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Regional differences in intelligence, infant mortality, stature and fertility in European Russia in the late nineteenth century

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ABSTRACT

Regional differences are presented for literacy adopted as a proxy for intelligence, infant mortality, fertility, stature and geographical location for 50 provinces in European Russia in the late nineteenth century. All variables were significantly inter-correlated. Intelligence was significantly higher in the north and west than in the south and east.

1. Introduction

There have been a number of studies of regional differences in intelligence within countries and their association with a range of socio-economic, demographic and epidemiological phenomena. The most commonly reported of these have been positive associations with per capita income, educational attainment, life expectancy and stature, and negative associations with infant mortality and fertility. These associations have been reported for the regions of the British Isles (Lynn, 1979), France (Lynn, 1980), the United States (Shatz, 2009), Italy (Lynn, 2010; Piffer & Lynn, 2014), Portugal (Almeida, Lemos, & Lynn, 2011), Spain (Lynn, 2012), China (Lynn & Cheng, 2013), Japan (Kura, 2013), Finland (Dutton & Lynn, 2014), India (Lynn & Yadav, 2015) and Turkey (Lynn, Sakar, & Cheng, 2015).

In this paper we present data for regional differences in intelligence, literacy, infant mortality, stature, fertility and geographical location in European Russia in the late nineteenth century. There are no data for regional intelligence in the nineteenth century and we have therefore adopted rates of literacy as a proxy for intelligence. This is justified on the grounds that a high correlation between literacy rates and intelligence have been reported in a number of studies. For example, a correlation of .861 between literacy rates for Italian regions in 1880 and early twenty-first century IQs has been reported by Lynn (2010); a correlation of .83 between literacy rates for Spanish regions in the early twenty-first century has been reported by Lynn (2010); (Lynn, 2012); and a correlation of 0.56 between literacy rates and IQs for the states and union territories of India in 2011 has been reported by Lynn and Yadav (2015). There is additional support for using literacy in the nineteenth century as a proxy for intelligence in the results of a study by Grigoriev, Lapteva and Ushakov (Григорьев, Лаптева, Ушаков, 2015) showing a correlation of .58 between literacy rates of the peasant populations of the districts (*uezds*) of the Moscow province in 1883 and the results of the Unified State Exam and State Certification on Russian Language in the districts of the contemporary Moscow oblast.

Our predictions based on results from a number of countries are that regional differences in literacy adopted as a measure of intelligence would be positively associated with stature and higher latitude and negatively associated with infant mortality and fertility. Positive correlations between IQ and stature of around 0.25 at the level of individuals have been reported in a number of studies (e.g. Stoddard, 1943, p. 200; Lacock & Caylor, 1965). It is proposed that these positive correlations arise because the quality of nutrition is a determinant of both IQ and stature shown in an extensive review of the evidence given in Lynn (1980) and confirmed by Benton (2001) and Arija et al. (2006). This effect of nutrition brings intelligence and stature into positive correlation at the level of individuals and populations. In addition, it is proposed that there is a positive feedback loop in which population IQ is a determinant of the quality of nutrition received by children, and the quality of nutrition received by children improves the IQs and stature of children. At the level of populations, a positive correlation between IQs and stature across the thirteen regions of the British Isles has been

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reported by Boldsen and Mascie-Taylor (1985) and between regional IQs and stature across the twelve regions of Italy ($r = .93$) has been reported by Lynn (2010).

Negative associations between intelligence and infant mortality have been reported in a number of studies. At the individual level an association between infant mortality and the low IQ of mothers has been reported by Savage (1946). At the population level, negative associations between infant mortality and IQs have been reported for.

13 regions of the British Isles ($r = -.78$) (Lynn, 1979) and for 90 regions of France ($r = -.30$) (Lynn, 1980). These results have been confirmed in more recent studies in the United States for which Reeve and Basalik (2011) have reported a negative correlation of −.54 between infant mortality and state IQs for 50 US states. Negative correlations between regional IQs and infant mortality in 1955–1957 and in 1999–2002 for 12 regions of Italy of −.841 and −.861 have been reported by Lynn (2010); and a negative correlation of −.79 between regional IQs and infant mortality in Finland has been reported by Dutton and Lynn (2014). It is proposed that the explanation for these correlations is that populations with high IQs are more competent in looking after their babies, e.g. by avoiding accidents, and are able to give them better nutrition, which makes them healthier and more resistant to disease.

