Intelligence 46 (2014) 40–46

Contents lists available at ScienceDirect

Intelligence

A study of the intelligence of Kazakhs, Russians and Uzbeks in Kazakhstan

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ARTICLE INFO

Article history:
Received 25 November 2013
Received in revised form 6 May 2014
Accepted 8 May 2014
Available online xxxx

Keywords:
Kazakhstan
Intelligence
Progressive Matrices
Russians
Uzbeks

ABSTRACT

Data are reported for intelligence measured by the Standard Progressive Matrices Plus of school students in Kazakhstan. Ethnic Kazakhs obtained a mean British IQ of 82.2, ethnic Russians obtained a mean British IQ of 103.2, and ethnic Uzbeks obtained a mean British IQ of 86.0. The IQ of Kazakhstan is estimated at 87.3.

Factor analysis showed three factors identified as Gestalt Continuation, Verbal-Analytic Reasoning and Visuospatial Ability, replicating the analysis by Lynn, Allik, and Irwing (2004). The Russians performed significantly better than the Kazakhs in all age groups on Factor g and Factor 1 (Visuospatial Ability). There was no significant ethnic difference for Factor 2 (Gestalt Continuation) for ages 11, 12 and 13, although Russians performed significantly better than Kazakhs for age 10. The Russians scored significantly higher Factor 3 (Verbal-Analytical Reasoning) at ages 11, 12 and 13.

1. Introduction

The research program to collect IQs for all nations in the world and examine their psychological, economic, sociological, demographic, climatic and other correlates was initiated by Lynn and Vanhanen (2002) and extended by Lynn and Vanhanen (2012). This research program has succeeded in collecting IQs for most major nations, but has not yet obtained IQs for the central Asian nations of the former Soviet Union consisting of Kazakhstan, Turkmenistan, Kyrgyzstan, Tajikistan and Uzbekistan. In this paper we contribute to this research program by reporting an IQ for Kazakhstan.

Kazakhstan is the largest of the central Asian republics of the former Soviet Union. It is larger than Western Europe and stretches from the Ural River in Eastern Europe to the frontier of China. The region north of Caucasus, near to Kazakhstan, is the origin of Indo-European language but the Kazahks have mixed (predominantly Mongoloid) ancestry. Kazakhstan had a population of approximately 17 million recorded in the 2009 census (Kazakhstan Statistical Agency, 2009). Until the late 1920s the Kazakhs were predominantly a nomadic pastoral people, very few of the children attended school and about 98% were illiterate. In the late 1920s they were required to become settled and elementary education became compulsory throughout the Soviet Union (The Big Soviet Encyclopaedia, 1953, vol 19, p. 347). Today, the population of Kazakhstan is ethnically diverse. The census of 2009 gives the population as 63.1% Kazakh, 23.6% Russian, 2.8% Uzbeck, 1.4% Uyghur, and 10.0% others (Kazakhstan Statistical Agency, 2009).

There are no data for the intelligence of the Russians or Kazakhs in Kazakhstan. However, there were some early studies of the intelligence of the closely related Uzbeks. These people are indigenous to central Asia and are scattered across Kazakhstan, Uzbekistan, Turkmenistan and Kyrgyzstan, between the Caspian Sea and China, and north of Afghanistan and Iran. They are most closely related genetically to the Iranians (Cavalli-Sforza, Menozzi, & Piazza, 1994, p. 225). In

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http://dx.doi.org/10.1016/j.intell.2014.05.004
0160-2896/

the first early study, Соловьев (1929) tested 72 Uzbek applicants for the army school (a secondary school specializing in preparation for the army), 112 students at this school and 393 soldiers, the majority of whom were Uzbeks, and samples of Uzbek professionals (N = 566) and ethnic European Russian professionals (N = 1031) with several tests of intelligence, attention and memory. He reported that the test scores and also the educational level of the Uzbeks were lower than those of the European Russians.

