pfister, 'Social inequality and the biological standard of living', 156-7.

order to (contextually) prepare the reader for the eventual analysis, it is worthwhile to shortly elucidate on the origin and the composition of the data set (to be discussed further at length in Chapter III). The sample, kindly provided by Dr. Ilari Taskinen[20], consists of conscription records of 531 Finnish soldiers drafted between 1918 and 1944. These records were created at the initial conscription date, and then updated during the duration of the soldier's military career. From these records, the following variables will be employed in the analysis: draft date, date of birth, occupation, level of education, military rank, mother tongue, height, and weight. With a handful of exceptions, all the above variables are available for every conscript in the data set. While the analysis will mostly be based on linear regression analysis, please see Chapter III for further in-depth discussion of the methodology.

It might furthermore be worthwhile to shortly expound on the reasoning behind the decision to utilise the above data set for this research. Firstly, as the data set is similar to other military samples used in historical anthropometric research, it provides the opportunity for comparison to these in terms of usefulness, findings, and obstacles encountered. Secondly, there has been, as of yet, no English language study focused solely on Finnish anthropometrical data gathered from historical military sources. Several English language studies have incorporated Finnish data, but these have so far, to my knowledge, always been presented in either a global or a supranational context, in most cases using only very sparse historical data derived from the Finnish statistical office.[21] Lastly, the data set contains two variables (see also Section III.1) which have either not, or only incidentally, appeared in the anthropometric literature, making the sample even more interesting for analysis. These variables are the soldier's military rank upon entering service, and his mother tongue (Finland had a Swedish-speaking minority, with on average higher SES, see Section II.2 for further discussion).

[20] Post-doctoral Researcher at Tampere University, Tampere, Finland. Currently Visiting Researcher, Radboud Group for Historical Demography and Family History at Radboud University, Nijmegen, Netherlands. For further information and research, see https://www.tuni.fi/en/ilari-taskinen.

[21] Examples of global studies incorporating Finland include Baten and Blum, 'Growing Tall but Unequal'; Matthias Blum, 'The influence of inequality on the standard of living: Worldwide anthropometric evidence from the 19th and 20th centuries', *Economics and Human Biology* 11:4 (2013) 436-52. Examples of supranational studies incorporating Finland include Karri Silventoinen et al., 'Body height, birth cohort and social background in Finland and Sweden', *European Journal of Public Health* 11:2 (2001) 124-29; Norkus et al., 'The Estonian antebellum paradox'.

To close off the introduction, a short reminder of what is to follow: in Chapter I (*The Study of Stature and Soldiers*), a closer look at the state of the research with regard to anthropometric history and its use of military data: what has been done, what has been found, and what remains to be seen. In Chapter II (*Finland: the Rollercoaster to Prosperity*), the Finnish nation will take the main stage, as we will examine its military and (socio)economic history, to get a grasp on the historical context of the data set. In Chapter III (*The Tall Director and his Comrades)*, the analysis of the data will be performed, by way of testing hypotheses drawn up in Chapter I and II, and its results shown. Following that, a short discussion of the analysis and its findings and implications, after which the conclusion will bring the thesis to a close.

CHAPTER I: THE STUDY OF STATURE AND SOLDIERS

I.1 – A Short History

The study of the growth and stature of humans has deep roots. Even as far back as Ancient Greece, philosophers such as Aristotle were describing processes of human growth and maturation.[22] It took however some two thousand years before this study grew into a 'real' science, when in the 18th and 19th century anthropologists, economists and social epidemiologists began studying the relationship between living conditions and differences in physical stature.[23]

It took until the 1970's for the concept of anthropometric history to truly take off, when several economic historians started using height data as a means of studying welfare of (historical) populations through more than just the measures of economic welfare.[24] Height in this sense became known as a measure of the 'biological standard of living', as opposed to an exclusively economic standard of living.[25] To cite Schoch et al. for an illustration of its benefits: 'the traditional monetary measures of economic and social performance contribute to an understanding of levels and changes in well-being at the aggregate level but fail to capture several important aspects of the quality of life, such as socioeconomic inequality and health in the broadest sense'.[26]

As such, anthropometric history has become a popular and effective way of studying changes and differences in welfare of populations. In contrast to a measure like GDP, which only manages to 'capture' a certain moment in time, height can be seen as a 'sum' of circumstances, all to do with the welfare of the socioeconomic environment the person grew up in.[27] To cite the title of a 2014 bestseller, it seems that indeed, *the body keeps the score*. What this means for

[22] Tanner, *A History of the Study of Human Growth*, 1-6.
[23] John Komlos, 'Anthropometric history: an overview of a quarter century of research', *Anthropologischer Anzeiger* 67:4 (2009) 341-56, at 341.
[24] Franken, 'Anthropometric History of Brazil, 1850-1950', 381-2.
[25] Lehmann et al., 'Temporal trends, regional variation and socio-economic differences in height, BMI and body proportions among German conscripts, 1956–2010', 391; Hatton and Bray, 'Long run trends in the heights of European men, 19th-20th centuries', 405.
[26] Schoch, Staub, and Pfister, 'Social inequality and the biological standard of living', 154.
[27] Lehmann et al., 'Temporal trends, regional variation and socio-economic differences in height, BMI and body proportions among German conscripts, 1956–2010' 391; Franken, 'Anthropometric History of Brazil, 1850-1950' 379, 386; Baten and Blum, 'Growing Tall but Unequal' 66-7.

historical research is that studying human stature enables researchers to look behind the economic curtain and make statements about the perceived welfare (background) of a person, with height functioning as a proxy measure for that welfare.

As discussed briefly in the introduction, a large source of this information used in the study of historical stature are military records. Three major reasons for this omnipresence can be distinguished. Firstly, and the most straightforward one, is that there simply is a vast amount of data. As early as the American Civil War, armies began recording the heights of their soldiers, either for statistical or health purposes.[28] The second reason is that, unlike other places of height registrations (such as travel documents, hospital records, or prison records), military conscription records are deemed to be mostly neutral, in the sense that they contain a cross section of the population, without overrepresentation of a certain social class.[29] Lastly, the fact that in most cases men were called up for the draft at roughly the same age, again makes for a neatly homogeneous sample, without the age (and therewith length) variation that might occur in other records.[30] All in all, military records remain a preferred source for the longitudinal study of historical human stature.

To end this section, I find it worthwhile to cite several authors in forming a short summary and 'mission statement' of contemporary anthropometric history, to paint a closing picture of the state of research, and to show what remains to be done:

Following the first ventures by economic historians in the 1970's, there nowadays exists a vast 'body of literature linking trends in the average height of a population with economics and living standard levels'.[31] This means that 'heights

[28] Heinrich Hartmann, *The Body Populace* 10-11.
[29] Franken, 'Anthropometric History of Brazil, 1850-1950' 379; Quanjer and Kok, 'Drafting the Dutch' 501; Schoch, Staub, and Pfister, 'Social inequality and the biological standard of living' 156.
[30] Steven L. Hoch, 'Tall Tales: Anthropometric Measures of Well-Being in Imperial Russia and the Soviet Union, 1821-1960', *Slavic Review* 58:1 (1999) 61-70, at 63; Poulain et al., 'Anthropometric traits at military medical examinations associated with demographic family characteristics in Sardinia at the turn of twentieth century' 311.
[31] Lehmann et al., 'Temporal trends, regional variation and socio-economic differences in height, BMI and body proportions among German conscripts, 1956–2010', 391.

are now widely seen as a useful measure of human welfare'[32], and as a 'valid complement to conventional welfare indicators'.[33]

However, there is still much debate about 'the channels of causation'[34], and there are many 'important questions unresolved'.[35] Some of the major gaps include 'the relative importance of diet and disease, [as well as] the role of income and genetic factors'[36], but, in a more general and overarching way, the field ought to discover precisely 'which socioeconomic forces affect [height] and how powerful they are (or were)'.[37]

I.2 – Findings

Moving on from its foundations, methods, major source, and mission, this section will take a deeper look at some of the major and interesting findings of the field. For clarity, this section is divided into subsections, each dealing with a separate socioeconomic factor.