Negative correlations between regional IQ and fertility have been reported for the states of the United States (Shatz, 2009; Reeve & Basalik, 2011), the regions of Turkey (Lynn et al., 2015) and the regions of India (Lynn & Yadav, 2015). The negative correlations between regional IQs and fertility indicate that fertility was dysgenic in these countries in the early twenty-first century.

We also predict that literacy rates in Russia in late nineteenth century would differ by geographical location based on the results of several studies. For example, Lynn (2010) showed that populations of the northern regions of Italy have higher IQ than those of the southern regions, Lynn and Yadav (2015) have reported that in India the populations of the southern regions have higher IQs than those in the northern regions, and Dutton and Lynn (2014), have reported that in Finland the populations of the western regions have higher IQ than the eastern populations.

2. Method

The data for literacy, infant mortality, fertility and stature in the late nineteenth century are available for 50 provinces of European Russia. The percentages of the population that were literate in 1897 were calculated from the data of the Russian Imperial census carried out 28 January, 1897. These data were published in 119 volumes (Первая всеобщая перепись населения Российской Империи 1897, 1899–1905). The literacy data consisted of the numbers able to read in Russian or any other language and the total numbers of respondents for regions from which the percentages of the population that were literate were calculated. These percentages are adopted as a measure of intelligence on the grounds that rates of literacy have been found to be highly associated with regional IQs across the regions of Italy ($r = .86$) (Lynn, 2010) and Spain ($r = .81$) (Lynn, 2012). Data for the rates of infant mortality (deaths of infants in the first year per 1000 live births) for the 50 European provinces were taken from the book by Adolf Rashin (Рашин, 1956). This book contains various statistical data for Russia for the period 1811–1913. Particularly, mean rates of infant mortality are given for the periods 1867–1881, 1886–1897 and 1908–1910. We used data for the period 1886–1897 as the closest to the date of census (1897). Data for fertility (number of births per 100) were taken from the Encyclopaedic Dictionary (Brockhaus and Efron; Энциклопедический словарь Ф.А. Брокгауза и И.А. Ефрона). These data are means for the period 1887–1897. Data for the stature of 20 year old male military recruits for 1874–1883 given by Anuchin (Анучин, 1889) were used as the measure of the stature of the populations of the provinces. In addition, we calculated the correlation of literacy rates of conscripts in the census 1887–1897 with the literacy of conscripts 1874–1883 as 0.878 showing that the literacy data have high reliability. Also given are the latitude and longitude of the midpoint of the regions.

3. Results

Table 1 gives descriptive statistics for the percentages of literacy, the rates of infant mortality, fertility, stature, latitude and longitude for the 50 provinces of European Russia in the late nineteenth century. Table 2 gives the Pearson correlations for the variables given in Table 1.

Table 1
Literacy (Lit), infant mortality (InMo), fertility (Fert), stature of recruits, latitude and longitude for 50 provinces of European Russia in the late nineteenth century.

