



Differences in the intelligence of children across thirty-one provinces and municipalities of China and their economic and social correlates



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ABSTRACT

This study reports the associations between the intelligence of children aged 8–10 years across thirty-one provinces and municipalities of the People's Republic of China and their economic and social correlates. It was found that regional IQs were significantly correlated at the $p < 0.001$ significant level with the percentage of Han in the population ($r = 0.75$), GDP per capita ($r = 0.73$), and years of education ($r = 0.76$). Results of a multiple regression analysis showed that regional IQs were the only significant predictor of regional differences in the GDP per capita accounting for 56% of the variance.

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1. Introduction

The first study of regional differences in intelligence within countries and their economic and social correlates was reported for the United States by Davenport and Remmers (1950), who gave a correlation of 0.32 between state IQ and per capita income. This positive association was confirmed with a correlation of 0.59 more than half a century later by McDaniel (2006).

The positive associations between regional differences in IQs within countries and per capita incomes have been reported in a number of studies of other countries including for 13 regions of the British Isles ($r = 0.73$) (Lynn, 1979), 90 regions of France ($r = 0.61$) (Lynn, 1980), 12 regions of Italy ($r = 0.94$) (Lynn, 2010), 19 regions of Italy ($r = 0.98$) (Templer, 2012), 18 regions of Spain ($r = 0.42$) (Lynn, 2012), 16 regions of Germany ($r = 0.79$) (Roivainen, 2012) and 12 regions of the United Kingdom (general factor of economic development: $r = 0.72$; weekly earnings: $r = 0.42$) (Carl, 2016).

Regional differences in intelligence across thirty-one regions of the People's Republic of China and their economic and social correlates were reported by Lynn and Cheng (2013).

This study showed that regional IQs were significantly associated with the percentage of Han in the population ($r = 0.59$), GDP per capita ($r = 0.42$), the percentage of those with higher education ($r = 0.38$, $p < 0.05$), and non-significantly with years of education ($r = 0.32$). This study used the IQs of participants who took a test on a website. It is not certain how far the sample was representative and there was no information for the validity or reliability of the test. For these reasons, we examine further data for regional differences in intelligence and their economic and social correlates in China.

2. Method

Data for IQs of children aged 8–10 from thirty-one provinces and municipalities of China were collected by the Ministry of Health of the People's Republic of China using a population proportion sampling method for a sample of 37,238 school pupils of both urban and rural areas and published by Li, Wang, Su, Zhang and Yu (2006) (in Chinese). The children's intelligence was assessed in 2005 using the Combined Raven's Test for Children (CRT-C2) (Wang & Qian, 1997), which consists of 72 questions of Raven's Standard Progressive Matrices (C, D, E) and the Coloured Progressive Matrices (A, Ab, B) (Raven, Court, & Raven, 1983). The time allowed to complete the test was 40 min.

The data for per capita income were measured as GDP (Gross Domestic Product) per capita in 2011 for each region obtained from the

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Table 1
Intelligence of children aged 8–10 of different regions in China, years of education, GDP per capita and ethnic composition.

