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An examination of Rushton's theory of differences in penis length and circumference and *r-K* life history theory in 113 populations

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ABSTRACT

Rushton's (1985, 2000) *r-K* life history theory that Mongoloids are the most *K* evolved, Caucasoids somewhat less *K* evolved, and Negroids the least *K* evolved is examined and extended in an analysis of data for erect penis length and circumference in three new data sets. These new data extend Rushton's theory by presenting disaggregated data for penis size for European and North African/South Asian Caucasoids; for East Asian and Southeast Asian Mongoloids; for Inuit and Amerindians and Mestizos, and for thirteen mixed race samples. The results generally confirm and extend Rushton's *r-K* life history theory.

1. Introduction

J. Philippe Rushton (1985, 2000) has advanced a theory of race differences in *r-K* life history. The theory is drawn from biology, in which species are categorized on a continuum running from *r* strategists to *K* strategists; *r* strategists have large numbers of offspring and invest relatively little in them, while *K* strategists have fewer offspring and invest heavily in them by feeding and protecting them during infancy and until they are old enough to look after themselves (Wilson, 1975). Fish, amphibians and reptiles are *r* strategists (large numbers of offspring and minimum investment) while mammals are *K* strategists (fewer offspring and greater investment). The *K* strategy is particularly strongly evolved in monkeys, apes and humans. Species that are *K* strategists have a syndrome of characteristics of which the most important are larger brain size, higher intelligence, longer gestation, and a slower rate of maturation in infancy and childhood.

Rushton (2000, pp. 167–169) has applied *r-K* life history theory to the three major races of *Homo sapiens*: Mongoloids (East Asians), Caucasoids (Europeans, South Asians and North Africans), and Negroids (sub-Saharan Africans). His theory is that East Asians are the most *K* evolved and Negroids the least *K* evolved, while Caucasoids fall intermediate between the two although closer to East Asians. Rushton has supported his theory by documenting that the three races differ in brain size, intelligence, length of gestation, rate of maturation in infancy and childhood, and a number of other variables including penis length and diameter.

Rushton (2000) reports that penis length and diameter are greatest in Negroids, intermediate in Caucasoids and smallest in Mongoloids. He reports that average erect penises are 4 to 5.5 inches in length and 1.25 inches in diameter among Mongoloids, 5.5 to 6 inches in length and 1.5 inches in diameter among Caucasoids, and 6.25 to 8 inches in length and 2 inches in diameter among Negroids (Rushton & Bogaert, 1987). He reports that in the United States, penises are longer among blacks than among whites (16.36 cm and 15.62 cm respectively) and that standard 52 mm condoms can fit most Caucasoids but are often too small for Negroids and too large for Mongoloids (Rushton, 2000, p. 167). The greater penis length of Negroids than of Caucasoids appears to have been first noted in the first century AD by the Greek physician Galen (AD 130–201) (Lewis, 1990). This was also observed in the Middle East in mediaeval times and was noted in the *One Thousand and One Nights*, the collection of stories of largely 9th century Persian origin and translated in the 19th century by the British Arabist Richard Burton (1885–1888). Several of the stories are about Persian wives who obtain sexual satisfaction with black slaves because these gave greater pleasure on account of the larger size of their penises. Similar accounts appear in ancient Jewish and Greco-Roman sources (Goldenberg, 2003, pp. 190, 369–370 n. 48-51; Thompson, 1989, pp. 6, 107, 210 n. 85).

In the 20th century the large penis size of blacks was documented and illustrated with a number of photographs by Bernatzik (1929) and was confirmed by Baker (1974, p. 329). These accounts have been of comparisons between Negroids and Caucasoids. There is less evidence for Mongoloids, but Rushton cites A French Army Surgeon (1898/1972) for the observation that Mongoloids have smaller penis length than Causasoids.

