Pergamon

0191-8869(95)00050-X

Person. individ. Diff. Vol. 19, No. 3, pp. 345–353, 1995

0191-8869/95 $9.50 + 0.00

LACK OF RACIAL DIFFERENCES IN BEHAVIOR: A QUANTITATIVE REPLICATION OF RUSHTON'S (1988) REVIEW AND AN INDEPENDENT META-ANALYSIS

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(Received 27 October 1994)

Summary—Rushton (*Personality and Individual Differences, 9*, 1009–1024, 1988) hypothesized that racial group differences exist across a range of behaviors from intelligence to social organization. Such differences were then discussed within the context of an evolutionary continuum (Negroid < Caucasoid < Mongoloid). For example, his observations that blacks compared to whites are less intelligent, physically mature more rapidly, and are more aggressive and impulsive (less law abiding) were said to support the evolutionary hypothesis. Quantitative replication of the 100 studies included in Rushton's original 'review and evolutionary analysis' and a meta-analysis of 100 randomly selected studies infer that any behavioral differences which do exist between blacks, whites and Asian Americans for example, can be explained *in toto* by environmental differences which exist between them.

INTRODUCTION

Six years ago Rushton (1988) hypothesized that racial group differences exist on brain size and intelligence (e.g. brain weight and test scores), maturation rate (gestation time and skeletal development), personality and temperament (aggressiveness and impulsivity), sexuality (size of genitalia and permissive attitudes) and social organization (marital stability and mental health). The between-group differences which he observed were then discussed in an evolutionary context, specifically, differential K theory—along the r/K continuum of reproductive strategies (e.g. from single cell animals to humans), K-selection essentially maximizes parental care and minimizes birthrate. Rushton further suggested that the races can be described along a continuum from relatively less to greater K-selection, that is, Negroid < Caucasoid < Mongoloid. His observations that Negroids compared to Caucasoids for example, are less intelligent, physically mature more rapidly, are more aggressive and impulsive (less law abiding) and less mentally healthy were said to support the evolutionary hypothesis.

Needless to say, Rushton's contentions caused quite a stir in the professional press. A search of the *Psychological Abstracts* data base on the key word Rushton (1988–1994) for example, found 34 papers which included some element of debate between Rushton and others: all of them cite Rushton's (1988) 'review and evolutionary analysis' paper (see References—Special Section A). This expansive (135 reference citations covering approx. 50 years of research in this field) qualitative review, which has been a cornerstone in Rushton's theorizing, has been criticized on a number of methodologic and theoretical grounds. The central arguments though have concerned bias in selection of primary studies for inclusion in the review as well as the inadequacy of its accounting for environment-related alternative explanations, specifically, socioeconomic ones (Cunningham & Barbee, 1991; Lynn, 1989a, b; Zuckerman & Brody, 1988). This study will provide an interpretive adjunct to Rushton's (1988) original analysis by means of a quantitative replication of it.

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METHOD

Rushton's (1988) sample of studies

Rushton cited 100 references in the five subsections or behavioral domains (brain size and intelligence, maturation rate, personality and temperament, sexual restraint, and social organization) of the 'Results' section of his original review (1988): 67 independent studies and 33 reviews. A scale-free metric—the *r*-index—which is interpretable as Pearson's linear correlation coefficient and estimates the strength of the race-behavior association, was calculated for each independent study which provided sufficient data (Cooper, 1989; Glass, McGaw & Smith, 1981): 36 (53.7%) reported data which allowed for such effect size estimation (see References—Special Section B). Pearson's *r* is calculable from a variety of outcome statistics (*t*-test, *F*-ratio, χ^2, *P*-level with *n*s, and group *M*s with SDs), and thus allows for ease of across-study comparison and summary.

