Intelligence 68 (2018) 82–86

Contents lists available at ScienceDirect

Intelligence

journal homepage: www.elsevier.com/locate/intell

A Flynn Effect in Khartoum, the Sudanese capital, 2004–2016

Edward Dutton[a], Salaheldin Farah Attallah Bakhiet[b,*], Habab Abdlahiy Osman[c], David Becker[d], Yossry Ahmed Sayed Essa[b], Tahani Abdulrahman Muhammad Blahmar[b], Richard Lynn[e], Sultan Mohammed Hakami[b]

[a] Ulster Institute for Social Research, London, UK
[b] King Saud University, Department of Special Education, College of Education, Riyadh, Saudi Arabia
[c] Tabuk University, Tabuk, Saudi Arabia
[d] Department of Psychology, Chemnitz University of Technology, Germany
[e] University of Ulster, Coleraine, UK

ARTICLE INFO

Keywords:
Colored progressive matrices
Sudan
Intelligence
Flynn effect

ABSTRACT

Three recent studies have summarized evidence for Negative Flynn Effects (Dutton et al., 2016; Flynn & Shayer, 2018; Woodley of Menie, Peñaherrera-Aguirre, Fernandes, and Figueredo, 2017), that is secular deceases in IQ scores. To develop this important line of research, as many instances of this effect must be reported and understood as possible. Dutton, Bakhiet, Ziada, Essa, and Blahmar (2017) reported, in *Intelligence*, a Negative Flynn Effect in Khartoum, where education was voluntary for some cohorts. This study reports an increase in IQ, as assessed by the Colored Progressive Matrices, in Khartoum between 2004 and 2016. The increase in IQ amounted to 8 to 13 points, based on assessments of children between the ages of 6 and 9. Thus, the original negative Flynn Effect reflected schooling not being compulsory for some of the earlier sample.

1. Introduction

The Flynn Effect (e.g. Flynn, 2012) refers to the secular increase in IQ scores reported across the twentieth century, amounting to an increase of roughly 3 points per decade. This effect has been found to have occurred to the greatest extent on the less *g*-loaded subtests (e.g. te Nijenhuis & Van der Flier, 2013). Since the late 1990s, a Negative Flynn Effect has been being reported in European countries, amounting to an average IQ loss of 2.44 points per decade (see Dutton, Van der Linden, & Lynn, 2016). Woodley of Menie, Peñaherrera-Aguirre, Fernandes, and Figueredo (2017) have systematically analyzed the negative Flynn Effect and have found that it is greatest when the aggregate *g*-loading of the indicator class is lowest. Three recent studies have summarized evidence for Negative Flynn Effects (Dutton et al., 2016; Flynn & Shayer, 2018; Woodley of Menie, Peñaherrera-Aguirre, et al., 2017), two of them in *Intelligence*. To develop this important line of research as many instances of this effect must be reported and understood as possible.

Accordingly, where previous studies showing a Negative Flynn Effect have been reported and then are not replicated it is vital that this is disseminated to researchers in this area. In this regard, Dutton, Bakhiet, Ziada, Essa, and Blahmar (2017) found a Negative Flynn Effect, between 1999 and 2010, among children in Khartoum aged between 9 and 18, amounting to a loss of 2.13 IQ points per decade. They argued that both Kuwait (Dutton, Bakhiet, Essa, Blahmar, & Hakami, 2017) and Sudan has adopted a strongly religious curriculum and age and time related variation in the intensity of this paralleled age and cohort variation in the Negative Flynn Effect. In the case of Khartoum, they argued that this may also explain why the Negative Flynn Effect was stronger among school children aged 6, but then weakened. However, another explanation which they proposed was that compulsory schooling was only introduced in Sudan[1] *after* data were collected from the first sample in 1999. This could, of course, be cleared-up by comparing datasets which were both administered in a context of compulsory schooling. This would allow us to establish whether or not there really is a Negative Flynn Effect in Khartoum. This is what we will do in this extension of Dutton, Bakhiet, Ziada, et al. (2017). This is clearly important in permitting future meta-analyses of the Negative

* Corresponding author.
E-mail addresses: bakhiet@ksu.edu.sa (S.F.A. Bakhiet), h-othman@ut.edu.sa (H.A. Osman), david.becker@s2009.tu-chemnitz.de (D. Becker), ysayed@ksu.edu.sa (Y.A.S. Essa), tbalahmar@ksu.edu.sa (T.A.M. Blahmar).