Rushton's contributions have been to document the race differences in penis length (Negroids > Causasoids > Mongoloids) more fully, and to formulate an evolutionary theory to account for these differences and integrate them with a number of other variables on an *r-K* life history continuum. His evolutionary theory is based on the premise that Negroids evolved in equatorial sub-Saharan Africa

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and that the Caucasoids and Mongoloids evolved from groups that migrated into the colder environments of North Africa, the Middle East, Europe and South Asia and Northeast Asia. This theory is now widely accepted by evolutionary biologists, e.g. Stringer (2011). Rushton proposes that these colder environments were more cognitively demanding and these were selected for larger brains and greater intelligence. There is widespread consensus on this thesis, e.g. Kanazawa (2008), Lynn (1991, 2006), and Templer and Arikawa (2006). Rushton extends the theory of these climatic selection effects further by proposing that colder environments selected for populations that had greater complexity of social organisation achieved by stronger co-operation between males and a reduction of inter-male sexual competitiveness and aggression (Rushton, 2000, p. 231). The reason for these adaptations was that in the colder climates men had to co-operate in group hunting to secure food and effective hunting required a greater degree of co-operation and a reduction of inter-male sexual competitiveness and aggression than was required in equatorial latitudes, where plant and insect foods are available throughout the year, there is little need for co-operative group hunting is unnecessary, and a high level of inter-male aggression is adaptive for reproductive success. Testosterone is a determinant of aggression (Book, Starzyk, & Quinsey, 2001; Brooks & Reddon, 1996; Dabbs, 2000). Hence, a reduction of aggression and sexual competitiveness between men in the colder climates would have been achieved by a reduction of testosterone, entailing the race differences in testosterone (Negroids > Caucasoids > Mongoloids) that are given in Lynn (1990). The reduction of testosterone had the effect of reducing penis length, for which evidence is given by Widodsky and Greene (1940).

Rushton's theory does not propose that there is a direct causal relationship between intelligence and penis length, such that high intelligence entails a reduction in penis length or greater penis length entails a reduction in intelligence. It is more probable that changes in these two variables evolved independently of each other in response to the climatic environments in which the races evolved. The colder environments of Europe and Northeast Asia selected for larger brains, greater intelligence, a reduction of inter-male aggression, and a reduction of testosterone levels and penis length, entailing positive associations of these variables across the three major races.

An elaboration of Rushton's *r-K* theory is that race differences in penis length may have evolved as an adaptation to population differences in the propensity for infidelity among human females. It has been proposed by Gallup et al. (2003) that longer penises may have evolved to displace semen left by other males from the female reproductive tract. Thus, under conditions of double mating (sperm competition) the human penis enables males to substitute their semen from those of their rivals. This theory implies that some selection pressures must have operated to reduce inter-male competition and the propensity for infidelity among females in the races that migrated from equatorial Africa into the more temperate and colder environments of Europe and Northeast Asia. A theory to explain this has been proposed by Miller (1994) as what he calls "paternal investment theory". This states that in the colder environments inter-male competition was reduced as a strategy by which men were able to secure females and replaced by increased provisioning of females with food obtained by hunting: "the colder the climate a population evolved in, the more they should have evolved drives that lead to provisioning" Miller (1994, p. 250). The reduced inter-male competition was secured by a reduction of testosterone, and this entailed a reduction in penis size. The effect of the colder climates on females would have been that they became dependent on males for provisioning them. This selected for fidelity because males would have been more likely to provision faithful than unfaithful female mates: "a female who has a child by a non-loyal male reduces her chance of catching a provisioning mate" (Miller, 1994, p. 242). Miller argues that his paternal investment theory explains why among Europeans and Northeast Asians men and women are more closely bonded, and marriages and non-marital relationships are more stable than those of Africans.

2. New data on race differences in penis length

Rushton has not done any further work on race differences in penis length since 2000, but since this year three new data sets on this issue have appeared. The present paper summarises these and makes four contributions to the evaluation of Rushton's theory. First, we examine how far these new data replicate Rushton's claim for differences in penis length between Mongoloids, Caucasoids and Negroids. Second, we consider data for penis length for European and North African/South Asian Caucasoids, making a distinction between these two groups that Rushton aggregated into a single group. Third, we consider data for penis length for Northeast Asians (Chinese, Japanese and Koreans) and South East Asians (Indonesians, Thais, Malays, etc.), making a distinction between these two groups that have sometimes been aggregated by Rushton as Asians. Fourth, we present data for penis length for Inuit, Amerindians, Mestizos, Hispanics and a number of mixed race populations, none of which were considered by Rushton, and consider how far these are consistent with Rushton's theory.