Analysis. Effect sizes were averaged (mean) across operational measures within behavioral domains, for example, three measures of intelligence reported in an original study would be averaged to produce one review outcome. However, if a study reported findings for two separate behavioral domains or if it made two different racial comparisons (e.g. Caucasoid–Negroid and Ca–Mongoloid), both outcomes were included in this review: 40 outcomes arose from the 36 studies. Next, *r*-indexes were averaged within each behavioral domain and racial comparison and the significance of each was estimated by the method of combining unweighted probabilities (Rosenthal, 1978; Stouffer, Suchman & DeVinney, 1949). Among the 36 studies included in this analysis, sample size (*n*) was not found to be associated with effect size, so the across-study combined probability was not weighted by individual study' sample size.

Random sample of studies

Because the validity of Rushton's procedures for study selection has been questioned, a random sample of studies was included in this quantitative review. From a meta-analytic perspective, they may be thought of as the comparison group. Computer searches were conducted of available data bases (1965–1994—*Dialog, Educational Resources Information Catalogue (ERIC), Medline, Psychological* and *Sociological Abstracts*) using the same broad conceptual subject key word scheme as Rushton (1988, see Table 1): 1614 manuscripts were retrieved from which a sample of 100 were randomly selected—80 independent studies and 20 reviews. Of the independent studies, 65 (81.3%) reported data which was sufficient for effect size estimation (see References—Special Section C). These 65 studies produced 73 outcomes which were analyzed in the same manner as Rushton's sample of studies.

One further methodological caveat ought to be discussed briefly. These authors will use the racial group terminology of black, white and Asian as synonyms for Rushton's preferred terms of Negroid, Caucasoid and Mongoloid, respectively. This usage is consistent with nearly all of the studies in this field, except those published by Rushton.

RESULTS

Sample description

The vast majority (88.1%) of this review's primary studies used U.S. *S*s only and the Rushton and random samples do not differ on this score. The Rushton sample (1976.9) does however, pre-date the random one (1984.2) by nearly a decade on average publication date; $F(1, 99) = 23.80$, $P < 0.001$. Also, nearly all of the research designs ($> 90.0\%$) among both of the samples of studies may be categorized as correlational or cross-sectional prevalence surveys. This is not surprising given the non-manipulative nature of the hypothesized independent variable, that is, race. Perhaps most important for the ultimate interpretation of this reviewed data, more than twice as many studies among the random sample as compared with Rushton's (46.2 vs 19.4%) used some method of socioeconomic adjustment (sample restriction, matching or mathematical modeling); χ^2 $(1) = 7.15$, $P < 0.01$. Relatedly, five of the studies included in Rushton's review (13.9%) were based upon inter-country comparisons (e.g. U.S. vs Japan or Nigeria) which may tend to overestimate the hypothesized race-behavior effect due to genetic variability by not accounting for between-country environmental

variability (five inter-country outcomes, $r^2 = 13.0\%$ vs 35 intra-country ones, $r^2 = 2.5\%$, $F(1, 38) = 8.42$, $P < 0.01$), whereas, only two of the randomly selected studies (3.1%) used such comparisons; χ^2 (1) = 4.18, $P < 0.05$.

The association of race with selected behavioral characteristics

A first scan of the overall summary findings outlined in the top half of Table 1 which concern the quantitative replication of Rushton's review would seem to lend credence to his original conclusion, that significant differences exist between the races across the five observed behavioral domains. Combined probabilities for domains with at least two study outcomes were all found to be significant in a statistical sense and also, it would seem, substantively. For example, average *r*s ranged from 0.134 (black–white sexuality comparison) to 0.226 (black–white intelligence comparison). Such effect sizes though may be interpreted to roughly mean that only 2–5% of the observed behavioral variability (r^2) may be accounted for by race, and the dominant cross-sectional design among the original primary studies does not allow for the inference that this is a genetic effect *per se*—environmental factors remain uncontrolled. This quantitative replication qualifies Rushton's original review findings in a number of other ways: (1) essentially no empirical data existed among Rushton's originally selected studies to support the notion that differences exist between racial groups on social organization (e.g. mental health or law abidingness)—only one non-significant study was represented among the sample; (2) personality and temperament inferences were also based upon what would seem to be very tentative empirical grounds—only two studies, one each black–white and Asian–white comparison, were reviewed, leaving selection bias a very potent alternative explanation; and (3) inferences which concern Asian–white comparisons were also based upon limited data—11 data points or study outcomes provided all of the information for hypothesis testing and theory development across the five observed behavioral domains.

