A Jensen effect on dysgenic fertility: An analysis involving the National Longitudinal Survey of Youth

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ABSTRACT

In this study we attempt to determine whether dysgenic fertility is associated with the Jensen effect. This is investigated with respect to a US population representative sample of 8110 individuals from the National Longitudinal Survey of Youth for whom there exists complete data on IQ and fertility. In addition to the general sample, the sample was also broken out by race and sex so as to examine whether or not the Jensen effect manifested amongst different sub-populations. The method of correlated vectors revealed significant Jensen effects in five of the seven samples, and in all cases the effect was in a direction indicating that subtests with higher g-loadings were associated with larger dysgenic fertility gradients. The magnitude of the difference between Spearman's ρ and Pearson's r was non-significant in all cases, suggesting that biasing factors were minimally influencing the result. This finding suggests that dysgenesis occurs on the 'genetic g' at the heart of the Jensen effect nexus, unlike the Flynn effect, which is 'hollow' with respect to g. Finally, the finding is discussed in the context of two converging lines of evidence indicating that genotypic IQ or 'genetic g' really has been declining over the last century.

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1. Introduction

1.1. The Jensen effect

The Jensen effect is a term first coined by Rushton (1998) to describe Arthur Jensen's finding that the vector (rank of the effect magnitude) of many biologically significant variables typically correlates both positively and significantly with the vector of subtest g-loadings. In other words the Jensen effect results from the tendency for subtests exhibiting the highest g-loadings to be best at discriminating amongst individual differences in biological variables. Jensen's (1998) method of correlated vectors has its origins in the work of Spearman (1927), who proposed what became known as Spearman's hypothesis, namely that Black–White differences would be most pronounced on tests that are the strongest measures of g. Recently Spearman's hypothesis has been rebranded as the Spearman–Jensen hypothesis, owing to Jensen's development of the method of correlated vectors (Rushton, 1998). Consistent with the hypothesis, a number of studies have found large and significant Jensen effects on Black–White differences (see Rushton & Jensen, 2010 for an overview). The nomological net of biological variables for which Jensen effects are known to exist is very broad, and includes inbreeding depression scores, evoked potentials,

brain pH, reaction times, test heritabilities (Jensen, 1998; van Bloois, Geutjes, te Nijenhuis, & de Pater, 2009), fluctuating asymmetry (Prokosch, Yeo, & Miller, 2005), brain size (Rushton & Ankney, 2009), and sex differences (Nyborg, 2005) amongst others.

Even though it is not without its detractors (e.g. Ashton & Lee, 2005), the existence of the Jensen effect would appear to have significant ramifications. Firstly it effectively falsifies Thomsonite models of the development of intelligence (e.g. Bartholomew, Deary, & Lawn, 2009; Thomson, 1916; van der Maas et al., 2006), which argue that g arises chiefly from random sampling or mutualistic reinforcement amongst distinct 'neural elements' or bonds, rather than from the existence of a special quality or 'mental energy', as was first posited by Spearman (1927). This is because the Jensen effect reveals the existence of an apparent nexus amongst diverse biological variables and g, which suggests that the factor corresponds to something very fundamental to brain neurophysiology and genetics, rather than being a mere statistical regularity (Eysenck, 1987; Rushton & Jensen, 2010). Secondly, it permits the 'hollowness' (i.e. the degree to which differences are most pronounced on non-g variance rather than g variance) of important phenomena like the Flynn effect to be determined. Debate has raged about whether or not the Flynn effect occurs on g (see Wicherts et al., 2004 and Woodley, 2011a for summaries). The most comprehensive study to date is that of te Nijenhuis (in press), who has determined, based on a comparison of studies from the Netherlands and the US, that the Flynn effect is 'hollow', as its

effect magnitude is typically slightly negatively correlated with subtest g-loadedness. Other apparently 'hollow' effects include, Spearman's Law of Diminishing Returns (Jensen, 2003) and IQ gains due to the effects of retesting (te Nijenhuis, van Vianen, & van der Flier, 2007).