Class affiliation

We start off with class affiliation, as – for class affiliation being after all a combination of socioeconomic factors – essentially confirming the before postulated anthropometric maxim of height being positively correlated with social status. In an analysis of Swiss conscription data between the years of 1875 and 1950, Schoch and colleagues found that out of several variables, class affiliation 'was the most important determinant of one's biological standard of living', with it influencing stature more than any other factor (e.g. urban/rural divide).[38]

As Quanjer and Kok find, in their study of Dutch nineteenth century conscription records, that different socioeconomic groups experienced different levels of stature and mortality due to disease and changes in food availability, so too do Schoch et al. find that due to the ability to shield themselves from short-term

[32] Huang, van Poppel, and Lumey, 'Differences in height by education among 371,105 Dutch military conscripts', 202.
[33] Baten and Blum, 'Growing Tall but Unequal', 68.
[34] Franken, 'Anthropometric History of Brazil, 1850-1950', 382.
[35] Brian A'Hearn, Franco Peracchi, and Giovanni Vecchi, 'Height and the Normal Distribution: Evidence from Italian Military Data', *Demography* 46:1 (2009) 1-25, at 1.
[36] Ibidem.
[37] Steckel, 'Heights and human welfare', 8.
[38] Schoch, Staub, and Pfister, 'Social inequality and the biological standard of living', 170.

financial fluctuations, people with higher SES were less likely to suffer from lesser nourishment.[39] To illustrate of just how big these differences in class affiliation could historically become, a 2005 paper by John Komlos showed a whopping 22.6 centimetres difference in height between 16-year-old boys of the lowest and highest social classes of 1840's England, again as a result of enormous differences in nutritional well-being following crises.[40]

Level of education

The level of a person's education has often been shown to be an excellent predictor of stature. Lehman et al., in a large-scale study of German conscripts, find 'significant and persistent differences in height and BMI' with regard to conscripts of different educational levels.[41] Huang, van Poppel, and Lumey, in a study of Dutch conscripts, find the same: '…a monotone height increase with a gradient of 5.1 cm comparing conscripts with the lowest and highest education level'.[42] They furthermore claim that it is the true determining factor, with the difference unable to be explained by socioeconomic background, family size, or region of birth.[43] The same finding – seemingly inexhaustible – is also found in Lithuanian soldiers[44] and Hungarian soldiers[45], among others.

Why education of all factors seems to be the one most commonly present as a reflection of SES is not completely clear. Whereas in other cases, such as (parental) occupation or region of birth, there are often conflicting results (as will be shown later), education does not seem to suffer from this volatility. It is possible that other factors, such as occupation or regional differences, are more malleable, or have more external influences working on them, making them less reliable stature predictors. In any case, it is a question that remains.

[39] Quanjer and Kok, 'Drafting the Dutch', 511; Schoch, Staub, and Pfister, 'Social inequality and the biological standard of living', 165-6.
[40] John Komlos, 'On English Pygmies and Giants: the Physical Stature of English Youth in the late-18th and early-19th Centuries', *Discussion Papers in Economics* 6:1 (2005) 1-21, at 6.
[41] Andreas Lehmann et al., 'Temporal trends, regional variation and socio-economic differences in height, BMI and body proportions among German conscripts, 1956–2010', *Public Health Nutrition* 20:3 (2016) 391-403, at 391.
[42] Huang, van Poppel, and Lumey, 'Differences in height by education among 371,105 Dutch military conscripts', 203.
[43] Ibidem, 206.
[44] Dregval and Vaičaitienė, 'Anthropometrical data and physical fitness of Lithuanian soldiers according to the sociodemographic characteristics', 58-9.
[45] Gyula Gyenis and Kálmán Joubert, 'Socioeconomic determinants of anthropometric trends among Hungarian youth', *Economics and Human Biology* 2:2 (2004) 321-33, at 326.

(Parental) occupation

Moving forward, there are several studies finding correlations between (parental) occupation and average stature. Lehman et al. too, in the study of German conscripts cited earlier, find persistent differences in height and BMI for different occupational levels, as is the case in the study of Hungarian soldiers mentioned above.[46] Contrastingly, Huang, van Poppel, and Lumey also find differences in stature relating to paternal occupation, but nevertheless see it trumped by educational level, i.e. the relation between paternal occupation and height ceases to exist when controlling for education.[47]

In any case, occupation remains a less popular variable of SES than education in most studies. Schoch et al. for example argue that because of the large variance in occupations it is much more difficult to satisfyingly test any hypotheses against it without introducing any form of classification.[48] A solution to this is indeed by using classification of occupations, such as the widely used HISCO (and related) classifications, therewith making it possible to classify and analyse large amounts of data containing occupational titles.[49]

Family composition

Introduced by Judith Blake in a 1981 paper, the Resource Dilution Hypothesis (RDH) proposes that children in larger families are often less well-nourished, because the more children a family has, the more resources that need to be shared.[50] In the years since, many scholars have studied the phenomenon, with varying findings.[51]

For example, going back to the study of Dutch conscripts, it finds lower average height among larger families.[52] However, just as with occupation, the

[46] Lehmann et al., 'Temporal trends, regional variation and socio-economic differences in height, BMI and body proportions among German conscripts, 1956–2010', 391; Gyula Gyenis and Kálmán Joubert, 'Socioeconomic determinants of anthropometric trends among Hungarian youth', 327.
[47] Huang, van Poppel, and Lumey, 'Differences in height by education among 371,105 Dutch military conscripts', 203.
[48] Schoch, Staub, and Pfister, 'Social inequality and the biological standard of living', 157.
[49] See for example the 2018 release of HSN standardized occupational titles: Kees Mandemakers et al., *HSN standardized, HISCO-coded and classified occupational titles, release 2018.01* (IISG, Amsterdam 2018).
[50] Judith Blake, 'Family Size and the Quality of Children', *Demography* 18:4 (1981) 421-442.
[51] Öberg, 'Sibship size and height before, during, and after the fertility decline', 31-35.
[52] Huang, van Poppel, and Lumey, 'Differences in height by education among 371,105 Dutch military conscripts', 203.

significance disappears when accounting for education. This might however also be a result of the timeframe of the study, with Poulain et al. suggesting that the condition possibly disappears when average socioeconomic conditions are higher, making it possible that this is only something found further back in time.[53] Öberg, in his study of Swedish conscripts between 1821-1950, did find significant proof for family size influencing heights, however also signalled the correlation weakening over time, possibly confirming the suggestion of Poulain et al.[54]

Regional differences

Another marker of SES is commonly recognized in regionality: mostly in a rural-urban dichotomy, sometimes in a geographic (e.g. north-south) dichotomy. The rule of thumb for historical rural-urban differences is that it is common for people residing in urban areas to have a higher SES than people residing in rural areas. This, however, does not always directly translate to the expected differences in stature.

Returning, again, to the Dutch conscripts from before, the same phenomenon repeats itself: on its own, people from urban areas are taller than their counterparts, a relation however that loses its significance when controlling for education.[55] Nonetheless, in Brazil, as Daniël Franken finds in his study ranging from 1850 to 1950, he shows a 'persistent regional inequality in heights'.[56] The same goes for the Lithuanian conscripts in the study by Dregval and Vaičaitienė.[57] So too for the German conscripts, with this time a north-south (urban-rural) dichotomy.[58] The same dichotomy is seen in Italian conscripts, again with southerners of smaller stature.[59]

Yet, whereas previous indicators of SES were decidedly one-sided, regional differences appear to be less uniform across different nations, and under

[53] Poulain et al., 'Anthropometric traits at military medical examinations associated with demographic family characteristics in Sardinia at the turn of twentieth century', 311.
[54] Öberg, 'Sibship size and height before, during, and after the fertility decline', 54.
[55] Huang, van Poppel, and Lumey, 'Differences in height by education among 371,105 Dutch military conscripts', 203, 206.
[56] Franken, 'Anthropometric History of Brazil, 1850-1950', 404.
[57] Dregval and Vaičaitienė, 'Anthropometrical data and physical fitness of Lithuanian soldiers according to the sociodemographic characteristics', 58-9.
[58] Lehmann et al., 'Temporal trends, regional variation and socio-economic differences in height, BMI and body proportions among German conscripts, 1956–2010', 369-7.
[59] A'Hearn, Peracchi, and Vecchi, 'Height and the Normal Distribution', 16.

different circumstances. For example, in a study of Polish conscripts (NB: all born in 1976), it was found that, contrary to the above, men with a rural background were taller than their urban counterparts.[60] Richard Steckel, in his 2008 anthology of modern anthropometric history, gives us a possible answer: he notes that in 19th-century Philadelphia, children born in rural areas were on average taller, due to the wide availability of dairy (with protein intake an important facet of early growth).[61] In any case, it is to be concluded that differences between rural/urban regions do not always lead to the same outcome, and that a rural background must not be carelessly equated with lower (nutritional) well-being.

I.3 – Obstacles

Having discussed some of the major findings of the field, it is beneficial to briefly return to the topic of some of the obstacles that anthropometric historians have faced in their research and see how they have navigated those. We will discuss respectively the three obstacles presented in the introduction, namely missing data on women, men not being registered, and conscripts not having fully grown yet.

The lack of women in historical (military) data presents us with a challenge. Because of their differing biological markup, men and women are asymmetrically affected by nutritional imbalances in childhood, with women often being more resilient than men.[62] This means that, having only data on men at our disposal (up until a certain point in time), it might be wrong to extend our findings in these studies to include the whole population, rather than only men, something which does not always seem to be noted in publications.