As for the overall random or comparison review, it also found little to no evidence of race-personality/temperament or race-social organization associations (see bottom half of Table 1). Also, similar to Rushton's quantitatively replicated findings, little evidence was suggestive of Asian–white behavioral differences. Only one behavioral domain's combined probability, which itself was based upon a small sample of only three studies, was found to be statistically significant, that is, maturation. The other four domains were summarily not significant for Asian–white comparisons. Even among significant black–white behavioral comparisons, race was estimated to account for very little behavioral variability: sexuality (0.9%), maturation (1.6%) and intelligence (2.2%). A final overall caveat would tend to put caution into any theory which is built upon racial group differences: One-third of the outcomes from the randomly selected studies (27 of 73, 37.0%) were null or counter to Rushton's hypotheses.

Effect size estimates which are averaged across behavioral domains and racial comparisons and serve to compare Rushton's central quantitatively replicated review finding with these authors' random one are displayed in Table 2. As for the amount of overall behavioral variability which may be accounted for by race, the effect estimated by Rushton (3.4%) was found to be more than eight times the estimate based upon a random selection of studies (0.4%). Focusing upon this random review's finding, less than one half of one per cent of the behavioral variability was accounted for by race, and again, this is not necessarily a genetic effect; environmental factors, specifically, socioeconomic ones are as of yet unaccounted for in these analyses.

Adjustment for socioeconomic-related environmental factors. This section may serve as an interpretive adjunct for this review's overall findings as well as an examplary analog to the historical misinterpretation of the data in this field when socioeconomic factors are unaccounted for. For example, focusing upon the random sample of 23 studies related to the race-intelligence association, a cornerstone of Rushton's theorizing, the average effect (*r*, SD) was estimated to be much smaller among the 13 socioeconomic-adjusted outcomes (0.067, 0.138) as compared to the 10 unadjusted ones (0.203, 0.129); $F(1, 21) = 5.84$, $P < 0.05$. In fact, in terms of intelligence variability which may be accounted for by race (r^2, the unadjusted estimate (4.1%) was found to be 10 times the adjusted one (0.4%). It ought to be noted here that this very small effect, that is, that race accounts for less than one half of one per cent of intellectual variability, was estimated with very gross environmental adjustment. Only one parameter of the environment was accounted for (i.e. socioeconomic status),

Table 1. The association (*R*-index) of race with selected characteristics[a] in 36 studies reviewed by Rushton (1988) and 65 randomly selected studies: summary statistics

	Intelligence		Maturation		Personality and Temperament		Sexuality		Social Organization	
Statistics	Ca–Ne	Ca–Mo	Ca–Ne	Ca–Mo	Ca–Ne	Ca–Mo	Ca–Ne	Ca–Mo	Ca–Ne	Ca–Mo
Rushton's Sample										
n	8[b]	4[c]	12[d]	2[e]	1[f]	1[g]	8[h]	3[i]	1[j]	0
Minimum *r*	−0.06[k]	−0.26	0.00	0.09			−0.04	0.09		
Maximum *r*	0.38	0.38	0.49	0.36			0.32	0.19		
Mean *r*	0.226	0.167	0.176	0.225	0.370**	0.440*	0.134	0.137	0.010	
(Mean *r*)^2	0.051	0.028	0.031	0.051			0.018	0.019		
Combined *z*[l]	5.76***	3.29**	7.66***	3.50***			6.41***	4.10***		
Random Sample										
n	20[m]	3[n]	5[o]	3[p]	13[q]	2[r]	6[s]	0	20[t]	1[u]
Minimum *r*	−0.13	−0.12	0.00	0.04	−0.26	0.00	−0.19		−0.38	
Maximum *r*	0.35	0.15	0.28	0.28	0.22	0.10	0.26		0.32	
Mean *r*	0.147	−0.010	0.126	0.177	−0.019	0.050	0.093		−0.005	0.070*
(Mean *r*)^2	0.022	0.000	0.016	0.031	0.001	0.003	0.009		0.000	
Combined *z*[l]	5.11***	−0.95	3.64***	2.85**	−1.05	0.94	3.37***		−1.53	

