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Regional differences in intelligence, income and other socio-economic variables in Turkey

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ABSTRACT

Data are presented for intelligence in twelve regions in Turkey showing that intelligence is highest in the west and lowest in the east. The west–east intelligence gradient is significantly correlated with regional differences in educational attainment and per capita income and negatively correlated with fertility, infant mortality and the percentage of Kurds.

1. Introduction

Regional differences in intelligence have been reported in several countries in which it has been shown that these are positively associated with per capita income, educational attainment, infant mortality, life expectancy and other socio-economic phenomena. These regional differences have been shown in 13 regions of the British Isles (Lynn, 1979), in 90 regions of France (Lynn, 1980), in the 50 states of the United States (McDaniel, 2006), in 12 regions of Italy (Lynn, 2010; Piffer & Lynn, 2014), in 5 regions of Portugal (Almeida, Lemos, & Lynn, 2011), in 15 regions of Spain (Lynn, 2012), in 31 regions of China (Lynn & Cheng, 2013), in 47 regions of Japan (Kura, 2013), in 4 regions of Finland (Dutton & Lynn, 2014), and in 33 regions of India (Lynn & Yadav, 2015).

In this paper we examine whether there are regional differences in intelligence in Turkey. Our first hypothesis is that intelligence is higher in the west than in the east. This hypothesis is advanced on the grounds that the population of the west of Turkey is predominantly Turkish and Caucasian and has higher rates of literacy while that in the east is predominantly Kurdish and Arabic and has higher rates of illiteracy (Kirdar, 2009). The west of Turkey is in Europe or close to Europe, and intelligence in Europe is higher than that in the Kurdish and Arabic Middle Eastern countries bordering the east of Turkey (Lynn & Vanhanen, 2012), and there was some migration from Greece into the west of Turkey in historical times with the establishment of Greek cities of Miletus, Ephesus and Smyrna. Our second hypothesis is that a west–east gradient of intelligence is positively associated with regional differences in educational attainment, per capita income and migration from east to west and negatively associated with infant mortality, fertility and the percentage of Kurds.

2. Method

Turkey is divided into 12 provinces for which the Turkish State Statistical Institution (TSSI) collects and publishes data for a number of social and economic phenomena. The geographical location of these provinces is shown in Fig. 1.

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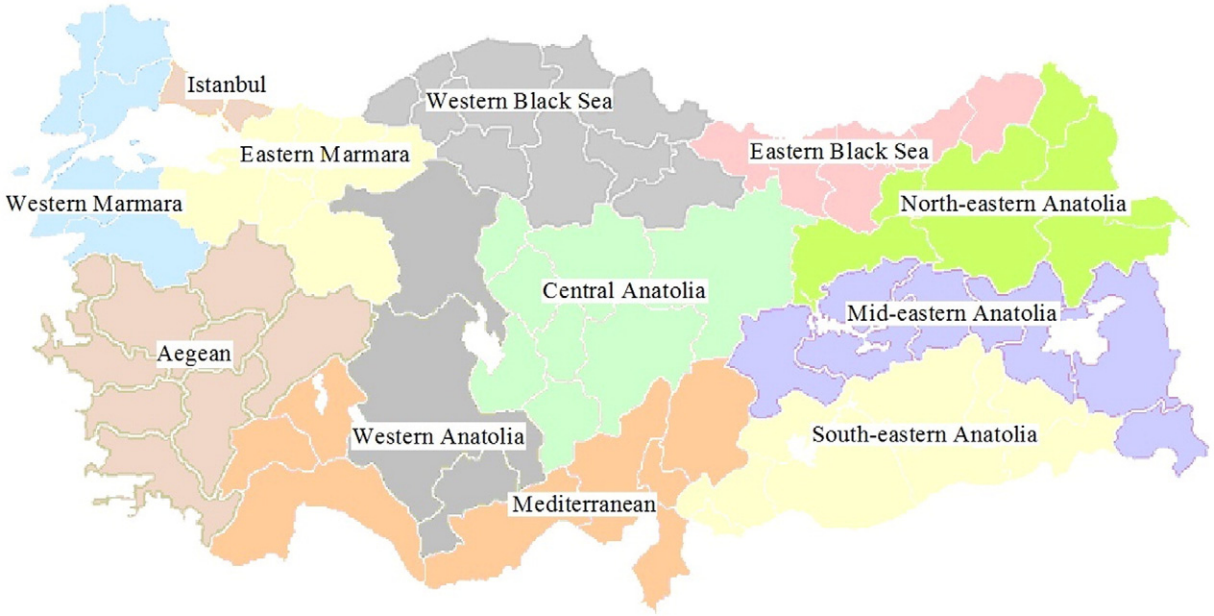

Fig. 1. Turkish regions.