Another early study of the intelligence of the Uzbeks was carried out in 1931 by Luria (1979). He did not use intelligence tests but gave a descriptive analysis of the Uzbeks' cognitive abilities. He distinguished two modes of thought designated as *graphic recall* (memories of how objects in the individual's personal experience are related) and *categorical relationships* (categorisation by abstract concepts). He concluded that the thought processes of illiterate Uzbek peasants were confined to *graphic recall* and that they were not able to form abstract concepts. For example, they were shown a hammer, an ax, a log and a saw, and asked which of these did not belong. The typical Uzbek answer was that they all belonged together because they are all needed to make firewood. People who are able to think in terms of *categorical relationships* identify the log as the answer because the other three are tools (an abstract concept). He reported that illiterate Uzbeks peasants were unable to form concepts of this kind. They were also unable to solve syllogisms. For instance, given the syllogism "There are no camels in Germany; the city of B is in Germany; are there camels there?" Luria gave as a typical Uzbek answer "I don't know, I have never seen German cities. If B is a large city, there should be camels there." Similarly, Luria asked "In the far north, where there is snow, all bears are white; Novaya Zemlya is in the far north; what color are the bears in Novaya Zemlya"? A typical Uzbek answer was "I've never been to the far north and never seen bears" (Luria, 1979, p. 77-8). Luria concluded that these people were not capable of abstract thought: "the processes of abstraction and generalization are not invariant at all stages of socioeconomic and cultural development. Rather, such processes are products of the cultural environment" (Luria, 1979, p. 74). Luria proposed that the ability to think in terms of *categorical relationships* is acquired through education. He did not suggest that the Uzbeks have any genetic cognitive deficiency. Luria's distinction between the categorization of objects in terms of practical experience and in terms of abstract concepts is similar to Piaget's (1929) distinction between concrete and formal operations.

The Luria study has been cited by Flynn (2012, p. 12ff) as an example of his theory that pre-modern people think in concrete terms, while modern-schooled people think in terms of abstract-scientific spectacles. It has also been cited by Oesterdiekhoff (2012) as an example of his theory that pre-modern people think at a Piagetian pre-formal stage of cognitive development, while modern-schooled people think at Piagetian formal stage of cognitive development. Cole (1988) has disputed Luria's interpretation of his results.

While there are no IQ data for Kazakhstan, there are data for educational attainment that Lynn and Vanhanen (2012) have used as proxies for IQs. These educational attainment data for Kazakhstan come from three sources. These are the 2007 TIMSS (Third International Mathematics & Science Study), the 2009 PISA (Programme for International Student Assessment) study and the 2012 PISA.

National differences in the 2007 TIMSS (Trends in International Mathematics and Science Study) are given for mathematical and science abilities of grade 4 and grade 8 school students in 58 countries and their relation to national IQs have been given by Lynn and Mikk (2007). They reported that national scores on the TIMSS were correlated with national IQs at 0.85, corrected for attenuation, 0.90. They gave TIMSS IQs for the countries in relation to 100 for Great Britain and reported that the TIMSS IQ for Kazakhstan was 101.

National differences in the 2009 PISA (Programme for International Student Assessment) study of the achievement of school students in grades 4 and 8 in mathematics and science in 87 countries and their relation to national IQs have been given by Lynn and Vanhanen (2012, p.18). In this study, the sample from Kazakhstan scored 406.3 and Britain scored 521.9. From these results, a British IQ of 84.7 for Kazakhstan has been calculated by Lynn and Vanhanen (2012, p.24). The same figure has been given by Coyle and Rindermann (2013) and Zajenkowski, Stolarski, and Meisenberg (2013). The publication of the PISA 2012 results (OECD, 2013) makes it possible to calculate a British IQ for Kazakhstan as follows. The mean British score was 502.3, and the mean Kazakhstan score was 416.7; the standard deviation is 100. From these figures, a British IQ for Kazakhstan can be calculated as 85.6. This result is very close to the IQ of 84.7 for Kazakhstan calculated from the 2009 PISA study. However, these results are very different from the IQ of 101 for Kazakhstan calculated from the 2007 TIMSS study.