Note: Ca, Caucasoid or white; Ne, Negroid or black; Mo, Mongoloid or Asian (e.g. Ca–Ne, Caucasoid vs Negroid group comparison).

[a] As selected by Rushton (1988).

[b] Buj, 1981; Ho *et al.*, 1980a, b, 1981; Jensen, 1980, 1985; Jensen & McGurk, 1987; Scarr *et al.*, 1983.

[c] Lynn, 1977, 1982; Misawa *et al.*, 1984; Scarr *et al.*, 1983.

[d] Bayley, 1965; Fujikura & Frochlich, 1966; Harlan *et al.*, 1979; Harlan *et al.*, 1980; Knobloch & Pasamanick, 1953; Niswander & Gordon, 1972; Olowe & Akinkugbe, 1978; Palinkas, 1984; Papiernik *et al.*, 1986; Rushton & Bogaert, 1987; Walters, 1967; Williams & Scott, 1953.

[e] Freedman & Freedman, 1969; Yu, 1986.

[f] Price & Miller, 1984.

[g] Freedman & Freedman, 1969.

[h] Fisher, 1980; Heltsley & Broderick, 1969; Johnson, 1978; Presser, 1978; Price & Miller, 1984; Reiss, 1967; Rushton & Bogaert, 1987; Sutker & Gilliard, 1970.

[i] Abramson & Imai-Marquez, 1982; Connor, 1975, 1976.

[j] Kessler & Neighbors, 1986.

[k] Negative effects are counter to Rushton's original hypotheses.

[l] Combined probability by method of adding zs. * $P < 0.05$, ** $P < 0.01$ and *** $P < 0.001$ (two-tailed).

[m] Angel, 1982; Boone, 1974; Elliott & Boeve, 1987; Entwisle & Alexander, 1990; Grubb, 1987; Harper & Mina, 1981; Johnston & Bolen, 1984; Kaufman, 1973; Kaufman *et al.*, 1988; Koenig & Mitchell, 1988; Kuhlman & Bieliauskas, 1976; Moran & Carter, 1991; Nichols & Watts, 1977; O'Leary *et al.*, 1991; Patterson *et al.*, 1990; Pinkett & Quay, 1987; Rychlak, 1975; Sewell, 1979; Taylor & Ziegler, 1987; Wellborn *et al.*, 1973.

[n] Chen *et al.*, 1982; Johnson *et al.*, 1983; Koenig & Mitchell, 1988.

[o] Brooke *et al.*, 1984; Capute *et al.*, 1985; Faix, 1982; Horon *et al.*, 1983; Munsick, 1987.

[p] Brooke *et al.*, 1984; Shu-fang & Wei-zhi, 1989; Yip *et al.*, 1991.

[q] Burger & Cross, 1979; Dura & Beck, 1986; Gillum *et al.*, 1984; Hamberger & Hastings, 1992; Harburg *et al.*, 1991; Johnson, 1989; Koblin *et al.*, 1990; Kuhlman & Bieliauskas, 1976; Kurtz & Zuckerman, 1978; Lowe & Hildman, 1972; Manning *et al.*, 1987; Oldroyd & Howell, 1977; Tashakkori, 1993.

[r] Takeuchi & Speechley, 1989; Yamamoto *et al.*, 1994.

[s] Chaning-Pearce & Solomon, 1987; Glenn & Weaver, 1979; Kozinetz, 1991; Pugh *et al.*, 1990; Steege & Jelorsek, 1982; Zelnik & Kanter, 1974.