1.2. Dysgenic fertility

The correlation of IQ and its proxies with fertility has been consistently negative since testing began (Lynn, 2011; van Court & Bean, 1985). The existence of this negative correlation had been intuited by Galton (1869) in the 1860's. Furthermore in the modern world, the negative correlation appears to be global in extent, existing both within (Meisenberg, 2008) and between countries (Lynn, 2011; Lynn & Harvey, 2008; Meisenberg, 2009; Reeve, 2009). This dysgenic effect, as it became known, has been a considerable source of debate, not least of all because of the existence of the countervailing Flynn effect, which confounded even the earliest attempts to directly quantify it (Lynn, 2011). Even though there has been much speculation about the likely impact of dysgenics on populations (e.g. Cattell, 1936, 1937, 1991; Itzkoff, 2003; Nyborg, 2012), until recently there has been no concrete evidence of such an impact. The first substantive evidence has been found using temporal correlation analysis (Woodley, 2012a), in which Western genotypic IQ means were reconstructed from 1455 to 2005 based on the assumption that they trended in the same direction as the status-fertility correlation, i.e. positively until the mid 1800's and then negatively afterwards (Skirbekk, 2008). This reconstructed genotypic IQ measure was found to be the strongest predictor of technological and scientific innovation rates, which trend in a similar manner, with peak per capita innovation rates having occurred in the 1870's, followed by a sharp decline (Huebner, 2005). In the study the Flynn effect was reconstructed for previous centuries based on the idea that its rise was relatively shallow up until the beginning of the 20th century, at which point it rose very sharply (three points per decade) and then stagnated after 2000 (Meisenberg, Lawless, Lambert, & Newton, 2005). The Flynn effect estimates correlated very strongly with historical estimates of the growth in GDP (PPP) per capita, and in regression a composite measure of these had a strongly inverse relationship with a combined measure of illiteracy and homicide. These findings were interpreted on the basis that genotypic IQ most strongly corresponds with the 'genetic g' at the heart of the nomological net of the Jensen effect. As the Flynn effect gains are 'hollow' with respect to g, it is argued that these occur on subfactor specific sources of variance, which are free to vary independently of g. The negative impact of homicide and illiteracy on the Flynn effect was taken to indicate a contribution from improved environmental conditions, consistent with the life history model proposed in Woodley (2011a, b; 2012b).

Thus far no study has attempted to directly determine if there is a Jensen effect on dysgenic fertility differentials, however the studies of Meisenberg (2010) and Meisenberg and Kaul (2010) have both found evidence that dysgenic fertility differentials might be associated with the effect. In both studies, dysgenics was investigated with respect to fertility differentials on the various subtests of the Armed Services Vocational Aptitude Battery (ASVAB), which is the principal cognitive ability battery used in the National Longitudinal Survey of Youth (NLSY). The ASVAB has good criterion validity, and formed the backbone of Herrnstein and Murray's (1994) comprehensive analysis of the social correlates of g. In Meisenberg (2010) a sample-wide dysgenesis rate of .8 of a point of genotypic IQ per generation was inferred based on the assumption that regression to the mean was to the sample mean. Meisenberg and Kaul (2010) stratified the NLSY based on race and sex and used race-specific means instead of the sample mean. They found a dys-

genesis rate of about .4 points per generation for the White cohort, .8 points for the Black cohort and 1.2 points for the Hispanic cohort. In both studies and across racial groups the gradient of dysgenic fertility was found to be most pronounced amongst females and also on g rather than the individual subtests. This finding strongly hints at a Jensen effect on dysgenic fertility, which would be significant as it implies that dysgenics is part of the genetic nexus of the Jensen effect, and (in line with the suggestion made in Woodley (2011a, 2012a, b) occurs on 'genetic g'. For the first time, the hypothesis that dysgenic fertility is associated with the Jensen effect will be explicitly tested.

2. Methods

Following the protocol in Meisenberg (2010) data were collected from the NLSY79 for all 8110 cases which had information on fertility and intelligence. The subjects were aged 14–22 at the inception of the study in 1979.

2.1. Cognitive ability measures

The ASVAB was administered in 1980. The ASVAB includes five academic tests (science, arithmetic, word knowledge, paragraph comprehension, mathematics knowledge), three vocational tests (auto & shop info, mechanical comprehension, electronics info), and two speeded tests (numerical operations, coding speed). The scores of each subtest were age-adjusted separately for race and sex. The g-factor was extracted from these age-adjusted test scores as the unrotated first factor of a maximum-likelihood factor analysis.