Region	Number	IQ Mean \pm SD	Years of education	GDP US\$ per capita	Ethnic populations	Ethnic composition (%)
Anhui Province	1179	98.2 \pm 17.7	6.98	3086	Han	99.0%
Beijing Municipality	1200	114.1 \pm 14.6	9.99	12,447	Hui	0.6%
					Han	96.0%
					Manchu	2.0%
					Hui	2.0%
Chongqing Municipality	1259	106.3 \pm 14.4	7.28	5341	Mongol	0.3%
					Han	95.0%
					Han	98.0%
Fujian Province	1221	107.1 \pm 15.0	7.49	7246	She	1.0%
					Hui	0.3%
					Han	91.0%
Gansu Province	1102	96.9 \pm 15.6	6.54	2380	Hui	5.0%
					Dongxiang	2.0%
					Tibetan	2.0%
					Han	99.0%
Guangdong Province	1200	101.1 \pm 15.3	8.08	7787	Zhuang	0.7%
					Yao	0.2%
					Han	62.0%
					Zhuang	32.0%
Guangxi Zhuang Autonomous Region	1204	98.3 \pm 15.7	7.58	2987	Yao	3.0%
					Miao	1.0%
					Dong	0.7%
					Gelao	0.4%
					Han	62.0%
					Miao	12.0%
					Buyei	8.0%
					Dong	5.0%
					Tujia	4.0%
					Yi	2.0%
Gelao	2.0%					
Sui	1.0%					
Hainan Province	1214	90.7 \pm 15.9	7.68	3520	Other	2.0%
					Han	82.6%
					Li	15.8%
					Miao	0.8%
Hebei Province	1200	105.4 \pm 14.4	7.74	4235	Zhuang	0.7%
					Han	96.0%
					Manchu	3.0%
					Hui	0.8%
Heilongjiang Province	1200	101.4 \pm 16.6	8.25	4000	Mongol	0.3%
					Han	95.0%
					Manchu	3.0%
					Korean	1.0%
					Mongol	0.4%
Henan Province	1200	95.4 \pm 16.3	7.72	3611	Hui	0.3%
					Han	98.8%
Hubei Province	1200	105.3 \pm 14.3	7.77	5434	Hui	1.0%
					Han	95.6%
					Tujia	3.7%
Hunan Province	1200	103.8 \pm 16.8	7.80	3652	Miao	0.4%
					Han	90.0%
					Tujia	4.0%
					Miao	3.0%
					Dong	1.0%
Inner Mongolia Autonomous Region	1200	105.1 \pm 13.8	7.76	8854	Yao	1.0%
					Han	79.0%
					Mongol	17.0%
					Manchu	2.0%
					Hui	0.9%
Jiangsu Province	1189	109.0 \pm 14.3	7.05	9535	Daur	0.3%
					Han	99.6%
					Hui	0.2%
Jiangxi Province	1200	98.9 \pm 18.3	7.55	3140	Han	99.7%
					She	0.2%
Jilin Province	1200	107.0 \pm 14.6	8.24	4668	Han	91.0%
					Korean	4.0%
					Manchu	4.0%
					Mongol	0.6%
					Hui	0.5%
Liaoning Province	1191	107.5 \pm 14.3	8.41	7788	Han	84.0%
					Manchu	13.0%
					Mongol	2.0%
					Hui	0.6%
					Korean	0.6%

(continued on next page)

Table 1 (continued)

Region	Number	IQ Mean \pm SD	Years of education	GDP US\$ per capita	Ethnic populations	Ethnic composition (%)
Ningxia Hui Autonomous Region	1200	93.4 \pm 17.1	7.03	3968	Xibe Han Hui Manchu	0.3% 62.0% 34.0% 0.4%
Qinghai Province	1160	92.8 \pm 16.8	6.12	3562	Han Tibetan Hui Tu Salar Mongol	54.0% 21.0% 16.0% 4.0% 1.8% 1.8%
Shaanxi Province	1259	104.7 \pm 15.6	7.71	4008	Han Hui	99.5% 0.4%
Shandong Province	1174	107.9 \pm 16.0	7.58	7317	Han Hui	99.3% 0.6%
Shanghai Municipality	1208	115.3 \pm 14.1	9.30	12,784	Han	99.0%
Shanxi Province	1274	108.0 \pm 14.0	8.02	3883	Han Hui	99.7% 0.2%
Sichuan Province	1227	105.4 \pm 16.4	7.07	3129	Han Yi Tibetan Qiang	95.0% 2.6% 1.5% 0.4%
Tianjin Municipality	1194	105.3 \pm 14.7	8.99	13,058	Han	99.0%
Tibet Autonomous Region	1193	77.3 \pm 16.8	3.43	2558	Tibetan Han Monpa Hui Other	92.8% 6.1% 0.3% 0.3% 0.2%
Xinjiang Uyghur Autonomous Region	1200	98.2 \pm 16.5	7.73	4633	Uyghur Han Kazakh Hui Kyrgyz Mongol Dongxiang Pamiris Xibe	45.0% 41.0% 7% 5% 0.9% 0.8% 0.3% 0.2% 0.2%
Yunnan Province	1210	96.8 \pm 17.7	6.33	2327	Han Yi Bai Hani Zhuang Dai Miao Hui Tibetan De'ang	67% 11% 3.6% 3.4% 2.7% 2.7% 2.5% 1.5% 0.3% 0.2%
Zhejiang Province	1200	115.8 \pm 13.0	7.46	9083	Han She	99.2% 0.4%

National Bureau of Statistics of China (NBSC, 2013). The logarithmic transformation for the GDP per capita was used because of the skewed nature of the data. Average years of education for each province and municipalities and the percentage of Han in each region were obtained from the China 2010 Population Census.

3. Results

The means and SDs of the children's IQs in each province and municipalities are shown in Table 1, together with the GDP per capita, years of education, and the percentage of Han. Table 2 gives the correlations between the measures and shows that children's IQs were significantly correlated with GDP per capita, years of education, and the percentage of Han ($r = 0.73$ to $r = 0.76$, $p < 0.001$). A higher percentage of Han was also significantly correlated with years of education and GDP per capita.