[t] Bachman *et al.*, 1991; Comstock & Helsing, 1976; Costello *et al.*, 1973; Ewart & Kolodner, 1991; Fillenbaum *et al.*, 1990; Gibbs, 1982; Gillum *et al.*, 1984; Hobbs *et al.*, 1984; Howard, 1988; Lauer *et al.*, 1974; Lawrence & Brown, 1976; Lowe & Hildman, 1972; Mccreary & Padilla, 1977; Parker, 1988; Pinkett & Quay, 1987; Pugh *et al.*, 1990; Russell *et al.*, 1990; Schoenbach *et al.*, 1986; Teplin, 1990; Weissman *et al.*, 1987.

[u] Bachman *et al.*, 1991.

Table 2. The association of race with selected characteristics: overall effect sizes (*R*-Index) combined across study outcomes and domains by samples

Effect size statistics	Rushton's sample	Random sample
n	40	73
Mean r* (SD)	0.184 (0.159)	0.060 (0.154)
(Mean r)^2	0.034	0.004
Combined z	10.53†	4.17†

Note. Within both samples the average effect size was not found to differ signficantly by type of racial comparison (e.g. Ca—Ne v Ca—Mo), so they were combined for this analysis.
*Between-group comparison: $F(1,111) = 15.46$, $P < 0.001$.
†$P < 0.001$ (two-tailed).

and this factor was typically measured in an imprecise way, for example, a dichotomous measure of annual family income or personal educational achievement was used. So even this review's socioeconomic-adjusted estimate probably represents an overestimate of the truth in nature.

Finally, all of the study outcomes from both Rushton's original and this random review were summarized together. In terms of the behavioral variability which may be accounted for by race, the unadjusted estimate ($r^2 = 2.0\%$, $n = 42$) was again found to be 10 times the one adjusted for socioeconomic factors (0.2%, 71); $F(1, 111) = 9.75$, $P < 0.01$, and the combined probability of the average adjusted estimate was found to be not statistically significant ($z = 1.59$).

DISCUSSION

First, having provided some measure of control for potential selection bias in Rushton's (1988) original review and evolutionary analysis, this review, which was based upon a randomly selected sample of studies, found little evidence of the racial group behavioral differences upon which Rushton had based his theoretical analysis. Averaging across the five behavioral domains described by Rushton (intelligence, maturation, personality and temperament, sexuality, and social organization), an estimate of the amount of behavioral variability which may be accounted for by race among randomly selected studies (0.4%) was found to be a small fraction of the one based upon a quantitative replication of Rushton's original selected studies (3.4%). Next, some measure of review adjustment for a potentially potent alternative explanation, that is, the socioeconomic environment, was provided by comparing those outcomes from studies which used any such control procedure (sample restriction, matching or mathematical modeling) with those that did not. Using all of this review data from studies selected randomly as well as those selected by Rushton, the outcomes of socioeconomic-adjusted studies on average accounted for a very small proportional fraction of race-behavior variability (0.2%) as compared with unadjusted studies (2.0%). In fact, the combined probability that the summary estimate among studies adjusted for socioeconomic status (0.2%) could be explained by sampling error was greater than 5%—not statistically significant.

The results of this meta-analysis, which included a quantitative replication of Rushton's original review, would seem clearly to support the following notions: (1) that selection as well as the 'third variable' of the socioeconomic environment are potent confounders which were left uncontrolled for in Rushton's original analysis; and (2) after adjustment for them, none of the null hypotheses concerning race differences in behavior can be rejected. Any behavioral differences which do exist between blacks, whites and Asian Americans for example, can be explained *in toto* by environmental differences which exist between them. Since Rushton's original evolutionary analysis, specifically, the application of *K*-selection theory to human racial groups, was built upon the biased empirical notion that genetic differences exist which account for behavioral differences between the races, we believe it is now unequivocally clear that this theoretical house has not only faltered, but has crumbled to the ground—the foundation upon which it was built is not only unsound, but in a sense, it never existed.

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