Province	Lit 1897	InMo 1886–1897	Fert 1888–1897	Stature (mm)	Latitude	Longitude
Estonia	77.9	156	2.94	1667	59.0	25.0
Livonia	77.7	190	2.89	1667	57.5	26.0
Courland	70.9	156	2.87	1670	56.5	23.0
St Petersburg	55.1	341	2.58	1644	59.0	30.0
Kovno	41.9	173	4.06	1641	55.5	23.5
Moscow	40.2	366	4.37	1644	55.5	37.0
Yaroslavl	36.2	306	4.29	1635	58.0	39.0
Grodno	29.2	179	4.75	1638	53.0	24.0
Vilna	28.8	141	4.12	1644	54.5	26.0
Tavriya	27.9	179	4.76	1660	46.0	34.5
Vladimir	27.0	363	5.23	1638	56.0	40.5
Kherson	25.9	170	4.59	1652	47.5	32.0
Olonets	25.3	321	4.60	1632	61.5	35.5
Vitebsk	24.6	187	3.75	1642	56.0	29.0
Tver	24.5	328	4.91	1642	57.0	35.5
Kostroma	24.0	341	4.80	1630	58.0	43.5
Saratov	23.8	377	5.53	1642	51.5	45.5
Arkhangelsk	23.3	253	4.01	1639	64.5	41.0
Novgorod	23.0	312	4.22	1638	58.5	36.0
Don Voisko oblast (Don Host Oblast)	22.4	206	–	1662	48.0	41.0
Samara	22.1	315	5.77	1641	53.0	50.5
Nizhniy Novgorod	22.0	410	4.81	1640	56.0	44.5
Yekaterinoslav	21.5	188	5.46	1658	48.0	36.0
Tula	20.7	320	4.97	1635	54.0	37.5
Orenburg	20.4	308	5.67	1636	53.0	59.0
Ryazan	20.3	292	5.81	1636	54.5	40.0
Kaluga	19.4	348	5.24	1636	54.5	35.5
Perm	19.2	437	5.42	1644	58.5	58.5
Vologda	19.1	358	4.48	1634	61.5	46.5
Chernigov	18.4	229	4.90	1641	52.0	32.0
Kiev	18.1	226	4.86	1654	50.0	30.5
Kazan	17.9	281	4.36	1626	55.5	49.0
Minsk	17.8	173	4.57	1634	53.0	28.0
Oryol	17.6	319	5.36	1639	53.0	35.5
Smolensk	17.3	322	5.45	1634	55.0	33.0
Volhynian	17.2	187	4.79	1641	51.0	26.5
Mogilev	16.9	194	4.86	1637	54.0	30.5
Poltava	16.9	205	4.83	1652	50.0	33.5
Kharkov	16.8	232	5.23	1645	50.0	36.5
Ufa	16.7	253	5.02	1628	55.0	56.0
Tambov	16.6	314	4.83	1636	53.0	41.5
Kursk	16.3	255	5.08	1643	51.5	36.5
Voronezh	16.3	309	5.56	1646	51.0	39.5
Vyatka	16.0	371	5.31	1629	58.0	50.5
Bessarabia	15.6	181	4.45	1654	47.0	29.0
Simbirsk	15.6	340	5.08	1637	54.5	47.0
Astrakhan	15.5	298	3.86	1651	48.0	47.0
Podolia	15.5	178	4.51	1648	49.0	28.0
Penza	14.7	366	5.50	1636	53.5	44.5
Pskov	14.6	298	4.17	1647	57.0	29.5

Table 2
Correlations for regional differences in intelligence, infant mortality, fertility and stature in Russia in the late nineteenth century.

	Infant mortality 1886–1897	Fertility 1888–1897	Stature recruits	Latitude	Longitude
Literacy 1897	−0.28*	−0.75***	0.56***	0.33*	−0.43**
Infant mortality 1886–1897		0.40**	−0.53***	0.40**	0.69***
Fertility 1888–1897			−0.48***	−0.34*	0.53***
Stature recruits				−0.37**	−0.46***
Latitude					0.12

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

4. Discussion

There are six points of interest in the results. First, the prediction that the rates of literacy adopted as a measure of intelligence would be positively associated with stature was significantly confirmed ($r = .56$, $p < .001$) and is consistent with the positive correlation between regional IQs and stature across the twelve regions of Italy ($r = .93$) (Lynn, 2010).These positive correlations between IQ and stature across the regions of Russia and Italy are consistent with those of around 0.25 at the level of individuals that have been reported in a number of studies (e.g. Stoddard, 1943, p. 200; Lacock & Caylor, 1965). To test for whether the association between literacy and stature is linear we calculated the quadratic regression of fertility on literacy. This increases the variance explained from .314 to .372, i.e. by 5.8%. In view of this small increase the relationship between literacy and stature can be regarded as largely linear.

Second, the prediction that the rates of literacy adopted as a measure of intelligence would be negatively associated with infant mortality was significantly confirmed ($r = -.28$, $p < .05$) and is consistent with the negative correlations across the regions of the British Isles ($r = -.78$), France ($r = -.30$), Italy ($r = -.80$), the American states ($r = -.54$), Finland ($r = -.79$) and India ($r = -.39$) (Lynn, 1979; Lynn, 1980; Lynn, 2010; Reeve & Basalik, 2011; Dutton & Lynn, 2014; Lynn & Yadav, 2015). To address this question of the extent to which the association between literacy and infant mortality among the regions may be attributable to the level of wealth of these regions we calculated partial correlation between literacy and infant mortality when stature as a good indicator of nutrition and, therefore, of wealth is controlled. This partial correlation is 0.02. Thus, the association between literacy and infant mortality may be attributed entirely to the level of wealth in a region. The proposed interpretation of these correlations is that regional IQs are a determinant of literacy, wealth and the quality of nutrition and health care, reinforced with positive feedback associations between these variable. To test for whether the association between literacy and infant mortality is linear we calculated the quadratic regression of fertility on literacy. This increases the variance explained from .079 to .093, i.e. by 1.4%. This increase is not statistically significant ($F < 1$). In view of this negligible increase the relationship between literacy and infant mortality can be regarded as linear.