[1] It should be noted that "Sudan" refers to the Republic of Sudan. This is now only the northern part of the Sudan, of which the capital is Khartoum. The southern part broke away from the old Republic of Sudan in 2011 to form "South Sudan," the capital of which is Juba. Sudan is predominantly Sunni Muslim and Arab or Arab-African cline while South Sudan is mainly Christian or animist and Sub-Saharan African.

https://doi.org/10.1016/j.intell.2018.03.007
Received 15 January 2018; Received in revised form 9 March 2018; Accepted 14 March 2018
0160-2896/ © 2018 Elsevier Inc. All rights reserved.

Flynn Effect and in understanding the factors which might lead to it, including sampling errors, in different parts of the world.

2. Method

The Colored Progressive Matrices (Raven, 2008), a non-verbal reasoning test aimed primarily at children, was administered in 2004 to a sample of 1683 children aged between 6 and 9 years in Khartoum, the capital of Sudan. They were selected by the stratified sampling method to be representative of public and private schools and socio-economic status variation within the city. Stratified sampling is a type of sampling method in which the total population is divided into smaller groups or strata to complete the sampling process. The strata are formed based on common characteristics in the population data. After dividing the population into strata, the researcher randomly selects the sample proportionally. The classes we used in the current sample of 2016 are: by sex, by age, and by socio-economic level based on parental income (very low, low, medium, high). This matched the stratification of the 2004 sample. The children were group tested in classes in their schools by trained psychologists. This administration has been published in Arabic in Khatib, Mutwakkil, and Hussain (2006) and an English-language summary was presented in Bakhiet and Lynn (2014). In 2016, a similar study was carried out in Khartoum, using the same stratified sampling method, on a sample of 3015 children of comparable ages. This was conducted by three of the authors.

For the purpose of cross-national comparability we used British norms from 2007 (Raven, 2008, Table A1) to convert raw scores into IQ scores, but these norms are designed for use on individuals who can only have integer scores. Rounding fractional parts of raw-scores can lead to distortions. For this reason we created third order polynomial functions which describe the relationship between raw and IQ-scores within an age group with an accuracy of > 0.99 and used these functions for conversions (see Supplementary material for more detailed description). The advantage is an increase in the accuracy level of the conversions.

3. Results

Descriptive statistics and sex differences for CPM raw-scores are given in Table 1 separately for 2004 and 2016. In 2004, sex differences are mostly in favor of males (pos.) except in the group composed of seven years olds. Effect sizes are small with absolute Cohen's *d* between 0.16 and 0.31 but with a high significance in *t*-test for the total sample ($p < 0.001$). In 2016, sex differences are in favor of females (neg.), except in the group of six years olds, and effect sizes are non-significant to small with absolute Cohen's *d* between 0.05 and 0.20 but with a high significance on the *t*-test for the total sample ($p < 0.001$).

The changes in means and standard deviations of sex differences in CPM raw-scores between 2004 and 2016 are given in Table 2. A decrease of sex differences in all age groups due to a stronger increase in raw-scores for females than males (+4.90 vs. 2.92 in total samples) is recognizable. There is a robust increase in raw-scores from 2004 to 2016 across both sexes and all age groups with a moderate to strong effect size and moderate to high significance. The sample from 2016 shows consistently larger standard deviations with mostly highly significant differences to those from the 2004 sample, except for six and nine years old males.

