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An increase of intelligence measured by the WPPSI in China, 1984–2006

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ABSTRACT

Normative data for 5–6 year olds on the Chinese Preschool and Primary Scale of Intelligence (WPPSI) are reported for samples tested in 1984 and 2006. There was a significant increase in Full Scale IQ of 4.53 points over the 22 year period, representing a gain of 2.06 IQ points per decade. There were also significant increases in Verbal IQ of 4.27 points and in Performance IQ of 4.08 points.

1. Introduction

It has been reported in numerous studies from the 1940s that the intelligence of the populations of the economically developed nations has been increasing. The first major study showing this was carried out in the United States by Tuddenham (1948), who reported that the average IQs of men conscripted into the American army in 1943 was 11.5 IQ points higher than those conscripted in 1917, representing a gain of 4.4 IQ points per decade. The second major study was carried out in Scotland and reported that the intelligence of 11 years old children had increased by 2.21 IQ points over the years 1932–1947, representing a gain of 1.47 IQ points per decade (Thomson, 1949). The presence of these increases has been confirmed in many Western countries and has been reviewed by Flynn (1984, 1987) and Flynn and Weiss (2007) after whom they have been designated "the Flynn effect."

There have only been two studies of the Flynn effect in Asia. The first of these were reported for Japan by Lynn and Hampson (1986). Recently, te Nijenhuis, Cho, Murphy, and Lee (in press) have reported large IQ gains averaging 7.7 points per decade in South Korea.

It is only in the last decade that increases in intelligence have been studied in economically developing countries. Only four studies of these have been reported. Daley, Whaley, Sigman, Espinosa, and Neumann (2003) reported a 15 IQ point gain over 14 years for school students on the Coloured Progressive Matrices in Kenya, representing a gain of 10.7 IQ points per decade. Meisenberg, Lawless, Lambert, and Newton (2005) reported an 18 IQ point gain for 20–70 year olds over 35 years on the Coloured Progressive Matrices in Dominica, where it represents a gain of 5.1 IQ points per decade. Colom, Flores-Mendoza, and Abad (2007) reported a 17 IQ point gain for 7–11 year olds in Brazil, over the 72 years (1930–2002) on the Draw-a-Man Test, representing a gain of 0.24 IQ points per decade. Finally, Khaleefa, Sulman, and Lynn (2009) reported WAIS-R Full Scale IQ gain of 4.05 points over the 20 year period (1987–2007) in Sudan, representing a gain of 2.05 IQ points per decade. The objective of this paper is add to the literature on IQ gains in economically developing nations by reporting data for an IQ gain in China.

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2. Methods

This study compares the IQs obtained by 5–6 year olds on the Chinese version of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) in 1984 and 2006. The WPPSI was constructed in the U.S.A. by Wechsler to measure the intelligence of children aged 3 to 7 years old (Wechsler, 1967). The WPPSI consists of 10 subtests, five of which comprise Verbal IQ (Information, Comprehension, Arithmetic, Vocabulary and Similarities) and five comprise Performance IQ (Geometric Design, Animal House, Block Design, Mazes and Picture Completion) (Wechsler, 1967). The verbal subtests are combined to produce to a Verbal IQ (VIQ) and the performance subtests are combined to produce to a Performance IQ (PIQ). All ten subtests are combined to produce a Full Scale IQ (FIQ), which is widely recognized as a good measure of general intelligence defined as an average of all cognitive abilities.

The Chinese WPPSI was standardized in China in 1984 on a representative nationwide sample of 1628 children aged 5–6 years old (Song & Yue-mei, 1987). The test has been shown to have good reliability in Chinese children (Gong & Dai, 1986; Gong & Dai, 1988; Yang, Liu, & Townes, 1994; Zhu, Lu, & Tang, 1984).