Third, the prediction that the rates of literacy would be negatively associated with rates of fertility was significantly confirmed ($r = -.75$, $p < .001$) and is consistent with the negative correlations across the American states ($r = -.37$) (Shatz, 2009), the regions of Turkey ($r = -.89$) (Lynn et al., 2015) and the regions of India ($r = -.25$) (Lynn & Yadav, 2015). The negative association between literacy and fertility among the European provinces of Russia in the late nineteenth century cannot be attributed to the wealth of these provinces: the partial correlation between literacy and fertility when stature as a proxy for wealth is controlled is -0.66 ($p < 0.001$). This negative correlation between regional IQs and fertility indicates that fertility was dysgenic in Russia at the end of the nineteenth century and is consistent with studies in many countries showing dysgenic fertility at this time (Lynn, 2011; Woodley & Figueredo, 2013). To test for whether the association between literacy and fertility is linear we calculated the quadratic regression of fertility on literacy. This did not increase the variance explained and the relationship between literacy and fertility can therefore be regarded as linear.

Fourth, the rates of literacy in the Russian provinces differed significantly by geographical location. The positive correlations with latitude ($r = .33$, $p < .05$) and the negative correlation with longitude ($r = -.43$, $p < .01$) show that the rates of literacy were higher in the north and west than in the south and east. These trends were partly determined by the rates of literacy being highest in the north-western provinces of St. Petersburg and the three Baltic states of Estland, Livland and Kourland (corresponding approximately but not precisely to contemporary Estonia and Latvia; Livland consisted of southern part of contemporary Estonia and eastern part of contemporary Latvia). Removing these four regions makes both correlations non-significant (.21 and −.23). It may be supposed that the correlation between literacy and longitude is spurious, but this is scarcely the case with the correlation between literacy and latitude. Inspection of the data in Table 1 reveals that the low correlation between literacy and latitude is partly due to the relatively high literacy rates of the three southern provinces of Tavriya, Kherson and Yekaterinoslav. The additional exclusion of these provinces makes the correlation between literacy and latitude significant again ($r = 0.33$). These provinces were inhabited predominantly by migrants (see Кабузан, 2004), whose intelligence is usually higher than that of population they from which they migrated (Dutton & Lynn, 2014).

Fifth, we consider finally the possible explanations for the differences in intelligence between provinces of Russia in the late nineteenth century. One likely factor is selective migration of the more intelligent from the provinces to the major cities of St Petersburg and Moscow which had the fourth and sixth highest rates of literacy. It has been reported in several studies that the populations of capital cities have higher IQs that the rest of the population, e.g., in Great Britain and France (Lynn, 1979, 1980) and in Portugal (Almeida et al., 2011). The likely explanation for this is that a higher that average IQ is needed to migrate to take advantage of the greater opportunities available in capital cities. Selective migration may also have contributed to the relatively high literacy rates in the southern provinces of Tavriya, Kherson and Yekaterinoslav.

Climatic differences are another likely factor determining the regional differences in the rates of literacy which were significantly higher in the north than in the south ($r = .33$, $p < .05$). The northern regions have colder winters than those in the south. This result is consistent with the world-wide positive association between cold climates and population IQs documented by Lynn (2006) and attributed to the evolution of higher intelligence in regions with colder winters as adaptations to the greater cognitive demands of survival in these harsh environments.

Sixth, the present study adds to the literature on the relatively new discipline cognitive epidemiology, concerned with the integration of the intelligence of populations with a number of socio-economic, demographic and epidemiological phenomena and positing the position of intelligence as "a unifying construct for the social sciences" set out at length by Lynn and Vanhanen (2012).

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