A multiple regression analysis using GDP per capita as the dependent variable showed that the only significant predictor was children's regional IQs (Beta = 0.72, $t = 3.37$, $p < 0.01$) accounting for 56% of the total variance. Neither the percentage of Han or years of education

were significant predictors of GDP per capita (Beta = -0.34 , $t = 1.80$, ns; Beta = 0.35, $t = 1.81$, ns).

4. Discussion

There are four principal points of interest in the study. First, the results show some degree of consistency with those of the previous study of regional differences in IQs in China reported by Lynn and Cheng (2013) in finding a correlation of 0.57 ($p < 0.001$) between the two data sets. There is, however, a much greater range of regional IQs in the present study. In the previous study, there was a range of 7 IQ points across the Chinese provinces and municipalities from 101 in Qinghai to 108 in Jiangsu and Shanghai. In the present study, there is a range of 38 IQ points from 77.3 in Tibet to 115.3 in Shanghai. We believe that the range of 7 IQ points found in the previous study is likely too low considering the large population and ethnic diversity of China, and compared with the greater range of 10.1 IQ points in the United States from Mississippi (94.2) to Massachusetts (104.3) reported by McDaniel (2006) and the 14 IQ points range in Italy from the northern region of Friuli-Venezia (103) to the southern region of Sicily (89) reported by Lynn (2010). The greatest inconsistency between the previous study

Table 2

Correlations among children's regional IQs, regional IQs in Lynn and Cheng (2013), years of education, regional ethnic composition, and GDP per capita in thirty-one provinces and municipalities in China.

Measures	Means (SD)	CRT-C2	Online IQ test (Lynn & Cheng, 2013)	Years of education	Regional ethnic Han population %
CRT-C2	102.1 (15.56)	–			
Online IQ test (Lynn & Cheng, 2013)	104.6 (1.91)	0.57***	–		
Regional average years of education	7.5 (1.13)	0.76***	0.32	–	
Regional ethnic Han population %	85.1 (21.52)	0.75***	0.59***	0.69***	–
GDP per capita Log US\$	3.68 (0.23)	0.73***	0.42*	0.66***	0.43*

* $p < 0.05$.

*** $p < 0.001$.

and present data is the IQ of Tibet given as 103 in the previous study in relation to an average of 105 for the whole of China, and as 77.3 in the present study in relation to an average of 102.1 for the whole of China. The low IQ in Tibet confirms the study by Lu, Fu, Kong, and Wang (1995) who reported results of three samples in Tibet of 40 Tibetan and 40 Han second year junior secondary school pupils (aged 12–13), the same numbers of second year senior secondary school pupils (aged 16–17), and the same numbers of second year university students using the Standard Progressive Matrices and tests of mathematics. In all three age groups the Han students had higher average IQs than the Tibetan students by 12.6 IQ points, $p < 0.001$, 8.4 IQ points and 5.3 IQ points, $p < 0.05$ respectively. These results give an average deficit of 8.8 IQ points of the Tibetans relative to the Han. This is much less than of 24.8 IQ points deficit in the present study. We believe that the present result is likely more reliable and valid.

Second, the results confirm those reported by Lynn and Cheng (2013) in showing that regional IQs in China are positively associated with the percentage of Han in the population (previous study $r = 0.59$; present study $r = 0.75$), with GDP per capita (previous study $r = 0.42$; present study $r = 0.73$) and with the years of education (previous study $r = 0.32$; present study $r = 0.76$). All the correlations are higher in the present study than in the previous study, and the correlation with the years of education ($r = 0.32$) in the previous study that was not statistically significant is statistically significant in the present study ($r = 0.76$, $p < 0.001$). The explanation for the higher correlations in the present study is likely that in the present study the intelligence data are more reliable and valid.

Third, the percentage of Han in the population is significantly correlated with the GDP per capita at $r = 0.43$. This is likely attributable to the higher average IQ of the Han shown in a number of studies reviewed by Lynn and Cheng (2013). However, the multiple regression analysis shows that the percentage of Han in the population does not add to IQ as a significant predictor of GDP.

Fourth, the results showing that the percentage of Han in the provinces and municipalities is significantly associated with the IQ ($r =$

0.75) confirms a number of studies at the individual level reviewed by Lynn and Cheng (2013) showing that the Han have a higher average IQ than the ethnic minorities.

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