However, seeing off this 'danger', many publications have found that 'the relation between height and socioeconomic status is no different in men and women'.[63] Meaning that while there might still be nominal differences between men and women in the way socioeconomic or nutritional factors influence height, the relative difference is negligible – good news for the universalization of findings derived from studies only having access to male data.

[60] Kolodziej, Szklarska, and Malina, 'Young Adult Height of Offspring Born to Rural-to-Urban Migrant Parents and Urban-Born Parents', 32.
[61] Steckel, 'Heights and human welfare', 9.
[62] Steckel, 'Heights and human welfare', 11.
[63] Huang, van Poppel, and Lumey, 'Differences in height by education among 371,105 Dutch military conscripts', 206.

The second obstacle is, admittedly, the most unavoidable one: someone not being registered at all. Two of them tend to lead to left truncation (the normal distribution shifting right), namely childhood mortality, and being found unfit for military service, since they are more prominent in low SES populations (thus 'eliminating' more men of lower average stature), while one of them, draft dodging, leads to the opposite, because it has been shown men of higher SES more easily evade conscription.[64]

Luckily, there are two avenues by which these obstacles are remedied. A first one is by statistically adjusting the sample for the truncation effect caused by missing conscripts, thereby 'normalizing' the sample.[65] A second one is more clandestine: some studies have shown effects cancelling each other out to a varying degree, with the final difference between the true sample and a 'normalized' sample being so small that they do not influence the final findings.[66]

The last obstacle, men not reaching full height before conscription, is one that is usually mitigated by, again, normalizing the sample. This can either be done by comparing the mean heights of the conscripts of several age groups and then adjusting for them, or by using a height prediction model, such as the one developed by Baten and Komlos, to increment the height of a conscript according to his age by a certain amount.[67]

[64] Hatton and Bray, 'Long run trends in the heights of European men, 19th-20th centuries', 406; Schoch, Staub, and Pfister, 'Social inequality and the biological standard of living', 156, 159-60; Quanjer and Kok, 'Drafting the Dutch', 501-2, 504, 512, 518, 521; Franken, 'Anthropometric History of Brazil, 1850-1950', 401.

[65] As done (by various statistical methods) in e.g. A'Hearn, Peracchi, and Vecchi, 'Height and the Normal Distribution'; Hatton and Bray, 'Long run trends in the heights of European men, 19th-20th centuries'; Franken, 'Anthropometric History of Brazil, 1850-1950'.

[66] See for example Quanjer and Kok, 'Drafting the Dutch'; Blum, 'The influence of inequality on the standard of living'.

[67] Joerg Baten and John Komlos, 'Height and the standard of living' *Journal of Economic History* 57:3 (1998).

I.4 – Hypotheses (I)[68]

This last part of the Chapter will contain the hypotheses that are to be tested in Chapter III and are derived from the above information. Generally, we predict to find confirmation that SES is correlated with stature. More generally, it is hypothesized that:

Due to the previously mentioned mechanism which describes a high level of education reflecting high SES, and with high SES and a high level of education found to be positively correlated with average height, higher levels of education will correspond to higher average height **(H1)**. In the same vein, it is hypothesized that higher levels of education will correspond to higher average weight **(H2)**. So too, it is hypothesized that higher levels of education will correspond to higher average BMI **(H3)**.

Following the same mechanism as above, it is predicted that a higher occupational background will correspond to higher average height **(H4)**, weight **(H5)**, and BMI **(H6)**.

It is furthermore hypothesized that, because growth only ceases between 20-25 years of age, conscripts between 18 and 25 will on average be taller (**H7)**, and heavier **(H8)**. Furthermore, it is hypothesized that by statistically adjusting for this difference, results will be more representative **(H9)**.

[68] For a complete overview of all hypotheses, please see Appendix A (p. 49).

CHAPTER II: FINLAND: THE ROLLERCOASTER TO PROSPERITY

II.1 – From Reds and Whites to the Russians: the Finnish Military

The moment when, only months after the October revolution threw the Russian state on its head, on the 6th of December 1917, the Finnish parliament declared independence from what had been their overlord for the preceding century, had been brewing in the nation for decades. Ever since the start of the Russification of Finland had officially taken off at the end of the nineteenth century, the calls for independence only kept growing, until that fateful day in 1917.[69]

What however had not been as active was the Finnish military. Some twenty years had passed since there had been any form of draft or compulsory conscription.[70] If that was not enough, barely two months later, on the 27th of January 1918, civil war broke out, when forces combined of the socialist and communist camps, colloquially known as 'the Reds', staged a coup in southern Finland.[71]

The first weeks of the war were relatively silent, with both sides gearing up for real conflict. While the Reds were in the numerical majority and occupied the industrial centres, the government forces, 'the Whites', had the advantage of more formidable commanders and the addition of the *Jägers*, Finnish troops that had been fighting with the Germans against the Russian Empire.[72]

However, starting at the beginning of March, when the war between the central powers and the new Russian state came to an end, the balance was soon heavily tipped in the favour of the Whites. More Jägers returned from the war and soon took up commanding posts within the White troops.[73] The real breakthrough however came in April, when the Germans staged an invasion of the southern coast

[69] David Kirby, *A Concise History of Finland* (Cambridge 2006), 152-9.
[70] Anders Ahlbäck, *Manhood and the Making of the Military: Conscription, Military Service and Masculinity in Finland, 1917-39* (London 2014) 4.
[71] Henrik Meinander, *A History of Finland* (London 2020), 128.
[72] Kirby, *A Concise History of Finland*, 161.
[73] Ibidem.

and the White troops in the north, under the command of soon-to-become-legendary Carl Gustaf Mannerheim started their march south, culminating finally on the first days of May, when the last pockets of Red resistance were defeated, and the Whites emerged victorious.[74]

When the restored government regained control of the country, universal male conscription was soon reintroduced. There was no major protest, as most people immediately realized a strong military was necessary, with a military giant (that in a way had also 'lost' the civil war) right on their doorstep.[75] From that moment in 1918 on, 'every young man declared able-bodied was not only expected to fight for his nation in wartime, but subjected to compulsory, prolonged military service'.[76]

In the first years of conscription, it was however not very popular. Up until the mid-1920's, only some roughly sixty percent of those called up would eventually undergo military training, due to many people dodging the draft, but also for medical reasons, with military authorities noting widespread malnourishment.[77] However, when the dust had settled, and the matter of conscription was soon engrained in the national spirit, it quickly became somewhat of a place for political considerations: 'the notion of young men educated into patriotism and dutifulness through military training suited conservative values and corresponded to middle class notions of young men needing guidance on the difficult road to responsible manhood…'.[78] It also became a place for what one might call 'class-mingling': the army became the only place where men from all social strata came together to join in a shared experience.[79]

Nevertheless, the army was also a place of 'othering', both externally and internally. Those that were rejected from military service for being deemed unfit were derogatorily called a *ruununraakki*, a crown wreck: they were regarded by some in society as inferior men, with diminished romantic prospects.[80] Internally, divisions remained based on class and origin, with for example the often primarily Swedish-speaking Jägers, who generally were of higher socioeconomic status,

[74] Henrik Meinander, *A History of Finland*, 130-1; Kirby, *A Concise History of Finland*, 162.
[75] Ahlbäck, *Manhood and the Making of the Military*, 4.
[76] Ibidem, 6.
[77] Ibidem, 46, 53.
[78] Ibidem, 69.
[79] Ibidem, 199.
[80] Ibidem, 182.

taking up high positions in the army, and a sense of injustice when people of lower SES were promoted over people with, for example, wealthier parents.[81]

A little over two decades after its inception, the Finns were suddenly firmly reminded of their reasoning behind the start of conscription, when on the 30th of November 1939, Soviet troops crossed the Finnish border in several places, marking the start of the Winter War, a first of three wars the Finns would be fighting over the next six years.[82]

After this first war had been ended, with Finland ceding much territory to the Russians, but with heavy casualties on the Russian side, it took some fifteen months for hostilities to return, with the Continuation War. This war, initiated by the Finns as a means of returning lost territories, and supporting the Germans in their Operation Barbarossa, ended in September of 1944, with the Soviets in the following peace deal annexing in total some 11 percent of the country.[83]

The Lapland war, the last of the three wars, was started on the day of the Soviet Peace, which forced the Finns to expel the German soldiers still on their territory. Realistically, the fighting only lasted for some three months, before most German troops had retreated to Norway, or were taken prisoner, with the last of minor skirmishes finally ending in April of the following year.[84]

With the Lapland War wrapped up, Finland had shown itself – in the face of a much larger and technologically advanced adversary in the Soviet Union – to possess a grand fighting spirit, with even Stalin in later years commending the Finnish army for their prowess.[85] Even with far inferior numbers, they were able to limit the Soviet advance, with their strength 'not based on military but human resources, [since] the military skills of the troops and the national unity experienced were the most forceful weapons to fight back against the enemy…'.[86] Finnish conscription had all but matured, and had shown itself a powerful weapon against military adversity.