Intelligence in the 12 provinces was calculated from the tests of math, reading comprehension and science administered to 4848 15-year-olds in the 2012 Programme for International Student Assessment (PISA) (OECD, 2012). These tests were administered in the fifth PISA survey to about 510,000 15 year old school students in 65 countries. These tests are adopted as measures of intelligence on four grounds. First, they are all components of general intelligence in Carroll's (1993, p. 524) taxonomy in which he gives math ability identified as "quantitative reasoning" as a component of intelligence, and reading comprehension defined in the PISA studies as the capacity to understand, use and reflect on written texts, and science understanding identified as "general science information" as other components of intelligence (Carroll, 1993, p. 598–9). Second, because these educational tests are components of intelligence, there is a high correlation between them and intelligence measured by intelligence tests (Kaufman, Reynolds, Liu, Kaufman, & McGrew, 2012). Third, it has been shown that the same genes determine cognitive ability measured by educational tests and intelligence tests (Bartels, Rietveld, van Baal, & Boomsma, 2002). Fourth, it has been shown that PISA tests and intelligence tests are very highly correlated across countries, e.g. at $r = .89$ for 63 countries reported by Rindermann (2007) and at $r = .91$ for 82 countries reported by Meisenberg and Lynn (2011).

Educational attainment was measured by the Yükseköğretime Geçiş Sınavı (YGS) examination. This examination is in Math/Science (physics, chemistry and biology) and Arts/Social Science (history, geography, philosophy, Turkish, and religion) taken by 742,916 high school students, average age 17 years, in 2012. Other variables included in the study were the average per capita log income (2010), the percentage higher education graduate rate (2013), the total fertility rate (2012), the infant mortality rate per 1000 live birth (2012), the net-migration rate per 1000 (2012, defined migration into the region − migration out of the region) to examine the hypothesis that there has been net-migration from the poorer to the more affluent regions and the percentage of Kurds (2010). These data were the latest available published in Turkish by the Turkish Statistical Institute (2010–2013). The longitude and latitude of the regions were measured as the geographical mid-point.

3. Results

Descriptive statistics for the data are given in Table 1. This shows, reading from left to right, the names of the 12 regions in both Turkish and English, the longitude and latitude of the mid-point of the regions, the net-migration rate, the total PISA scores, the British IQ equivalents of the total PISA scores, the PISA scores for math, reading comprehension and science, the YGS scores for educational attainment in Math/Science and Verbal/Social science, the per capita income for 2010, the higher education graduate rate for 2013, the total fertility rate for 2012, the infant mortality rate per 1000 live birth for 2012 and the percentage of Kurds (2010).

The British IQ equivalents of the total PISA scores have been calculated by calculating the differences between the Turkish means and the British mean of 502 (SD = 100) in standard deviation units and expressing the differences as conventional IQs. Table 2 gives the product–moment correlations between the variables and the significance levels.

4. Discussion

There are seven points of interest in the results. First, the total PISA scores adopted as IQs were significantly positively correlated with per capita income ($r = .81$), higher educational graduation rate ($r = .63$) and with educational achievement measured by the YGS examination ($r = .87$), and significantly negatively correlated with total fertility rate ($r = -.89$), the

Table 1
Intelligence and socio-economic variables by the 12 regions of Turkey.