Means of 2004 and 2016 as well as sex- and time-differences are given in Table 3 in British IQ scores according to the norms of 2007. The biggest sex differences are found among the seven years olds in 2004, with a difference of 3.67 IQ points in favor of males, and in 2016, with a difference of 4.18 in favor of females. By comparing sexes without separating them by age group, there was a sex-difference in 2004 of 2.75 points in favor of males but in 2016 of 2.43 points in favor of females. There was an increase in IQ scores, between 2004 and 2016, of 10.10 points (0.84 per year, 8.4 points per decade) for both sexes 7.52 (0.63 per year) for males only and 12.70 (1.06) for females. The strongest Flynn Effect could be found for nine years old females with an increase of 18.08 points (1.54 per year) and among the total cohort of nine year olds with an increase of 16.46 (1.37 per year), but these numbers must be taken with caution because of raw scores below the 1st British percentile, where CPM loses reliability. More credible top Flynn Effects are among the seven year olds with an increase of 11.82 (0.99 per year) for males and 8.91 (0.74 per year) for females. By contrast, the Flynn Effect markedly increases with age among girls and is stronger among girls than boys, apart from among 7 year olds, where the Flynn Effect appears to be anomalously high among boys.

4. Discussion

As noted above, the mean of the eight gains is .62*d*, equivalent to 10.10 IQ points over the twelve years and 8.42 IQ points per decade. Clearly, this is a very large effect and it may be wondered whether it is a result of measurement error. However, the average per decade Flynn Effect across the twentieth century is generally calculated using tests such as WAIS. Gains commensurate with that which we have observed have been found on Progressive Matrices tests. For example, between 1982 and 2007, the CPM score of a representative sample of British 8 year olds rose by 14.53 points (Flynn, 2012, p. 197). This amounts to an increase of 5.8 points in a decade.

As discussed, in Dutton, Bakhiet, Ziada, et al. (2017) a negative Flynn Effect was reported in a representative Khartoum sample of 9 to 18 year olds. They also found noticeable differences in the intensity of the effect by age-group. The possible explanations which they presented were: a negative intelligence-fertility nexus in Sudan, internal migration from the war torn parts of the country, age-group differences in the intensity of Sudan's "Muslim Curriculum" (a possibility broached in Flynn (2012) to explain anomalies in Sudan's Flynn Effect), and the fact

Table 1
Descriptive statistics and sex differences in raw-scores for CPM from Khartoum in 2004 and 2016.

Age (y)	Sex	2004						2016					
		N	*M*	*SD*	Dif. (m-f)	*D*	*T*	*N*	*M*	*SD*	Dif. (m-f)	*d*	*T*
6	M	92	13.50	5.30	1.00	0.21	−1.65	305	15.60	5.50	0.50	0.09	−1.07
	F	167	12.50	4.30				269	15.10	5.70			
7	M	167	13.00	4.80	−1.20	−0.26	2.65**	284	17.20	6.20	−0.30	−0.05	0.58
	F	293	14.20	4.60				294	17.50	6.20			
8	M	286	16.10	5.80	0.90	0.16	−2.00*	368	18.60	6.90	−1.40	−0.20	2.84**
	F	366	15.20	5.60				431	20.00	7.00			
9	M	183	17.60	7.30	2.10	0.32	−2.70**	505	20.50	7.40	−1.40	−0.19	3.04**
	F	129	15.50	5.90				559	21.90	7.60			
6–9	M	728	15.44	5.70	0.98	0.18	−3.69***	1462	18.36	6.92	−1.00	−0.14	3.86***
	F	955	14.46	5.10				1553	19.36	7.33			

m = male; f = female; *d* = Cohen's *d* for sex differences; *T* = *t*-values for sex differences; Significance (two-tailed): *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Download English Version:

https://daneshyari.com/en/article/7292818

Download Persian Version:

https://daneshyari.com/article/7292818

Daneshyari.com