[81] Kirby, *A Concise History of Finland*, 163; Ahlbäck, *Manhood and the Making of the Military*, 201.
[82] Henrik Meinander, *A History of Finland,* 147, 151-2, 154-5; Kirby, *A Concise History of Finland*, 208.
[83] Vesa Neye et al., *Finland at War: The Continuation and Lapland Wars, 1941-45* (Oxford 2016), 317-20.
[84] Ibidem, 314-6.
[85] Pasi Tuunainen, 'The Finnish Army at War: Operations and Soldiers, 1939-45', in: Tiina Kinnunen and Ville Kivimäki eds., *Finland in World War II: History, Memory, Interpretations* (Leiden/Boston 2012), 139-190, at 139.
[86] Marianne Junila, 'Wars on the Home Front: Mobilization, Economy and Everyday Experiences', in: Tiina Kinnunen and Ville Kivimäki eds., *Finland in World War II: History, Memory, Interpretations* (Leiden/Boston 2012) 191-232, at 194.

II.2 – A People United Yet Divided

At the turn of the 20th century, Finland could, by far, not measure itself economically against some of the more prosperous western nations, and had suffered from levels of very high wealth inequality for decades.[87] Nowadays, a good century later, Finland is among the nations ranking highest in Human Development (HDI), GDP per capita, and low wealth inequality.[88] In this section, we will take a look at (the evolution of) some of the socioeconomic variables in Finland of the first four decades of the 20th century.

To first paint a picture of that start of the century: in the year 1900, GDP per capita was much lower than in the parts of Europe where industrialisation had taken off much earlier than in Finland, where it only really commenced around 1870: in 1900 its GDP per capita was only 76 percent of that of its neighbour (and long-time overlord) Sweden, and only a miniature 37 percent of that in Great Britain.[89] Wealth inequality was very high, with the richest decile owning almost 90% of total wealth.[90] Of the population, some 70 percent was employed in primary production, with most of them working as learned or unlearned labourers, or as farmers.[91] Urbanisation, the share of population living in urban areas, was very low for European standards at the time, standing at only 12.6 percent.[92] While industrialisation was picking up, it was still far below Swedish levels, at 16.7%, compared to 23.9%.[93]

Nevertheless, things were headed in the right direction. In the decades following the turn of the century, the Finnish economy rapidly 'Europeanised': forty years later, GDP per capita had more than doubled;[94] industrialization had mostly caught up with the rest of Europe;[95] and wealth inequality had significantly decreased, directly contradicting the Kuznets curve, which posits that inequality

[87] Erik Bengtsson et al., 'Unequal poverty and equal industrialisation: Finnish wealth, 1750-1900', *Scandinavian Economic History Review* 67:3 (2019) 229-248, at 229-30.
[88] United Nations Development Programme, *Human Development Report 2020* (New York 2020).
[89] Bengtsson et al., 'Unequal poverty and equal industrialisation', 229-30.
[90] Ibidem, 237.
[91] Riitta Hjerppe and Jukka Jalava, 'Economic Growth and Structural Change: A Century and a Half of Catching-up', in: Jari Ojala, Jari Eloranta, and Jukka Jalava eds., *The Road to Prosperity: An Economic History of Finland* (Helsinki 2006) 33-64, at 51.
[92] Bengtsson et al., 'Unequal poverty and equal industrialisation', 239.
[93] Ibidem.
[94] Hjerppe and Jalava, 'Economic Growth and Structural Change', 47.
[95] Antti Häkkinen and Jarmo Peltola, 'On the Social History of Unemployment and Poverty in Finland, 1860-2000', in: Kalela et al. eds., *Down from the heavens, up from the ashes: The Finnish economic crisis of the 1990s in the light of economic and social research* (Helsinki 2001) 309-345, at 310-12.

first rises with industrialisation before falling again;[96] and primary production had lost some 35% of its share of the population.[97] Only urbanisation lagged behind, in some cases even leading to rural overpopulation, which lasted until after the Second World War, when rapid urbanization commenced.[98]

Yet, even with all economic improvements of the first four decades of the twentieth century, the Finnish nation was still in many ways a society divided by class. Class affiliation and inequality took on many forms, with several avenues worth exploring, because they paint a picture of Finland that economic variables by themselves are unable to put together. We will, respectively, look at four of the 'class dividers' of Finnish society, namely: education, occupation, language, and the military.

Around 1900, only about half of rural children were able to attend primary school, the other half not receiving any schooling at all, and growing up with only what their parents taught them.[99] When, in 1921, compulsory schooling was officially introduced, this percentage had been lowered to around 15.[100] In many cases it nonetheless did not prevent many working-class children leaving school around the sixth grade of primary school (± 12-13 years old), their parents either being unable or unwilling to let their children go to school any longer: education beyond the sixth grade was chiefly viable for those children coming from the middle or higher classes. [101]

It were precisely these children from the higher classes that would later on go to university, in those times still a privilege for the few. Moreover, 'it was from these ranks of the highly educated that the pioneers of the emerging civic society arose'.[102] These walks of life were, with very few exceptions, impracticable for children of the lower classes. And this had a knock-on effect, especially with regard to occupation. As those from higher social classes were moving from the sixth grade of elementary school on to further schooling, and thereby moving on to well-paying jobs, the children that left school in many cases went back to their parents,

[96] Petri Roikonen, 'Income Inequality in Finland, 1865-2019', *Scandinavian Economic History Review* (2021) 1-18, at 5-6.
[97] Hjerppe and Jalava, 'Economic Growth and Structural Change', 51.
[98] Norkus et al., 'The Estonian antebellum paradox', 14.
[99] Meinander, *A History of Finland*, 115.
[100] Ahlbäck, *Manhood and the Making of the Military*, 15.
[101] Ibidem.
[102] Meinander, *A History of Finland*, 116.

helping them with farm work or other unskilled jobs, as their parents in many cases could not keep supporting themselves indefinitely.[103]

Workers from the lower classes too suffered more unpredictability with regard to their livelihood, with for example the depression in the 1930s making huge swathes of them unemployed, at a time when seasonal unemployment was already highly common in rural areas.[104] Moreover, a 1936 research project found that 'the nutritional state of the population was poor among working class families in both the cities and rural areas'.[105] Coupling that with both high wealth and income inequality, people from working class families were decidedly disadvantaged in life compared to the middle and higher classes, both with regard to education and occupation, and therefore too with regard to future education, occupation, and nutrition.[106]

The final two indicators of inequality, language and the military, are not as decisive or do not form so much a causal sequence as do the two indicators discussed above. Nevertheless, they are clear indicators of differences in social stratification, and especially interesting for our analysis in Chapter III.

For long, language had been an issue at the forefront of cultural clashes in Finland: 'until the late nineteenth century, [Swedish had] been the language of the educated classes in Finland…'.[107] The language issue was never a battle between nationalities, but merely 'at the bottom about social change': when in the late nineteenth century a certain baron publicly started speaking Finnish, it was seen by the nobility as 'unseemly and an affront to the [noble] estate'.[108] Even though in the first decades of the 20th century Finnish gained massively in popularity, with for example universities switching to classes in Finnish in 1937, Swedish remained the language of the elite: Swedish-speakers held higher jobs, enjoyed higher social status, disproportionally enjoyed secondary education more than Finnish-speakers, and traditionally held disproportionately higher ranks in the military.[109]

[103] Ahlbäck, *Manhood and the Making of the Military*, 15.
[104] Häkkinen and Peltola, 'On the Social History of Unemployment and Poverty in Finland, 1860-2000', 314-5.
[105] Ibidem, 320.
[106] Ibidem; Bengtsson et al., 'Unequal poverty and equal industrialisation', 237, 239; Roikonen, 'Income Inequality in Finland, 1865-2019', 5; Hjerppe and Jalava, 'Economic Growth and Structural Change', 51.
[107] Ahlbäck, *Manhood and the Making of the Military*, 74.
[108] Kirby, *A Concise History of Finland*, 119-21.
[109] Ibidem, 169-70, 185, 186-7; Ahlbäck, *Manhood and the Making of the Military*, 90.

Language did not act as the only class divider of the Finnish military but was surely one of its hallmarks. As discussed in Section II.1, the majority Swedish-speaking Jägers, the Finns that had fought for the German Empire in the First World War, became commanders and other high-ranking officials in the Finnish army upon their return. After the civil war, many of these Jägers were promoted 'far beyond their formal military education', and 'by the 1920s a good deal of the training officers, as well as company and regiment commanders of the conscript army, were Jäger veterans', with many '[originating] within the educated upper and middle class'.[110] Language differences had made the military, too, a place of class division.