Region	Longitude	Latitude	Migration rate	PISA total score	Brit IQ	PISA Math	PISA Reading	PISA Science	YGS	Income	Higher education graduates %	Fertility rate	Infant mortality	Kurds %
Batı Marmara/ Western Marmara	27.2	40.8	7.71	487	97.7	479	490	492	11.0	12,127	11.38	1.61	10.60	0.9
Doğu Marmara/ Eastern Marmara	30.3	40.2	5.25	485	97.4	473	494	488	10.7	12,507	12.20	1.78	9.80	4.9
Orta Anadolu/ Central Anatolia	35.9	39.0	−4.12	484	97.3	471	503	479	11.0	11,037	10.25	2.04	10.90	1.3
Ege/Aegean	28.8	38.3	2.59	478	96.3	465	493	475	11.1	14,668	12.15	1.72	11.60	6.1
Batı Anadolu/ Western Anatolia	32.5	38.6	3.61	475	95.9	460	486	478	11.8	14,310	16.31	1.82	10.30	7.7
İstanbul/ Istanbul	29.0	41.4	2.20	470	95.2	456	486	468	10.9	17,089	14.79	1.77	8.60	14.8
Doğu Karadeniz/ Eastern Black Sea	39.5	40.9	7.27	462	94.0	443	478	465	10.4	10,964	10.65	1.75	10.70	0.1
Akdeniz/ Mediterranean	33.2	37.3	−1.09	460	93.7	446	473	462	10.9	11,633	11.39	2.19	12.00	4.9
Batı Karadeniz/ Western Black Sea	34.4	40.5	−3.21	448	91.9	428	461	456	10.7	10,745	9.94	1.75	10.70	0.3
Kuzeydoğu Anadolu/ North-eastern Anatolia	41.6	40.5	−15.47	448	91.9	437	459	449	10.1	8644	9.07	2.84	13.10	32.0
Ortadoğu Anadolu/ Mid-eastern Anatolia	41.3	38.4	−7.21	417	87.3	395	434	423	9.4	8006	9.20	2.77	13.40	79.1
Güneydoğu Anadolu/ South-eastern Anatolia	40.1	37.8	−7.58	411	86.3	397	423	412	9.3	6773	7.79	3.47	15.60	64.1

Table 2
Pearson product–moment correlations between the intelligence and socio-economic variables in the 12 regions of Turkey.

	Mean (SD)	Longitude	Latitude	Migration rate	PISA total score/IQ	PISA Math	PISA Reading	PISA Science	YGS	Income	Higher education graduates	Fertility	Infant mortality	Kurds
Longitude	34.48 (5.18)	–												
Latitude	39.44 (1.39)	−.19	–											
Migration rate	−.84 (6.96)	−.71**	.26	–										
PISA total score/IQ	460.47 (25.41)	−.76**	.35	.66*	–									
PISA Math	445.83 (27.82)	−.76**	.33	.62*	.99***	–								
PISA Reading	473.33 (24.78)	−.71**	.39	.63*	.99***	.97***	–							
PISA Science	462.25 (24.42)	−.77**	.32	.70**	.99***	.98***	.96***	–						
YGS	10.61 (.71)	−.74**	.15	.59*	.87***	.84***	.86***	.87***	–					
Income	4.05 (.11)	−.83***	.31	.69*	.81***	.80***	.83***	.80***	.87***	–				
Higher education graduates	11.26 (2.41)	−.68*	.16	.61*	.63*	.61*	.64*	.64*	.81***	.88***	–			
Fertility	2.13 (.59)	.75**	−.46	−.80***	−.84***	−.79***	−.84***	−.88***	−.82***	−.86***	−.66*	–		
Infant mortality	11.44 (1.87)	.69*	−.60*	−.68*	−.80***	−.75**	−.82***	−.83***	−.77**	−.88***	−.75**	.91***	–	
Kurds	18.02 (26.73)	.63*	−.37	−.62*	−.87***	−.84***	−.88***	−.86***	−.84***	−.73**	−.50	.86***	.76**	–

* $p < .05$.
** $p < .01$.
*** $p < .001$.

infant mortality rate ($r = -.80$) and the percentage of Kurds ($r = -.87$).