In the study to be reported we extend existing knowledge of the intelligence of Kazakhs and Uzbeks by presenting data for intelligence measured by the Standard Progressive Matrices Plus and for three factors in the Standard Progressive Matrices Plus identified as Gestalt Continuation, Verbal-Analytic Reasoning and Visuospatial Ability. The reason for using the Standard Progressive Matrices Plus is that the Progressive Matrices has been the most frequently used test for the measurement of national IQs summarized in Lynn (2006) and Lynn and Vanhanen (2012), and the Standard Progressive Matrices Plus is the most recently standardized British version of the test. The reason for analyzing the data for three factors found by Lynn, Allik, and Irwing (2004) in the Standard Progressive Matrices and identified as Gestalt Continuation, Verbal-Analytic Reasoning and Visuospatial Ability is to extend the measurement of national and racial differences in intelligence beyond general intelligence to more specific factors.

2. Method

This study of the intelligence of ethnic Kazakhs, Russians and Uzbecks in Kazakhstan was carried out in 2013 in schools in one of the cities in the southern part of the country. All the schools from which the sample was drawn were selected as representative of the three groups in elementary and middle schools by a teacher who works in one of the schools and knows the schools in the city well. The Kazakh sample consisted of 402 school students in five Kazakh elementary and middle schools. The Russian sample consisted of 164 school students in the two Russian-Kazakh elementary and middle schools and the Uzbeck sample consisted of 51 school students in the two Russian-Kazakh schools. The total sample consisted of 300 boys and 317 girls.

The school students were tested for intelligence with the Standard Progressive Matrices Plus (SPM Plus), a non-verbal intelligence test standardized in Britain in 2008 (Raven, 2008). The test was administered in class groups and was given in Russian, without time limitation. In the response sheets given, participants recorded their name, date of their birth, date of testing, their sex, ethnicity and the number of their siblings.

It was shown by Lynn et al. (2004) that there are three Factors in Raven's Standard Progressive Matrices which they identified as Gestalt Continuation, Verbal-Analytic Reasoning and Visuospatial Ability. These three Factors loaded positively on a higher order Factor identifiable as *g*. We therefore examined the present data to determine whether this analysis can be replicated.

3. Results

The results for the Kazakh school students are given in Table 1. This shows for each age from 8 to 16 years the numbers, mean scores and standard deviations on the Standard Progressive Matrices Plus, and the British IQs taken from the manual of the 2008 British standardization given in Raven (2008). The bottom row gives the mean British IQs of the total samples of boys and girls calculated by weighting the IQs of each age group by the numbers. The mean British IQ of the total sample is 82.2. It is debatable whether a "Flynn effect" adjustment should be made to this figure for a possible increase in the British IQ over the years 2008–2013. An increase in the British IQ measured by the Standard Progressive Matrices between 1979 and 2008 among 7 to 12 year olds but not among 13 to 15 year olds was reported by Lynn (2009) but it is not known whether the British IQ increased over the years 2008–2013. Studies by Shayer and Ginsburg (2007, 2009) have reported declines in the British IQ measured by Piagetian tests from the 1990s. In view of these results, no Flynn effect adjustment has been made to the present results.

The results for the Russian school students are given in Table 2. This shows for each age from 9 to 15 years the numbers, mean scores and standard deviations on the Standard Progressive Matrices Plus, and the British IQs taken from the manual of the 2008 British standardization given in Raven (2008). The bottom row gives the mean British IQs of the total samples of boys and girls calculated by weighting the IQs of each age group by the numbers. The mean British IQ of the total sample is 103.2.

The results for the Uzbek school students are given in Table 3. This shows for each age from 10 to 15 years the numbers, mean scores and standard deviations on the Standard Progressive Matrices Plus, and the British IQs taken from the manual of the 2008 British standardization given in Raven (2008). The bottom row gives the mean British IQs of the total samples of boys and girls calculated by weighting the IQs of each age group by the numbers. The mean British IQ of the total sample is 86.0.