2.2. Dysgenic fertility gradient

For 7439 subjects the self-reported number of children was known for 2008. For those who were not interviewed in 2008, responses from the 2006, 2004, or 2002 interviews were used instead. Thus the sample has completed or nearly completed fertility. To calculate the gradient of dysgenic fertility each subtest was correlated with the total number of children.

2.3. Vector correlations

Spearman's rank correlation and Pearson's product moment correlation were both used (in SPSS) to determine the correlated vector correlation between the magnitude of test g-loading and the magnitude of the dysgenic fertility gradient. The N equals the number of ASVAB subtests (10). Fisher's r-to-z transformation was used to determine whether the two methods produced significantly different magnitude results which would indicate the existence of biasing factors (Nyborg, 2005). The NLSY data were also broken out along race and sex lines, following the protocol of Meisenberg and Kaul (2010) so as to determine whether the Jensen effect exists within these categories. The sample sizes for each of the sub-populations are as follows: White males N = 2039, White females N = 2102, Black males N = 1224, Black females N = 1258, Hispanic males N = 617 and Hispanic females N = 648.

3. Results

Table 1 reveals significant Jensen effects (where the P value for Spearman's ρ is <.05) on dysgenic fertility for White males, White females, Black females and Hispanic males, but not for Black males and Hispanic females. Despite this in all instances the vector correlation trends in the expected positive direction.

Table 1
ASVAB subtests along with their respective g-loadings and dysgenic fertility gradients for the whole of the NLSY sample (N = 8110), White males (N = 2039), White females (N = 2102), Black males (N = 1224), Black females (N = 1258), Hispanic males (N = 617) and Hispanic females (N = 648).

ASVAB subtest	Subtest g-loading (whole sample)	Dysgenic fertility (whole sample)	Subtest g-loading (White males)	Dysgenic fertility (White males)	Subtest g-loading (White females)	Dysgenic fertility (White females)	Subtest g-loading (Black males)	Dysgenic fertility (Black males)	Subtest g-loading (Black females)	Dysgenic fertility (Black females)	Subtest g-loading (Hispanic males)	Dysgenic fertility (Hispanic males)	Subtest g-loading (Hispanic females)	Dysgenic fertility (Hispanic females)
Science	.916	−.147	.895	.000	.860	−.062	.879	−.015	.854	−.196	.906	−.165	.893	−.302
Arithmetic	.857	−.103	.845	.036	.850	−.038	.781	−.008	.737	−.160	.804	−.124	.814	−.195
Word knowledge	.911	−.192	.899	−.005	.877	−.094	.912	−.012	.912	−.202	.912	−.172	.910	−.322
Paragraph comprehension	.846	−.131	.850	.012	.799	−.050	.851	−.031	.852	−.173	.869	−.167	.871	−.292
Numerical operations	.723	−.086	.700	.050	.647	−.036	.700	.055	.696	−.175	.721	−.072	.702	−.211
Coding speed	.655	−.074	.641	.051	.548	.004	.639	.036	.613	−.162	.682	−.070	.669	−.231
Auto–shop information	.727	−.105	.645	.048	.616	−.042	.715	.045	.561	−.130	.760	−.106	.718	−.202
2–39 Math knowledge	.836	−.130	.833	.005	.834	−.057	.766	−.052	.793	−.222	.808	−.171	.811	−.241
Mechanical comprehension	.804	−.097	.780	.046	.740	−.039	.732	.056	.831	−.062	.807	−.140	.720	−.195
Electronic information	.847	−.127	.823	.017	.750	−.056	.797	−.015	.668	−.102	.862	−.210	.783	−.189
Spearman's ρ	.806**		.927**		.758*		.619 (ns)		.806**		.855**		.547 (ns)	
Pearson's r	.890**		.865**		.783**		.665*		.788**		.871**		.768**	

* $P < .05$.
** $P < .01$.

A difference in the magnitude of Spearman's ρ (the generally preferred indicator of a Jensen effect) and Pearson's r favoring the latter suggests that outliers or peculiarities associated with either the subtest g-loadings or the dysgenic fertility magnitudes might be biasing the results (Nyborg, 2005). The differences are generally small however (with the biggest being .221 in the case of Hispanic females and the smallest being .016 in the case of Hispanic males), and are non-significant in all cases, which suggests that bias is minimal.