That was however not the only way the military underpinned class stratification. For example, men who associated themselves with the labour movement – men, mostly, of the lower working classes – were oftentimes forbidden from serving in the civil guard.[111] Amendments to the conscription law of 1921 contained possibilities for denying 'politically untrustworthy' men to serve in the military, something the Social Democrats called a 'military caste system': it were mostly working-class men who had socialist or communist sympathies that were excluded through this mechanism.[112] All in all, the military, even though in a broad sense *the* place for egalitarianism of the classes, was still a system in which class stratification and inequality were present and persistent.

To conclude, the Finnish *Rollercoaster to Prosperity*, while taking a nation far behind the rest of Europe in the late 19th century through three separate wars and onto the global stage as a beacon of equality and welfare, nevertheless left behind many people in the first four decades of the 20th century, and was unable to do away, or even seriously curtail, the many factors influencing stark class differences.

[110] Ahlbäck, *Manhood and the Making of the Military*, 90-4.
[111] Ibidem, 14.
[112] Ibidem, 64.

II.3 – Hypotheses (II)[113]

As in the previous chapter, the information discussed in this chapter will be our guide in formulating several hypotheses to be tested in Chapter III.

Due to the relationship shown between having Swedish as the mother tongue and traditionally belonging to a higher social class, it is, following the previously described finding that people with a higher socioeconomic status have a higher average stature and better nutrition, hypothesized that conscripts with Swedish as their mother tongue have a higher average height **(H10)**, weight (**H11**), and BMI (**H12**) than their primarily Swedish-speaking counterparts.

Having shown that speaking Swedish as the mother tongue is correlated with better education prospects, also considering that those are found to be of higher SES, which also correlates to higher level of education, it is hypothesized that conscripts with Swedish as their mother tongue have a higher average level of education **(H13**).

Having shown that the Finnish conscription army favoured people of higher SES holding higher ranks in the military, and higher SES correlated with larger stature, weight and therefore BMI, it is hypothesized that a higher military rank corresponds to higher average height (**H14**), weight (**H15**), and BMI (**H16**). By the same mechanism, with Swedish speakers supposedly of higher SES, it is hypothesized that conscripts with Swedish as their mother tongue have a higher average military rank (**H17**).

Following the above, if higher SES is correlated with a higher military rank, it is hypothesized that a higher level of occupation (**H18**) or a higher level of education (**H19**) corresponds to a higher military rank.

Furthermore, with the quality of education steadily improving during the first four decades of the twentieth century, including the introduction of mandatory elementary schooling, it is hypothesized that the level of education improves with each succeeding birth cohort **(H20**).

Lastly, it is within the above context taken to be true that one factor of SES should correspond with another, thus it is hypothesized that a higher level of occupation corresponds to a higher level of education (**H21**).

[113] For a complete overview of all hypotheses, please see Appendix A (p. 49).

CHAPTER III: THE TALL DIRECTOR AND HIS COMRADES[114]

III.1 – Methodology and Source

To start off, first a quick word on the layout of this chapter. We will look at the results of the analysis for each dependent variable, with the first three the focus of section III.2, and the last two discussed in section III.3 (respectively height, weight, BMI, education level, and military rank). However, we will first shortly discuss the methodology used in each of these analyses, and then take a deeper look at the contents of the source material.

The methodology of the analysis consists primarily of performing several linear regression analyses on different factors of the data set, which enables us to study the varying effects certain independent variables (such as age) have on another, dependent variable (such as height). Because in a complex network of interactions there is never only a single variable exerting all of the change in some other variable, it is paramount that one controls for the other variables that might influence the relationship between them, keeping in mind that these variables themselves might also in their own way influence the dependent variable. For that reason, the analyses performed below always control for every other relevant factor in that particular analysis – which the tables themselves will reflect.[115]

As mentioned in the Introduction and shown in Table 1 (p. 28), the data set contains information on several factors of a conscript's life, namely: age at draft (combining year of birth and year of draft); his occupation (which is here coded using the HISCLASS-5 codification)[116]; his level of education (reduced from fourteen categories to three, see Appendix B, p. 52); his military rank; and his mother tongue, as well as his height and weight.

[114] The tallest conscript found in the data set is coincidentally (or is it?) also the one with the highest occupational level: a whopping 191 centimetres tall, this Swedish-speaking, 30-year-old Managing Director is the giant of the sample. He would, however, only go on to become a regular rank-and-file soldier. It seems you cannot *always* be on top.

[115] To expound slightly on this, it means that the tables shown are, on their own, always a result of a singular multiple linear regression analysis, and not several separate ones joined together. This means that every variable is controlled for by the others.

[116] Mandemakers et al., *HSN standardized, HISCO-coded and classified occupational titles, release 2018.01*, 9.

Table 1. Overview of sample, Finnish conscripts 1918-1944.

Variable								
Birth cohort	**1894-1898**	**1899-1903**	**1904-1908**	**1909-1913**	**1914-1918**	**1919-1923**	**1924-1926**	**%**
Total in cohort	26	56	77	82	106	110	74	100
Age at draft								
17-19	0	0	57	40	3	61	72	43.9
20	0	48	4	29	89	39	0	39.4
>20	25	6	10	10	4	5	0	11.3
Unknown	1	2	6	3	10	5	2	5.5
Occupational level								
Elite	1	0	1	2	0	1	0	0.9
Lower middle class	0	1	4	8	7	8	4	6.0
Self-employed farmers and fishermen	9	20	18	22	30	19	14	24.9
Skilled workers	6	12	12	15	16	16	21	18.5
Unskilled workers and farm workers	7	9	32	20	32	40	19	29.9
Unknown	3	14	10	15	21	26	16	19.8
Educational level								
No formal education	16	19	15	7	4	3	0	12.1
Only (some) elementary education	9	31	48	57	79	73	58	66.9
Education beyond elementary	1	6	9	12	14	25	16	15.6
Unknown	0	0	5	6	9	9	0	5.5
Military rank								
Deemed unfit for service	6	5	6	7	9	3	2	7.2
Rank-and-file	16	40	58	52	62	85	65	71.2
NCO	3	10	12	18	24	15	6	16.6
Officer	1	1	1	5	11	7	1	5.1
Mother tongue								
Finnish	18	42	61	65	91	88	67	81.4
Swedish	8	12	14	17	12	20	6	16.8
Russian	0	2	2	0	0	0	0	0.8
Unknown	0	0	0	0	3	2	1	1.1

Source: see Introduction, page 8.

It is worthwhile to shortly reflect further on the composition of the data set before moving on to the analysis and results and consider some of the things that stand out. First, it is noteworthy that many of the conscripts at the time of registration are younger than twenty. When conscription was introduced, and at least through the 20's and 30's, men were obligated to start their service in the year

they turned twenty-one.[117] It is possible that some of these men were twenty the year they started military service (as they would turn twenty-one that same year), but that does not explain the large number of men younger than twenty in the data set. It is best to assume that some men were either called up earlier than the mandatory age twenty-one, or that they themselves chose to start their service earlier, for varying reasons.

It is also worth noting the low number of conscripts from higher occupational levels. While it comes close to reflecting the economic situation during the first half of the century (see section II.2), it is still lower than would be expected. Three reasons might be at the root of this: first, being in higher education was a valid reason for draft exemption. If it would logically follow that someone with high education would go on to a higher occupational level, they would therefore be missing from the records. A second reason might be that, simply, men aged 18-21 did not yet occupy such a high occupational position. A third reason might be draft dodging being more common among men of higher occupational position, but there is no proof of this.

When looking at military rank, it is surprising that only 7.2 percent of conscripts were deemed unfit for service, as 'towards the end of the 1930s roughly one man in six was completely discarded'.[118] This would suggest that almost half of these 'rejects' were not registered in the records. Without any further research however, that is difficult to prove or decisively state.

A last point of interest is the inclusion of four conscripts with Russian as their mother tongue. Even though Russian was only very shortly an official language in Finland, when it was part of the Russian Empire, there remained many speakers of Russian after the Finnish independence, whose ancestors had settled in Finland when it was still the Grand Duchy. Around the turn of the century, there were some 9000 remaining, having however mostly disappeared from the higher echelons of public life.[119] For further critique of the source, please see the Discussion.

[117] Ahlbäck, *Manhood and the Making of the Military*, 15.
[118] Ibidem, 182.
[119] Meinander, *A History of Finland*, 114.

III.2 – Results: Anthropometric Factors

The results of the different analyses will be discussed independently. We will first discuss the analysis of all factors influencing height, after which we will discuss the variables of weight, and BMI.

Height

Before diving into the analysis straightaway, it is important to first briefly analyse the representativeness of the data set, in order to be sure that the results are derived from information that is generally in line with other (scientific) observations, and to test (hypothesis) ***H9***. In Table 2 below, the data set is compared with two other sources containing information about the stature of Finnish men in the early twentieth century. Shown are the names of the data sets, the mean and median of their recorded heights, and their standard deviation.