We next examined the data to determine whether they contain the three Factors in Raven's Standard Progressive Matrices shown by Lynn et al. (2004) and which they identified as Gestalt Continuation, Verbal-Analytic Reasoning and Visuospatial Ability. Initially all items were screened for difficulty, skewness and kurtosis. Items A1, A2 and B1 were removed because of extreme Kurtosis (>30). Using exploratory structural equation modeling within Mplus, we then tested for one-, two- and three-factor solutions. Inspection of these solutions, combined with an examination of the matrix of tetrachoric correlations suggested that items B1, C7, C9–C11, D6–D10, and E6–E12 showed no meaningful relationships to the other items as shown in Table 5. The most plausible interpretation of this is that these items were either too easy or too difficult for the current population and that therefore responses were essentially random guesses. For example, the item B1 was correctly answered by more than 97% of the total sample and the mean proportion of correct responses for the remaining items is 0.134 and very close to the value of 0.125 which would be expected for random guessing. We therefore excluded these items from the analysis which is based on the remaining 41 items.

Table 1
Scores on the Standard Progressive Matrices Plus of Kazakh school students in Kazakhstan.

Age	Boys			Girls		
	N	Mean (sd)	IQ	N	Mean (sd)	IQ
8	10	25.10 (7.99)	95	6	22.67 (8.71)	90
9	17	18.59 (7.74)	70	13	17.69 (5.19)	75
10	22	23.09 (8.57)	75	24	25.04 (6.23)	85
11	66	22.68 (7.01)	80	74	24.91 (7.17)	85
12	69	28.28 (7.63)	85	73	28.26 (6.81)	85
13	19	24.95 (8.93)	75	6	23.83 (9.11)	70
14	1	23.00	65	1	18.00	55
16	1	28.00	70	–	–	
Total	205		80.5	197		83.9

Table 2
Scores on the Standard Progressive Matrices Plus of Russian school students in Kazakhstan.

Age	Boys			Girls		
	N	Mean (sd)	British IQ	N	Mean (sd)	British IQ
9	2	29.50 (4.95)	97.5	3	34.00 (1.00)	115.0
10	7	29.14 (6.94)	90.0	19	33.42 (2.80)	105.0
11	12	30.92 (8.76)	95.0	23	30.74 (6.29)	95.0
12	14	33.29 (8.84)	100.0	18	36.06 (4.24)	110.0
13	7	35.71 (8.28)	102.5	18	36.22 (8.99)	105.0
14	14	37.57 (3.76)	110.0	18	38.44 (3.45)	110.0
15	5	34.80 (4.87)	100.0	4	38.00 (6.16)	105.0
Total	61		100.4	103		104.8

Table 3
Scores on the Standard Progressive Matrices Plus of Uzbek school students in Kazakhstan.

Age	Boys			Girls		
	N	Mean (sd)	British IQ	N	Mean (sd)	British IQ
10	2	23.50 (7.78)	80.0	2	23.50 (0.71)	80.0
11	4	29.50 (1.91)	92.5	2	28.00 (7.07)	90.0
12	9	28.67 (5.32)	85.0	3	27.33 (7.23)	80.0
13	1	33.00	95.0	1	37.00	110.0
14	15	31.60 (5.78)	90.0	8	34.75 (4.68)	100.0
15	3	27.33 (6.66)	77.5	1	27.00	75.0
Total	34		82.9	17		92.1

Several procedures have been suggested for determining the number of common Factors in a data set including the Kaiser Criterion, the scree test, parallel analysis, the Minimum Average Partial test, and an Information Criterion (Akaike, 1973; Costello & Osborne, 2005; Peres-Neto, Jackson, & Somers, 2005; Timmerman & Lorenzo-Seva, 2011; Velicer, 1976; Velicer, Eaton, & Fava, 2000; Zwick & Velicer, 1986). Recently, Lorenzo-Seva, Timmerman, and Kiers (2011) have shown via Monte Carlo simulation, that a new method described as the Hull method, particularly when implemented using the Comparative Fit Index, is consistently successful in identifying the correct number of factors when, as is the case here, samples are of medium size and the number of indicators per factor is substantial. We therefore applied the Hull-CFI method using the factor program v.9.20 (Lorenzo-Seva & Ferrando, 2006). This indicated three factors. As a check we also used parallel analysis implemented with Minimum Rank Factor Analysis which indicated two to three factors.