Second, the hypothesis that regional IQs would be higher in the west and decline towards the east was confirmed by the significant correlation between regional IQs and longitude ($r = .81$). The highest IQ was in Batı Marmara/Western Marmara located in the west and European Turkey where the British IQ was 97.7, and the lowest IQ was in Güneydoğu Anadolu/South-eastern Anatolia located in the east where the British IQ was 86.3.

Third, in addition to the west–east IQ gradient, there was also some trend for a north–south gradient with the highest score in the north-western province of Batı Marmara/Western Marmara (487) and the lowest score in the south-eastern province of Güneydoğu Anadolu/South-eastern Anatolia (411). The trend for IQs to be higher in the north than in the south is quantified by the correlation of .35 between the latitude and the IQ of the regions although is not statistically significant. There is, however, a significant correlation between the latitude of the regions and infant mortality ($r = -.60$) indicating that infant mortality was higher in the more southerly regions.

Fourth, the regional difference of 11.4 IQ points between the highest and lowest provinces in Turkey is comparable to the 11 IQ points difference between the highest and lowest regions in Italy (Lynn, 2010) and the 10.1 IQ points difference between the highest and lowest states in the United States (Massachusetts: 104.3; Mississippi: 94.2) reported by McDaniel (2006). The relatively high IQ of Central Anatolia may be attributable to the presence of Ankara in this region because capital cities usually attract high IQ people, including government bureaucrats and professionals. For instance, the highest IQs in Britain and France have been found in the capital cities (Lynn, 1979, 1980). A further factor that may have contributed to the lower IQs in the eastern regions is the mountainous nature which has made them relatively inaccessible and this is likely to have retarded economic development and education, with an adverse effect on IQ.

Fifth, the positive correlations between migration and longitude ($r = .71$) and between migration and IQs ($r = .66$) indicate that there has been migration from the poorer south-east to the richer west and north-west. It is likely that this migration has been selective for intelligence and has contributed to the higher average IQs in the more affluent west and north-west and that there has been selective migration from the central and eastern parts of Asia Minor to the west for many centuries during which the port cities on the western Aegean coast have been prosperous and have likely attracted able and enterprising migrants from the interior and east of the country. Several studies have found that migrants from poorer to more affluent regions have higher than average IQs than non-migrants, probably because a higher IQ is needed to envision the advantages and find the resources to migrate. This has been shown in the United States by Tolnay (1998) and Vigdor (2002), who have both found that it has been blacks with greater educational attainment (a proxy for intelligence) who migrated from the southern states to the northern states. Higher than average IQs of migrants have also been reported for Scotland for which Maxwell (1967) reported an IQ of 108.1 for emigrants.

Sixth, the negative correlation between regional IQs and total fertility rate ($r = .89$) indicates that fertility has been dysgenic in Turkey in recent years. This result is consistent with studies in many countries showing dysgenic fertility in recent decades (Lynn, 2011; Woodley & Figueredo, 2013). The strong negative correlation between IQ and fertility for the regions of Turkey is partly attributable to the eastern regions having not yet completed the demographic transition, especially in the south-east with its fertility rate of 3.47.

Seventh, the mean PISA score in Turkey was 462 and was 40 points lower than the British mean of 502, a difference of .40*d* (standard deviation units), equivalent to 6 IQ points. Thus, the British IQ of Turkey in this study was 94. This is higher than the British IQ of 89.4 for Turkey given by Lynn and Vanhanen (2012) in their compilation of IQ studies based on older studies in Turkey. Thus, the present data suggest that the Turkish IQ has increased relative to the British IQ in recent years. This is confirmed by the increase in the average PISA scores from 426.5 in 2003 to 462 in 2012, corresponding to a rise of approximately 5 IQ points in only 9 years, suggesting massive improvements in the educational system. However, a lower rate of increase of 3.52 IQ points a decade in Turkey for the Draw-a-Man test has been calculated by Rindermann, Schott, and Baumeister (2013) for the period 1977–2010.

References

Almeida, L. S., Lemos, G. C., & Lynn, R. (2011). Regional differences in intelligence and per capita incomes in Portugal. *Mankind Quarterly*, *52*, 213–221.

Bartels, M., Rietveld, M. J. H., van Baal, G. C. M., & Boomsma, D. I. (2002). Heritability of educational achievement in 12 year olds and the overlap with cognitive abilities. *Twin Research*, *5*, 544–553.