Table 2. Comparison of different sources of historical height of Finnish men, in centimetres.

Data set	Mean	Median	σ	Years in data
Thesis data set, unadjusted	170.2	170.0	6.7	1894-1926
Thesis data set, adjusted	171.5	171.7	6.7	1894-1926
Clio Infra	171.5	172.3	2.5	1900-1940
NCD-RisC	169.8	169.7	1.3	1896-1926

Source: thesis data set, Clio Infra database, NCD-RisC database. See text and annotations for further information.

The adjusted data set (to adjust for the fact that many in their teens and early twenties have not reached full height yet, see Introduction and Section I.3) was constructed using the method as described by Baten and Komlos, which led to an adjusted mean increase of 1.3 centimetres.[120] The other two data sets were retrieved from the Clio Infra project[121], and the NCD-RisC databases.[122] It can be observed that in both the unadjusted and adjusted state, the thesis data is (or gets) very close to earlier observations, and is well within the margin of error. While it

[120] Baten and Komlos, 'Height and the standard of living'. The following changes were made to the data set: the height of every male 18 or below was increased by 2.4cm; that of every 19-year-old by 1.7cm; that of every 20-year-old by 0.9cm; that of every 21-year-old by 0.4cm; and finally, that of every 22-year-old by 0.1cm.
[121] Mandatory citation: Joerg Baten and Mathias Blum (2015), *Height*, accessed via the Clio Infra website (clio-infra.eu, accessed July 20th, 2022). Source contains height data on 10-year-cohorts. Used were the data for 1900-1940, due to an otherwise extremely small sample.
[122] NCD Risk Factor Collaboration, 'A century of trends in adult human height', *eLife* (2016), accessed via https://ncdrisc.org/archives.html (accessed July 23rd, 2022). Source contains height data for a large number of years. Used were the data for 1896-1926 (nearly the same range as own data set).

leaves ***H9*** undecided, it is a good sign for the base representativeness of the sample, meaning we can comfortably move towards the results of the regression analysis of the factors influencing conscript's height, for which please see Table 3 (p. 32).

We observe the confirmation of ***H1***, with a higher level of education significantly corresponding to higher average stature, with a mean increase of between 4.81 and 4.89 centimetres for respectively the unadjusted and the adjusted data set when comparing between those having only (some) elementary schooling, and those having more than that.[123] We too observe confirmation of ***H10***, with those having Swedish as their mother tongue being (so to speak) significantly taller than their Finnish-speaking counterparts, with a mean increase of respectively 2.64 and 2.63 centimetres.

There is also confirmation of ***H14***, with the significant finding that those conscripted as an NCO (non-commissioned officer) are on average 2.26 and 2.22 centimetres taller, respectively, than the rank-and-file conscripts. The last significant, yet unexpected finding is that those of the 1904-1908 birth cohort are significantly less tall than those of the 1914-1918 birth cohort, by a (relatively speaking) whopping 3.03 and 3.13 centimetres, respectively.

We find no confirmation of either ***H4*** or ***H7***, with in all cases surrounding these there being no significant findings. There is some promise for ***H4***, but the low amount of data on those of the 'Elite' occupational level might play a part here in relation to the insufficient significance.

[123] From this point on, when two findings related to height are simultaneously given, they indicate the finding for respectively the unadjusted, and the adjusted data set.

Table 3. Linear regression model of influences on average height in centimetres, Finnish conscripts 1918-1944.

Variable	B (σ) Unadjusted	B (σ) Adjusted
Constant	169.72*** (1.23)	169.87** (0.85)
Age at draft		
17-19	0.77 (0.99)	1.68* (0.99)
20	Reference	Reference
>20	1.38 (1.34)	0.63 (1.34)
Birth cohort		
1894-1898	-0.70 (2.04)	-0.65 (2.04)
1899-1903	-0.08 (1.25)	-0.08 (1.25)
1904-1908	-3.03** (1.32)	-3.13** (1.32)
1909-1913	-0.55 (1.15)	-0.62 (1.15)
1914-1918	Reference	Reference
1919-1923	-0.07 (1.14)	-0.02 (1.14)
1924-1926	-0.34 (1.43)	0.06 (1.43)
Occupational level		
Elite	5.38* (3.12)	5.39* (3.12)
Lower middle class	0.79 (1.38)	0.78 (1.38)
Self-employed farmers and fishermen	-0.15 (0.78)	-0.15 (0.78)
Skilled workers	0.05 (0.84)	0.05 (0.84)
Unskilled workers and farm workers	Reference	Reference
Educational level		
No formal education	-0.56 (1.04)	-1.31 (1.04)
Only (some) elementary education	Reference	Reference
Education beyond elementary	4.81*** (1.39)	4.89*** (1.39)
Military rank		
Deemed unfit for service	-1.26 (1.41)	-1.31 (1.41)
Rank-and-file	Reference	Reference
NCO	2.26** (0.91)	2.22** (0.91)
Officer	3.90 (2.53)	3.88 (2.53)
Mother tongue		
Russian	-2.63 (3.30)	-2.67 (3.30)
Finnish	Reference	Reference
Swedish	2.64*** (0.92)	2.63*** (0.92)

Source: see Introduction, page 8. Heights adjusted using Baten and Komlos (1998).
Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Weight

Moving on to the factors concerning weight, the analysis is less supportive of the hypotheses (see Table 4., p. 34).[124] Of the posited hypotheses, only ***H2*** is significantly confirmed, as the model shows that a conscript with an education beyond elementary school is on average almost five kilograms (4.99) heavier than a conscript not having had any formal education. Furthermore, in the same vein as before, the only other significant finding is that conscripts of the 1904-1908 birth cohort are found to be less heavy than their 1914-1918 birth cohort comrades by some three-and-a-half kilograms.

Although close, ***H5*** is not confirmed, thereby not extending the finding found above that higher-ranked conscripts were necessarily heavier as were they taller. ***H8*** also falls by the wayside, with only an insignificant indication being given. And whereas speaking Swedish as their mother tongue or being of a higher military rank was a predictor for being of higher average stature, this too is not extended to weight, with neither ***H11*** nor ***H15*** being confirmed.

BMI

If many socioeconomic indicators not being found to significantly correlate with weight was a speedbump, then BMI is a brick wall (see Table 5, p. 35). We do not find significant confirmation of either ***H3***, ***H6***, ***H12*** or ***H16***. The only significant finding again pertains to the birth cohort, with the unexpected discovery of a lower average BMI for those born in the 1899-1903 cohort.

[124] Nb: for both weight and BMI I am also controlling for the season the conscript was registered during, keeping to the meteorological seasons. This is to avoid seasonal changes to diet unwittingly influencing the analysis.

Table 4. Linear regression model of influences on average weight in kilograms, Finnish conscripts 1918-1944.

Variable	B (σ)
Constant	63.39*** (1.89)
Age at draft	
17-19	Reference
20	-0.17 (1.24)
>20	1.59 (1.39)
Birth cohort	
1894-1898	-1.55 (2.62)
1899-1903	-3.27* (1.78)
1904-1908	-3.42** (1.66)
1909-1913	-0.33 (1.41)
1914-1918	Reference
1919-1923	-1.182 (1.46)
1924-1926	-2.89 (1.89)
Occupational level	
Elite	2.63 (3.81)
Lower middle class	1.27 (1.69)
Self-employed farmers and fishermen	0.86 (0.96)
Skilled workers	0.29 (1.02)
Unskilled workers and farm workers	Reference
Educational level	
No formal education	Reference
Only (some) elementary education	0.16 (1.31)
Education beyond elementary	4.99** (2.08)
Military rank	
Deemed unfit for service	-1.28 (1.71)
Rank-and-file	Reference
NCO	1.86* (1.12)
Officer	1.36 (3.102)
Mother tongue	
Russian	-3.47 (4.01)
Finnish	Reference
Swedish	1.78 (1.14)
Season of draft	
Spring	1.19 (1.44)
Summer	-0.92 (3.26)
Autumn	Reference
Winter	-0.50 (1.92)

Source: see Introduction, page 8.
Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 5. Linear regression model of influences on average BMI in kg/m^2, Finnish conscripts 1918-1944.