We next subjected the 41 items to exploratory structural equation modeling using the diagonally weighted least squares estimator (Booth & Hughes, 2014). We tested for a one-, two- and three-factor solution initially using the default Geomin rotation. The three-factor solution was the most meaningful in that all items showed a salient loading on at least one Factor, and it also showed a substantial increment in fit according to all indices as compared with the one- and two-factor solutions, confirming the superiority of the three-factor solution given in Table 4. In order to assess the robustness of the solution we rotated the three-factor solution using Equamax and Direct Oblimin (Schmitt & Sass, 2011). The solutions were highly similar, but the Equamax solution showed the best approximation to simple structure, and was therefore selected for further analysis. In a penultimate step we tested a confirmatory factor model, using the diagonally weighted least squares estimator, in which only the salient loadings from the Equamax solution were allowed. Three further cross loadings were allowed based on modification indices. This solution demonstrated close fit ($\chi^2 = 1165.5$, df = 773, CFI = 0.971, TLI = 0.969, RMSEA = 0.030).

The resultant solution for the CFA (confirmatory factor analysis) is given in Table 5. This shows three factors that are highly similar to those found by Lynn et al. (2004). We follow this previous study in interpreting Factor 1 as Gestalt Continuation, Factor 2 as Visuospatial Ability and Factor 3 as Verbal-Analytic Reasoning. Factor 1 is interpreted as Gestalt Continuation because the items loading on this factor are solved by perception of the pattern as a gestalt and identifying the correct piece for its completion without the use of reasoning. Factor 2 is interpreted as Visuospatial Ability because the items loading on this factor are solved by visuospatial analysis. Factor 3 is interpreted as Verbal-Analytic Reasoning because the items loading on this factor are arithmetical addition and subtraction problems that require verbal reasoning for their solution. Most of the items in the SPM Plus load on the same factors as in the solution of SPM by

Table 4
Fit statistics for the one-, two-, and three-factor ESEM solutions.

No. factors	χ^2	df	CFI	TLI	RMSEA
One	1511.0	779	0.945	0.942	0.041
Two	1180.0	739	0.967	0.963	0.032
Three	949.2	700	0.981	0.978	0.025

Table 5
Loadings of items on three-factor exploratory and confirmatory factors and on the higher order factor *g* VS GC VAR. Significant loadings are given in bold face.