4. Discussion

It appears that dysgenic fertility is indeed a Jensen effect. Not only is the effect significant in the majority of cases (five out of the seven analyses – in all cases the effect trends in the expected positive direction) but its effect magnitude is relatively large and is on a par with other variables for which Jensen effects have been recorded (e.g. Jensen, 1998; Rushton & Jensen, 2010). This finding using a large and representative sample of the US population, along with subpopulations and a well validated measure of intelligence, therefore allows us to place dysgenic fertility into the genetic nexus of the Jensen effect.

The White males exhibit the least dysgenic fertility of all groups examined, with fertility differentials being positive in most cases. It must be noted however that the abilities with respect to which the White males are apparently in 'eugenic' fertility are the ones exhibiting lower g-loadings. Hence, even for this group the tendency is for fertility to be depressed on highly g-loaded abilities.

The results of this study help to contextualize other findings in the literature, which have thus far not been discussed in relation to dysgenesis. Silverman (2010), for example, has found that visual reaction time has increased substantially since Galton first started measuring it between 1884 and 1893. In Galton's measures, reaction time means were .183 s for men (N = 2522) and .187 for women (N = 302). Silverman demonstrates that Galton's measures were typical of his era with reference to reviews of reaction time studies from 1911 (which did not include Galton's studies), in which reaction times ranged from .151 to .200 s, with a median of .192.

Silverman's review of twelve modern (post 1941) reaction time studies reveals a substantially longer mean for both men (.250 s) and women (.277 s), with a combined sample size of 3836. Silverman concludes that in 11 of the 12 studies and in 19 of the 20 comparisons, as well as in his meta-analysis, the differences in reaction time means between Galton's estimates and modern estimates are statistically significant. Silverman speculates that these findings might result from increased exposure to neurotoxins. An alternative hypothesis is that because dysgenic fertility and reaction times are both part of the genetic nexus of 'genetic g', dysgenic fertility is prolonging reaction time in addition to reducing g. This would make Silverman's finding strong evidence that genotypic IQ ('genetic g') really has been in decline since the last decades of the 19th century.

Another issue that our finding may shed light upon is the apparent anti-Flynn effect on measures of crystallized intelligence (in particular crystallized knowledge), which has been observed in a number of countries, sometimes spanning multiple decades (e.g. Khaleefa, Sulman, & Lynn, 2008; Lynn, 2009; te Nijenhuis, in press; Wicherts et al., 2004). Declines in measures of crystallized intelligence typically solicit little commentary in the literature, as gains in measures of fluid intelligence usually swamp these losses (e.g. Khaleefa et al., 2008; Lynn, 2009; te Nijenhuis, in press; Wicherts et al., 2004). A handful of researchers have proposed that measures of crystallized intelligence might be superior measures of g relative to measures of fluid intelligence (Gignac, 2006; Gregory, 1999;

Matarazzo, 1972; Robinson, 1999). Consistent with this is the finding that in head-to-head comparisons using a sufficiently broad array of intelligence measures, measures of fluid intelligence (such as Ravens matrices) have been found to be substantively less g-loaded than measures of crystallized knowledge (such as vocabulary, see Johnson, Bouchard, Krueger, McGue, & Gottesman, 2004). Furthermore Miller (2000a) has argued that crystallized knowledge (such as vocabulary) is likely to have been (and still is) a very significant indicator of general fitness (underlying genetic quality), which might therefore account for its relatively high g-loading, as Miller has also argued that the positive manifold results from the effects of pleiotropic mutations which in abundance would lower both g and general fitness (Miller, 2000b, c). The observations of multi-decadal declines in crystallized knowledge might therefore relate to dysgenic fertility via the genetic nexus as both anti-Flynn effects and dysgenic fertility concern subtests exhibiting high g-loadings.

The finding of a Jensen effect on dysgenic fertility is significant to future research, as in light of the aforementioned findings it strongly suggests that 'genetic g' really has been in decline since the end of the 19th century. This reinforces the significance of the idea that changing genotypic IQ has had real world impacts on important factors such as the rates of scientific and technological innovation amongst Western populations (Woodley, 2012a).

Acknowledgments

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