Variable	B (σ)
Constant	22.04*** (0.46)
Age at draft	
17-19	Reference
20	0.20 (0.30)
>20	0.38 (0.39)
Birth cohort	
1894-1898	-0.10 (0.64)
1899-1903	-1.12** (0.44)
1904-1908	-0.26 (0.41)
1909-1913	0.02 (0.34)
1914-1918	Reference
1919-1923	-0.40 (0.36)
1924-1926	-0.88* (0.46)
Occupational level	
Elite	-0.53 (0.93)
Lower middle class	0.13 (0.41)
Self-employed farmers and fishermen	0.29 (0.23)
Skilled workers	0.07 (0.25)
Unskilled workers and farm workers	Reference
Educational level	
No formal education	Reference
Only (some) elementary education	-0.04 (0.32)
Education beyond elementary	0.34 (0.51)
Military rank	
Deemed unfit for service	-0.11 (0.42)
Rank-and-file	Reference
NCO	0.09 (0.27)
Officer	-0.42 (0.76)
Mother tongue	
Russian	-0.46 (0.98)
Finnish	Reference
Swedish	0.02 (0.28)
Season of draft	
Spring	0.27 (0.35)
Summer	0.09 (0.80)
Autumn	Reference
Winter	-0.01 (0.32)

Source: see Introduction, page 8.
Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

III.3 – Results: Other Factors

In this Section we will be looking at the results of the analysis pertaining to educational level and military rank.

Education

We successfully find significant confirmation of ***H13***, with having Swedish as the mother tongue a predictor for enjoying a higher average education than a primarily Finnish-speaking conscript, with a difference of around one higher level of education (see Table 6, p. 37). [125]

We also observe many significant findings that should point towards a confirmation of ***H20***. Only the birth cohorts of 1909-1913 and 1919-1923 do not present us with a significant change, while the rest, almost in unison apart from the 1899-1903 birth cohort, shows us a gliding scale with regard to education level improving with each birth cohort. Most notably however are those of the 1894-1898, who are seemingly much worse off educationally than one would expect considering the other changes.

With a regression homerun we, perhaps unsurprisingly, but still interestingly, confirm ***H21***, with all levels of higher occupation, except for the self-employed farmers and fishermen, showing significantly higher levels of education than those conscripts of the lowest occupational level, with the Elite on average an impressive five levels of education higher than the unskilled (farm) workers.

[125] It is important to note that the variables relating to education and military rank work differently than those of an anthropometric nature, with the 'scores' of education and military rank symbolizing static situations (see for the explanations behind those Appendix B, p. 52). Therefore, if for some variable military rank is 'half as high', it does not mean the person is half as high ranked. It simply indicates that relative to the other conscript, they are closer to another military rank than that conscript. For education, the scale is much wider and detailed, however still not a true 'sliding scale'. Whereas here the 'steps' between numbers do indicate a more tiered improvement, it still should be seen within the context of their symbolic nature, and those differences to be regarded more as statistical tools signifying relative difference, rather than true representations of a certain physical situation, as is the case with anthropometric measurements.

Table 6. Linear regression model of influences on educational level. Finnish conscripts 1918-1944.

Variable	B (σ)
Constant	3.98*** (0.28)
Age at draft	
17-19	Reference
20	0.01 (0.23)
>20	0.46 (0.31)
Birth cohort	
1894-1898	-2.77*** (0.44)
1899-1903	-0.74*** (0.28)
1904-1908	-0.84*** (0.30)
1909-1913	-0.35 (0.27)
1914-1918	Reference
1919-1923	0.46* (0.26)
1924-1926	0.70** (0.33)
Occupational level	
Elite	5.06*** (0.67)
Lower middle class	1.55*** (0.30)
Self-employed farmers and fishermen	0.01 (0.18)
Skilled workers	0.43*** (0.19)
Unskilled workers and farm workers	Reference
Mother tongue	
Finnish	Reference
Russian	0.95 (0.76)
Swedish	1.03*** (0.21)
Military rank	
Deemed unfit for service	-0.02 (0.32)
Rank-and-file	Reference
NCO	0.30 (0.21)
Officer	0.42 (0.58)

Source: see Introduction, page 8. For explanation of scale, see text or Appendix B (p. 52)
Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 7. Linear regression model of influences on military rank. Finnish conscripts 1918-1944.

Variable	B (σ)
Constant	2.21*** (0.05)
Age at draft	
17-19	Reference
20	0.17** (0.08)
>20	-0.15 (0.11)
Birth cohort	
1894-1898	0.11 (0.16)
1899-1903	0.01 (0.10)
1904-1908	0.08 (0.11)
1909-1913	0.15 (0.09)
1914-1918	Reference
1919-1923	-0.02 (0.09)
1924-1926	-0.02 (0.11)
Occupational level	
Elite	-0.07 (0.25)
Lower middle class	0.28*** (0.11)
Self-employed farmers and fishermen	0.15** (0.06)
Skilled workers	-0.02 (0.07)
Unskilled workers and farm workers	Reference
Educational level	
No formal education	-0.08 (0.08)
Only (some) elementary education	Reference
Education beyond elementary	0.03 (0.11)
Mother tongue	
Finnish	Reference
Russian	-0.63** (0.26)
Swedish	-0.16** (0.07)

Source: see Introduction, page 8. For explanation of scale, see text or Appendix B (p. 52)
Significance levels: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Military rank

We start off with a surprise: not only is ***H17*** not confirmed, the reverse is observed, even significantly, with primarily Swedish-speaking conscripts lower in average rank than their comrades with Finnish as their mother tongue (see Table 7, p. 38). This finding is also significant for those with Russian as their mother tongue, who fare even worse than the Swedish-speakers compared to the Finnish-speakers.

Nevertheless, we do find statistically significant confirmation of ***H18***, with both the lower middle class and the self-employed farmers and fishermen enjoying higher average military ranks than the unskilled workers and farm workers. We however do not find any sign of confirmation of ***H19***, with it being resolutely disproven.

A last, unpredicted, statistically significant finding is that, compared to conscripts that are registered between ages 17-19, those at age 20 fare ever so slightly better.

DISCUSSION

As we have seen, several of the tested hypotheses turned out to be confirmed, but many have also been left in the dust. Looking back, the results mostly confirm one of the maxims of anthropometric history: the level of education being an excellent predictor of SES, with other indicators of SES, such as occupation or, in Finland's case, mother tongue, directly related to the level of education.

More specifically, we confirmed the long-standing consensus that height is influenced by such indicators of SES, with education, mother tongue and higher military rank all predicting larger stature. In this sense we have also found this same effect for weight, with a higher level of education predicting higher weight (but bad news on weight later).

We have furthermore shown that the class stratification in Finland, demonstrated earlier, at the time of these men getting drafted still permeated society, with results showing several connections between the aforementioned 'avenues of class', with those of high educational and/or occupational background often from Swedish-speaking (higher class) families, with larger average stature.

Nevertheless, we have also established proof for the then ongoing betterment of Finnish society, with the average level of education steadily increasing across the board. The army was however not yet free of inequality, with those of higher occupation on average landing higher up on the military ladder.

In spite of this, we have also had to accept many hypotheses being discarded. In particular, all of the hypotheses concerning effects of indicators of SES on BMI, and all save one regarding weight, were rejected. Speculating on this, there might be one of several things at play: first, it might be that due to the relative temporality of weight, and therefore too of BMI, only short-term indicators of SES, such as recent disease, malnourishment, or other crisis, play any major role on significant changes in these measurements. Secondly, there is a possibility that because of the lower average stature of early 20th century Finns, longitudinal changes in BMI and weight stemming from changes in the SES environment are

simply too insignificant.[126] Lastly, it might be that the nature of weight, or, more probable, that of BMI – oft scholarly criticized – is simply less suitable for this type of study in the way that height is.[127]

We have also been surprised by findings that were not predicted. One variable especially takes the mystery cake: the birth cohort of 1904-1908. Both in height and weight, the members of this cohort were found to be significantly worse off than their comrades. There is not one single explanation to be found. Nothing suggests that in precisely the formative years of these men the situation was in such a dire state that they could not have but grown up shorter than their peers, although this cannot be excluded. An alternative explanation might be that by chance this cohort contained many men under 20 years of age, as Table 1 (p. 30) suggests, which however is contradicted by the rejection of ***H7*** and ***H8***, in both cases older conscripts not found to be significantly taller or heavier than younger ones.

A third explanation might simply be the sample, bringing us to the discussion of the limitations of this study, with the first one being the sample size. With many indications of confirming certain hypotheses on the brink of significance, and some variables having only but a few entries (such as Russian-speakers or those with the highest occupational class), it might be that for the sample to provide clearer results, its size would have to be improved, perhaps also clearing up the birth cohort mystery. Luckily there is a possibility for that, and it might certainly be interesting to see what this would mean for the questions that remain.

Another limitation is the lack of knowledge about the men that did not end up in the conscription records, be it through exemption, being found unfit, or by draft dodging. Without this information, it is more difficult to regard the sample as a true cross section of the (male) Finnish society, with the absence of these men possibly skewing the sample in a specific way. It is worthwhile exploring more about the nature and SES background of those not being recorded in the records, in order to gain a more complete understanding of Finnish social society.

[126] Stemming from the simple mathematical fact that a (on average heavier) tall person of 80kg losing 5% of their weight loses more nominal weight than a (on average lighter) short person of 60kg losing 5% of their weight.
[127] Which, to cite Steven L. Hoch, 'it would seem that height without weight cannot bear the burden of anthropometric analysis', might admittedly be a very controversial speculation. Cited from: Hoch, 'Tall Tales', 64.