Items	3 factor ESEM solution			3 factor CFA solution			
	f1 VS	f2 GC	f3 VAR	f1 VS	f2 GC	f3 VAR	g
A1	–	–	–	–	–	–	–
A2	–	–	–	–	–	–	–
A3	0.02	**0.69**	0.18		0.73		0.63
A4	−0.12	**0.88**	0.07		0.71		0.61
A5	−0.04	**0.78**	0.16		0.75		0.64
A6	0.09	**0.88**	0.04		0.88		0.75
A7	**0.39**	**0.49**	0.12		0.86		0.74
A8	**0.46**	**0.57**	−0.00		0.91		0.78
A9	0.21	**0.67**	0.03		0.78		0.67
A10	**0.39**	**0.42**	0.07		0.77		0.66
A11	**0.29**	**0.35**	0.09		0.63		0.53
A12	0.13	**0.38**	0.15		0.55		0.47
B1	–	–	–	–	–	–	–
B2	−0.20	**0.91**	−0.06		0.52		0.47
B3	**0.55**	**0.46**	0.06	0.87			0.68
B4	**0.70**	**0.21**	0.03	0.79			0.71
B5	**0.74**	**0.32**	0.02	0.90			0.81
B6	**0.60**	**0.22**	0.04	0.71			0.65
B7	**0.47**	**0.37**	0.11	0.75			0.68
B8	**0.68**	0.06	**0.24**	0.82			0.75
B9	**0.72**	0.01	**0.19**	0.79			0.72
B10	**0.71**	−0.06	**0.34**	0.84			0.76
B11	**0.65**	−0.01	**0.33**	0.82			0.74
B12	**0.52**	0.03	**0.32**	0.72			0.65
C1	**0.52**	**0.18**	**0.34**	0.83			0.75
C2	**0.52**	0.16	**0.36**	0.83			0.75
C3	**0.47**	**0.21**	**0.28**	0.77			0.70
C4	**0.56**	0.15	**0.30**	0.82			0.75
C5	**0.42**	0.00	**0.37**	0.65			0.59
C6	**0.47**	**0.16**	**0.37**	0.79			0.72
C7	–	–	–	–	–	–	–
C8	0.06	0.19	**0.55**			0.70	0.69
C9	–	–	–	–	–	–	
C10	–	–	–	–	–	–	
C11	–	–	–	–	–	–	
C12	−0.04	0.18	**0.49**			0.55	0.46
D1	**0.19**	0.04	**0.70**			0.83	0.70
D2	**0.14**	**0.15**	**0.74**			0.91	0.76
D3	−0.07	0.02	**0.64**			0.52	0.43
D4	−0.06	0.15	**0.46**			0.46	0.39
D5	0.06	0.00	**0.40**			0.42	0.35
D6	–	–	–	–	–	–	–
D7	–	–	–	–	–	–	–
D8	–	–	–	–	–	–	–
D9	–	–	–	–	–	–	–
D10	–	–	–	–	–	–	–
D11	−0.24	−0.07	**0.63**			0.30	0.25
D12	**−0.47**	**0.33**	0.23	0.52	−0.44		0.05
E1	**0.27**	−0.00	0.28			0.51	0.42
E2	−0.07	0.04	**0.41**			0.34	0.28
E3	**−0.24**	−0.11	**0.64**		−0.45	0.76	0.23
E4	−0.06	−0.02	**0.65**			0.52	0.44
E5	−0.23	0.09	**0.41**		−0.34	0.59	0.19
E6	–	–	–	–	–	–	–
E7	–	–	–	–	–	–	–
E8	–	–	–	–	–	–	–
E9	–	–	–	–	–	–	–
E10	–	–	–	–	–	–	–
E11	–	–	–				
E12	–	–	–	–	–	–	–

Lynn et al. (2004). The principal exceptions are, first, that in the SPM items B3 and B4 load on the Gestalt Continuation Factor, while in the SPM Plus they load more highly on the Visuospatial Ability Factor; and second, C8 and D1–D5 load on the Visuospatial Ability Factor in the SPM and on the Verbal-Analytic Reasoning Factor in the SPM Plus.

Gestalt Continuation and Visuospatial Ability correlate at 0.798, Gestalt Continuation and Verbal Analytic Reasoning at 0.614, and Visuospatial Ability and Verbal Analytic Reasoning at 0.773. These correlations indicate the presence of a major factor present in the SPM Plus, as was found for the SPM. In order to test for this higher order factor we estimated a model in which the loadings for Visuospatial Ability and Verbal-Analytic Reasoning were set equal. This model provided again showed a close fit ($\chi^2 = 1241.8$, df = 774, CFI = 0.965, TLI = 0.963, RMSEA = 0.033), and the respective standardized loadings were 0.86, 0.90 and 0.85 for Gestalt Continuation, Visuospatial Ability and Verbal-Analytic Reasoning respectively.