In the current study, data for 1195 children aged 5–6 years old on the Chinese WPPSI were obtained in 2005–2007 in the Jintan Child Study. This study consisted of a sample of 1656 children comprising 24.3% of all preschool children in the Jintan City region. The original sample of 1656 children was reduced to a sample of 1195 children to provide a match for age and gender distribution to the 1984 sample. The mean age of both samples was 5.7 years. The Jintan sample, composed of 55.5% boys and 44.5% girls, was drawn from four preschools that reflect the region's geographical, social, and economic profile: the urban city center (Jianshe preschool), the suburbs (Huacheng preschool), and the surrounding rural area (Xuebu and Huashan preschools). Jintan is located in southeast China, approximately 50 miles south of Nanjing and 120 miles north of Shanghai, in the province of Jiangsu. Although the 1984 sample is nationally representative and the 2006 sample is regionally representative, the two samples are still comparable. Not only is the Jintan sample drawn from city, town, and village populations, but the demographics of Jiangsu are similar to those found on the national level (e.g., sex ratio, proportion of population living in urban or rural areas, ethnic majority) (All China Data Center, n.d.). Institutional Review Board approval was obtained from the University of Pennsylvania and the ethical committee for research at Jintan Hospital in China. Further information regarding the subjects, recruitment, and setting are described in Liu, McCauley, Zhao, Zhang, and Pinto-Martin (2010) and in Liu and Lynn (2011).

3. Results

Table 1 gives the mean scaled scores and standard deviations of the 1984 and the 2006 samples on the ten subtests, as well as for the Verbal, Performance, and Full Scale scores. The right hand columns give the differences between the two samples expressed as *ds* (standard deviation units), and t values for the statistical significance of the differences in the scores obtained in the two samples. It will be noted that the 2006 sample obtained significantly higher Verbal, Performance, and Full Scale scores than the 1984 sample, although this advantage was not present in all of the subtests.

Table 1
Mean scaled scores of 1984 and 2006 samples.

Test	1984		2006		d	t
	Mean	SD	Mean	SD		
Information	9.86	3.16	10.64	2.76	0.26	6.97***
Vocabulary	9.88	2.98	10.51	2.65	0.22	5.92***
Math	10.20	3.08	11.01	2.70	0.28	7.41***
Similarities	10.12	3.02	9.79	3.00	−0.11	−2.88**
Comprehension	10.01	3.15	10.78	2.95	0.25	6.66***
Animal-house	9.96	3.04	11.52	2.93	0.52	13.75***
Picture-completion	9.98	3.05	9.97	3.30	−0.003	−0.08*
Maze	10.03	3.12	11.80	3.33	0.55	14.32***
Geometric design	9.89	3.08	10.54	2.62	0.23	6.04***
Block-design	10.25	3.33	8.91	2.97	−0.43	−11.24***
Verbal scaled scores	49.97	11.33	52.72	10.53	0.25	6.64***
Performance scaled scores	50.13	10.63	52.74	9.99	0.25	6.67***
Full scaled scores	100.08	19.44	105.46	17.78	0.29	7.63***

d = the difference between the 2 means divided by the average sd.
t = the value of t as a test of the significance between the two means.
*** p<0.001.
** p<0.01.
* p<0.05.

Table 2 gives the mean IQ scores between the 1984 norm sample and 2006 sample. Comparing the two samples, significant increases of 4.27, 4.08, and 4.53 IQ points can be observed for Verbal, Performance, and Full scale scores, respectively.

Table 3 gives the mean IQs of the boys and girls in the two samples. It will be seen boys obtained slightly higher mean IQs than girls in both samples, and that comparable gains from 1984 to 2006 were obtained by both boys and girls.

For the 2006 sample, correlation matrices of subtests and VIQ, PIQ, and FIQ are provided in Tables 4 and 5. Since it was not included in previously published data, this information could not be presented for the 1984 sample.

4. Discussion

The present study compared 2006 WPPSI-R test scores of a sample of Chinese children aged 5–6 years with those of same-age children obtained in the 1984 Chinese

Table 2
Comparing VIQ and PIQ and FIQ with that of norms.

	1984		2006		d	t
	Mean	SD	Mean	SD		
Verbal IQ	99.85	14.32	104.12	14.85	0.29	7.66***
Perform IQ	100.40	14.67	104.48	14.93	0.28	7.22***
Full scale IQ	99.99	14.07	104.52	14.35	0.32	8.35***

d = the difference between the 2 means divided by the average sd.
t = the value of t as a test of the significance between the two means.
*** p<0.001.