Since it was not yet possible for this study to take regional information such as place of birth and residence into its analysis, it might be that the influence of these variables was therewith overlooked.[128] As shown in Section I.2, many studies have found regional differences in SES and anthropometric factors. It might very well be that inclusion of these variables in a future study might shed more light on the situation, or might wholly change the impact of some of the variables that were analysed.

[128] This information will however be available at a later date, as it is currently undergoing ordering and (regional) codification.

CONCLUSION

To state it concisely, this thesis aimed to further our understanding of the limitations and ultimate usefulness of military data, to add to the body of literature that anthropometric history has put forth, and to improve our knowledge of Finland's complex socioeconomic history.

With regard to this first goal, we have analysed the many ways in which military data has been used before by anthropometric and economic historians, we have discussed the most prominent of issues that can prevent one from doing conclusive research in the area and we have shown ways of how these can be mitigated. With our case study, we have put these reflections directly into practice: based on the examined literature, and with actively allaying the limitations we faced, we formulated and tested several hypotheses, with many compelling findings resulting from their analysis.

These findings have supported us in pursuing our second goal. Not only have we confirmed some of the findings of the field, both strengthening those and legitimizing our own research, but we have also opened some new avenues: the research performed here regarding some of the more underresearched factors of socioeconomic status such as mother tongue in a multilingual society, or the attainment of a certain military rank by a conscript, holds promise for the field of anthropometric history, with more of this type of intriguing scholarly exploration surely promising interesting findings in the future.

Moreover, it were precisely these factors that have shed an alluring light on the Finnish nation and its society: going their own way after centuries of overlordship by their neighbours, through civil, defensive, and offensive wars, all the while struggling with their national, linguistic and political identities: the study of the literature and the results of the analyses have taught us a great deal about this Finnish *Rollercoaster to Prosperity*.

The question we have tried answering in pursuit of the above goals asked in what way conscription records are able to reflect, predict, and interlink factors of socioeconomic status. I hope to have shown that conscription records reflect a conscript's socioeconomic status through not only 'militarily' recording anthropometric measurements of a conscript, but also by recording further factors

which we know to be indicators of socioeconomic fortitude. In this sense, it is not the separate variables that are recorded, but the intricate collection of them together enabling historians to accurately predict socioeconomic status of a conscript, and, owing to its purported generalisability, that of the wider population. And lastly, it is through this diversity and richness of information, and the longitude of capture, that conscription records are able to interlink these factors, providing even deeper insight into the relationship these separate factors share in representing, and again further influencing, one's socioeconomic status.

To conclude, the findings of this research provide implications and suggestions for further study concerning four main points. First, many questions remain for Finland even after this study. It would be worthwhile continuing this avenue of research, perhaps with an expanded data set, to clear up the insecurities mentioned in the discussion, and to learn more about the early social history of independent *Suomi*. Additionally, more information is needed regarding the historical relationship of long-term and short-term changes to weight, and therefore BMI, in order to discover more about the true nature of the factors affecting these. Third, as mentioned above, peculiar intricacies (as was mother tongue for Finland) of a certain nation which might be reflected in a specific way in the conscription records are worth exploring more broadly, as doing so will teach us both more about the nature of particular societies, as well as about the unique factors driving class stratification within nations. Lastly, and most straightforward, I wish to wholeheartedly encourage economic and social historians to raid local and national military archives, as even decades or centuries later, they might hide all there is to know about man's physical and social nature of the past, merely tucked away in a box of dusty conscription records.

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APPENDICES

Appendix A: Hypotheses

Number : 1
Hypothesis : Higher level of education corresponds to higher average height.
Confirmed : Yes (unadjusted), **Yes** (adjusted)
Significance : <0.01 (unadjusted), <0.01 (adjusted) for relevant finding.
Note : When comparing those having had only (some) elementary schooling and those having more than elementary schooling.

Number : 2
Hypothesis : Higher level of education corresponds to higher average weight.
Confirmed : Yes
Significance : <0.05
Note : When comparing those having only (some) elementary schooling and those having more than elementary schooling.

Number : 3
Hypothesis : Higher level of education corresponds to higher average BMI.
Confirmed : No
Significance : -
Note : -

Number : 4
Hypothesis : Higher occupational background corresponds to higher average height.
Confirmed : No (unadjusted), **No** (adjusted)
Significance : <0.1 (unadjusted), <0.1 (adjusted)
Note : -

Number : 5
Hypothesis : Higher occupational background corresponds to higher average weight.
Confirmed : No
Significance : -
Note : -

Number : 6
Hypothesis : Higher occupational background corresponds to higher average BMI.
Confirmed : No
Significance : -
Note : -

Number **: 7**
Hypothesis **:** Conscripts above 20 will on average be taller than younger conscripts.
Confirmed **: No** (unadjusted), **No** (adjusted)
Significance **: -**
Note **: -**

Number **: 8**
Hypothesis **:** Conscripts above 20 will on average be heavier than younger conscripts.
Confirmed **: No**
Significance **: -**
Note **: -**

Number **: 9**
Hypothesis **:** By adjusting for height difference, heights will be more representative.
Confirmed **: Undecided**
Significance **: -**
Note **:** By adjusting heights following the method of Komlos & Baten (1998), the mean height became more in line with the Clio Infra data on average Finnish stature, but moved away from the NCD-RisC data on average Finnish stature.

Number **: 10**
Hypothesis **:** Having Swedish as mother tongue corresponds to higher average height.
Confirmed **: Yes**
Significance **:** <0.01
Note **:** Compared to conscripts with Finnish as their mother tongue.

Number **: 11**
Hypothesis **:** Having Swedish as mother tongue corresponds to higher average weight.
Confirmed **: No**
Significance **: -**
Note **: -**

Number **: 12**
Hypothesis **:** Having Swedish as mother tongue corresponds to higher average BMI.
Confirmed **: No**
Significance **: -**
Note **: -**

Number **: 13**
Hypothesis **:** Having Swedish as mother tongue corresponds to higher average education.
Confirmed **: Yes**
Significance **:** <0.01
Note **:** Compared to conscripts with Finnish as their mother tongue.

Number **: 14**
Hypothesis **:** Higher military rank corresponds to higher average height.
Confirmed **: Yes** (unadjusted), **Yes** (adjusted)
Significance **:** <0.05 (unadjusted), <0.05 (adjusted)
Note **:** When comparing NCO's to rank-and-file soldiers.

Number : 15
Hypothesis : Higher military rank corresponds to higher average weight.
Confirmed : No
Significance : <0.1
Note : -

Number : 16
Hypothesis : Higher military rank corresponds to higher average BMI.
Confirmed : No
Significance : -
Note : -

Number : 17
Hypothesis : Having Swedish as mother tongue corresponds to higher average military rank.
Confirmed : No
Significance : <0.05
Note : The reverse was observed, with Swedish as mother tongue corresponding to lower average military rank.

Number : 18
Hypothesis : A higher level of occupation corresponds to higher military rank.
Confirmed : Yes (x2)
Significance : <0.01 (A); <0.05 (B)
Note : When comparing lower middle class to unskilled workers and farm workers (A); when comparing self-employed farmers and fishermen to unskilled workers and farm workers (B).

Number : 19
Hypothesis : A higher level of education corresponds to higher military rank.
Confirmed : No
Significance : -
Note : -

Number : 20
Hypothesis : The level of education improves with each succeeding birth cohort.
Confirmed : Yes (with minor exceptions)
Significance : <0.01 (x3), <0.05 (1x)
Note : While not a strictly linear improvement, there is a clear improvement over time.

Number : 21
Hypothesis : A higher level of occupation corresponds to a higher level of education.
Confirmed : Yes (x3)
Significance : <0.01 (x3)
Note : When comparing Elite, or lower middle class, or self-employed farmers and fishermen to unskilled workers and farm workers.

Appendix B: Clarification of variable scores

Educational level

In the linear regression model of influences on educational level, the numbers displayed correspond to the following classification:

#	Type of education (when dependent variable)	14 to 3 coding (when independent variable)
1	No formal education	**1** No formal education
2	”Circling schooling” or 1 year elementary school	**2** Only (some) elementary
3	2-3 years of elementary school	2
4	4-5 years of elementary school	2
5	6 years of elementary school	2
6	Vocational courses	**3** More than elementary
7	Vocational examination	3
8	1-5 years of middle school	3
9	Highschooler	3
10	Matriculation examination	3
11	Bachelor’s degree	3
12	Master’s degree	3
13	Licentiate degree	3
14	Doctoral degree	3

Military rank level

In the linear regression model of influences on educational level, the numbers displayed correspond to the following classification:

#	Military rank
1	Deemed unfit for service
2	Rank-and-file
3	NCO (Non-commissioned officer)
4	Officer