We now consider the ethnic differences on the higher order factor *g* for the total test and on the three primary factors and for the 11, 12, 13 and 14 year olds (the numbers are too small for analysis of the other ages). All factor scores were calculated by unit weighting and summing item scores, and then standardizing. These are given in Table 6. The results show that Russians performed significantly better than Kazakhs in all age groups on Factor *g* and Factor 1 (Visuospatial Ability) and at ages 11, 12 and 13 on Factor 3 (Verbal-Analytical Reasoning) and their advantage increased with age. There is no significant ethnic difference for Factor 2 (Gestalt Continuation) for ages 11, 12 and 13, although Russians performed significantly better than Kazakhs for age 10. We examined the means for boys and girls in the Russians and Kazakhs and found no significant differences.

4. Discussion

An IQ for Kazakhstan can be calculated from these results as follows: the Russians have a mean British IQ of 103.2 and comprise 23.6% of the population; the Kazakhs have a mean British IQ of 82.2 and comprise 63.1% of the population; the Uzbeks have a mean British IQ of 86.0 and comprise 2.8% of the population. Weighting the IQs of these three groups by their percentages of the population gives an IQ of 87.9 for Kazakhstan. These three groups comprise 89.5% of the population. The remaining 10.5% consists of Chuvash, Tartars, Uyghurs and other south Asian peoples. Early studies of intelligence in the former Soviet Union found that these peoples had lower IQs than ethnic Russians (Grigoriev & Lynn, 2009). Their IQ is likely about the same as that of Kazakhs (82.2). On this assumption, adding this fourth group and weighting the IQs of the four groups by their percentages of the population gives an IQ of 87.3 for Kazakhstan. This figure compares quite closely with the British IQ of 84.7 for Kazakhstan calculated by Lynn and Vanhanen (2012, p.24) from the PISA 2009 study of the achievement of school students in grades 4 and 8 in mathematics and science and with the British IQ of 85.6 for Kazakhstan calculated from the PISA 2012 study of the achievement of 15 year old school students. The closeness of the estimates from the PISA studies and the present IQ study is a further confirmation that the PISA results give a good measure of the intelligence of nations. However, these results are not consistent with the 2007 TIMSS of the mathematical and science abilities of grade 4 and grade 8 school students from which an IQ 101 for Kazakhstan was calculated by Lynn and Mikk (2007). This suggests errors in the 2007 TIMSS data for Kazakhstan.

The mean British IQ of 103.2 for the Russian sample is higher than that for Russians in Russia which is estimated on

Table 6
Mean standardized scores of Kazakhs and Russians on four factors for four age groups.

Age	Mean		Sample size		d	t	p
	Kazakhs	Russians	Kazakhs	Russians			
Factor g							
10	−0.402	0.596	46	26	0.999	5.925***	5.57E−8
11	−0.462	0.399	140	35	0.861	5.328***	3.06E−7
12	0.064	0.773	142	32	0.709	4.319***	.00001
13	−0.305	0.885	25	25	1.190	4.412***	.00003
Factor 1 VS							
10	−0.380	0.684	46	26	1.064	6.023***	3.60E−8
11	−0.459	0.375	140	35	0.834	5.690***	1.59E−7
12	0.120	0.664	142	32	0.544	4.042**	.00007
13	−0.192	0.712	25	25	0.904	3.666**	.00038
Factor 2 GC							
10	−0.206	0.445	46	26	0.651	3.674**	.00024
11	−0.269	0.194	140	35	0.463	2.805	.00333
12	0.090	0.384	142	32	0.293	2.363	.01030
13	−0.171	0.374	25	25	0.544	1.625	.05680
Factor 3 VAR							
10	−0.334	0.125	46	26	0.458	2.723	.00408
11	−0.354	0.334	140	35	0.688	3.673**	.00035
12	−0.109	0.873	142	32	0.982	4.195**	.00008
13	−0.467	1.230	25	25	1.698	6.259***	1.01E−7

** p < .01 (Bonferroni adjusted).
*** p < .001 (Bonferroni adjusted).

the basis of three studies as 96.5 (Lynn & Vanhanen, 2012, p.27). The most likely explanation for this is that many Russians in Kazakhstan are professionals who migrated to Kazakhstan to take up employment. They would have had higher than average IQs which would have been transmitted to their children who were tested in this study.