Carroll, J. B. (1993). *Human cognitive abilities*. Cambridge: Cambridge University Press.

Dutton, E., & Lynn, R. (2014). Regional differences in intelligence and their social and economic correlates in Finland. *Mankind Quarterly*, *54*, 447–456.

Kaufman, S. B., Reynolds, M. R., Liu, X., Kaufman, A. S., & McGrew, K. S. (2012). Are cognitive *g* and academic achievement g one and the same? An exploration of the Woodcock–Johnson and Kaufman tests. *Intelligence*, *40*, 123–138.

Kirdar, M. G. (2009). Explaining ethnic disparities in school enrollment in Turkey. *Economic Development & Cultural Change*, *57*, 297–333.

Kura, K. (2013). Japanese north–south gradient in IQ predicts differences in stature, skin color, income, and homicide rate. *Intelligence*, *41*, 512–516.

Lynn, R. (1979). The social ecology of intelligence in the British Isles. *British Journal of Social and Clinical Psychology*, *18*, 1–12.

Lynn, R. (1980). The social ecology of intelligence in the France. *British Journal of Social and Clinical Psychology*, *19*, 325–331.

Lynn, R. (2010). In Italy, *north–south* differences in IQ predict differences in income, education and infant mortality. *Intelligence*, *38*, 93–100.

Lynn, R. (2011). *Dysgenics: Genetic deterioration in modern populations* (2nd Revised ed.). London: Ulster Institute for Social Research.

Lynn, R. (2012). ***North–south*** differences in Spain in IQ, educational attainment, per capita income, literacy, life expectancy and employment. *Mankind Quarterly*, *52*, 265–291.

Lynn, R., & Cheng, H. (2013). Differences in intelligence across thirty-one regions of China and their economic and demographic correlates. *Intelligence*, *41*, 553–559.

Lynn, R., & Vanhanen, T. (2012). *Intelligence: A unifying construct for the social sciences*. London: Ulster Institute for Social Research.

Lynn, R., & Yadav, P. (2015). Differences in cognitive ability, per capita income, infant mortality, fertility and latitude across the states of India. *Intelligence*, *49*, 179–185.

Maxwell, J. (1967). *The level and trend of national intelligence*. London: London University Press.

McDaniel, M. A. (2006). State preferences for the ACT versus SAT complicates inferences about SAT-derived state IQ estimates: A comment on Kanazawa (2006). *Intelligence*, *34*, 601–606.

Meisenberg, G., & Lynn, R. (2011). Intelligence: A measure of human capital in nations. *Journal of Social, Political & Economic Studies*, *36*, 421–454.

OECD (2012). The Organisation for Economic Co-operation and Development. *Programme for International Student Assessment (PISA)* (http://www.oecd.org/pisa/).

Piffer, D., & Lynn, R. (2014). New evidence for differences in fluid intelligence between north and south Italy and against school resources as an explanation for the north–south IQ differential. *Intelligence*, *46*, 246–249.
Rindermann, H. (2007). The *g*-factor of international cognitive ability comparisons: The homogeneity of results in PISA, TIMSS, PIRLS and IQ tests across nations. *European Journal of Personality*, *21*, 667–706.
Rindermann, H., Schott, T., & Baumeister, A. E. E. (2013). Flynn effect in Turkey: A comment on Kagitcibasi & Biricik (2011). *Intelligence*, *41*, 178–180.
Tolnay, E. (1998). Educational selection in the migration of southern blacks, 1880–1990. *Social Forces*, *77*, 487–514.
Turkish Statistical Institute (2010-2013). http://www.tusiad.org/__rsc/shared/file/Bireysel-gelir-raporu.pdf, http://www.turkstat.gov.tr/Start.do.
Vigdor, J. L. (2002). The pursuit of opportunity: Explaining selective black migration. *Journal of Urban Economics*, *51*, 391–417.
Woodley, M. A., & Figueredo, A. J. (2013). *Historical variability in heritable general intelligence. Its evolutionary origins and socio-cultural consequences.* Buckingham, UK: University of Buckingham Press.