The mean British IQs of 82.2 for the Kazakh sample and 86.0 for the Uzbek sample are substantially lower than those for Russians in Kazakhstan, Russians in Russia and for central and northern Europeans. The low IQ of the Uzbeks found in the present study confirms the early work of Соловьев (1929) and Luria (1979) that they do not achieve the same cognitive level in abstract thinking as Russians. However, the IQs of the Kazakh and Uzbek samples are closely similar to the IQs of other South Asian countries given in Lynn and Vanhanen's (2012, p.27) compilation as 84.8 (Azerbaijan), 81.0 (Bangladesh), 84.2 (Bhutan), 82.6 (India), 74.4 (Kyrgyzstan), and 84.0 (Pakistan).

The results of the analysis of the three factors in the Standard Progressive Matrices Plus identified as Gestalt Continuation, Verbal-Analytic Reasoning and Visuospatial Ability, are closely similar although not identical to the three factors reported by Lynn et al. (2004). The differences could be due to the different versions of the tests (SPM vs SPM Plus). The three factors can be integrated with Carroll's (1993, p. 626) widely accepted taxonomy of cognitive abilities, such that Verbal-Analytic Reasoning can be identified as Carroll's Factor 2F Fluid intelligence, Visuospatial Ability can be identified as Carroll's Factor 2V Broad Visual Perception, and Gestalt Continuation can be identified as one of Carroll's stratum 1 narrow ability factors. The results showing that the Russians performed significantly better than the Kazakhs on g, Verbal-Analytical Reasoning and Visuospatial Ability but not on Gestalt Continuation extend knowledge of the cognitive abilities of peoples from differences in general intelligence to ethnic differences in some of Carroll (1993) stratum 2 and 1 factors.

The low IQ of the Kazakhs and Uzbeks raises a problem for the explanation of the evolution of racial differences in intelligence. The leading theory for this is the cold winters theory proposed by Lynn (1991, 2006) that higher intelligence evolved in environments with colder winters as adaptations to the greater cognitive demands of survival through these. This theory has been accepted by Rushton (2000), Kanazawa (2008) and Templer and Arikawa (2006) who have presented data for lowest winter temperatures and national IQs for 129 countries and reported a correlation of −.66, i.e. there is a tendency for the populations of higher IQ countries to have lower winter temperatures. More recently, this association has been confirmed by Meisenberg and Woodley (2013) who have reported a correlation of −.746 between lowest winter temperatures and national IQs for 143 countries.

These negative correlations support the cold winters theory, but Kazakhstan and Uzbekistan are anomalies because they have very low winter temperatures but not high IQs. Templer and Arikawa (2006) give data for average winter temperatures for 129 countries including −15 °C for Kazakhstan and −6 °C for Uzbekistan, compared with around zero for northern and central Europe (e.g. −3 °C for Germany, −1 °C for Belgium, 2 °C for France and Britain), and −3 °C for China and Japan.

In addition to the cold winters theory, it has been proposed by Miller (2005, 2014) and Lynn (2006) that it is necessary to posit the appearance of new alleles for enhanced intelligence that appeared as genetic mutations in some populations but failed to appear in others or, if they did appear, failed to spread throughout the populations. It has been shown by Cochran and Harpending (2009) that a number of new alleles appeared in different populations during the last ten thousand years. The present results showing the low IQs of Kazakhs and Uzbeks despite the very cold winters in Kazakhstan and Uzbekistan are a further anomaly for the cold winters theory of the evolution of racial differences in intelligence and a further strengthening of the hypothesis of the appearance of new alleles for enhanced intelligence that appeared as genetic mutations in some populations but failed to appear or failed to spread in others including central Asia.

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