(2a) The first new data set consists of a review of a number of studies of penis length and also of penis circumference in five racial samples carried out by Templer (2002). His results are summarised in Table 1. It will be seen that these confirm Rushton's theory that European Caucasoids (represented by samples from Canada and the United States) have greater stretched penis length than Mongoloids, represented by Japanese (4.38 vs 3.37), and that Negroids represented by Nigerians have greater flaccid penis length and circumference than European Caucasoids (represented by samples from Germany, France, Czechoslovakia and the United States) (3.45 vs 3.37 for length and 3.92 vs 3.83) for circumference. Templer reports that the correlation between penis length and circumference is .43.

In addition, Templer's data extend Rushton's theory by distinguishing between European Caucasoids and South Asian Caucasoids, who are aggregated by Rushton into a single group. His data show that European Caucasoids have greater flaccid penis length and circumference than South Asian Caucasoids represented by a sample from India (3.45 vs 2.87 for length; 3.82 vs 3.53 for circumference). Standard deviations were not given in these studies, so it is not possible to calculate the statistical significance of the differences between the groups.

(2b) The second new data set consists of a survey carried out in New York City in 2010 of objectively measured and self-measured

Table 1
Penis length (inches) in five groups (source: Templer, 2002).

Race	N	Measure	Length	Circumference
South Asians	111	Flaccid	2.87	3.53
Europeans	483	Flaccid	3.45	3.82
Nigerians	320	Flaccid	3.62	3.92
Europeans	142	Stretched	4.38	–
Japanese	184	Stretched	3.37	–

Table 2
Penis length (inches) in four ethnic groups in New York.

Penis length	Blacks	Hispanics	Whites	Asians
Measured	6.9	6.5	6.1	5.3
Self-reported	7.9	7.7	7.8	6.7

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Table 3
Penis length (cm) in 113 countries.

Country	Penis length	Country	Penis length
Negroids		*Caucasoids: European*	
Angola	15.73*	Albania	14.73*
Benin	16.20*	Argentina	14.88
Burkina Faso	15.89*	Armenia	13.22
Cameroon	16.67*	Australia	13.31
Central African Republic	15.33	Austria	14.16
Chad	15.39	Azerbaijan	13.72
Cote d'Ivoire	15.22	Belarus	14.63
Congo (Braz.)	17.93*	Belgium	15.85*
Congo (Zaire)	17.33*	Bosnia	15.67*
Gambia	15.88	Bulgaria	15.02
Ghana	17.31*	Canada	13.92
Haiti	16.01	Chile	14.59
Jamaica	16.30*	Croatia	14.77
Nigeria	15.50	Cuba	15.29*
Senegal	15.89	Czech Republic	15.89*
South Africa	15.29*	Denmark	15.89*
Zambia	15.78*	Estonia	13.78*
Zimbabwe	15.68	Finland	13.78*
Mean	16.07	France	13.53*
		Georgia	16.00*
		Germany	14.48
		Greece	14.73
		Hungary	15.61*
Caucasoids: North African/South Asian		Iceland	16.51*
Afghanistan	13.69	Ireland	12.78
Algeria	14.19*	Italy	15.74*
Bangladesh	11.20	Macedonia	13.98
Egypt	15.69	Netherlands	15.87
India	10.24	New Zealand	13.99
Iran	14.55*	Norway	14.34
Iraq	14.55*	Poland	14.29
Israel	14.38*	Portugal	13.19
Lebanon	16.82*	Romania	12.73
Libya	13.74	Russia	13.21
Morocco	15.03*	Serbia	14.87
Pakistan	15.25	Slovakia	15.21*
Palestine	15.08	Slovenia	15.13*
Saudi Arabia	13.80*	Spain	13.85
Sri Lanka	10.89	Sweden	14.88
Tunisia	15.01*	Switzerland	14.35
Turkey	14.11	Ukraine	13.97
Turkmenistan	13.48	United Kingdom	13.97
Yemen	12.72	USA	12.90
Mean	13.28	Uruguay	15.14*
		Mean	14.51
Mongoloids			
China	10.89	*Amerindians/Mestizos*	
Hong Kong	11.19	Colombia	17.03
Japan	10.92	Ecuador	17.77
Korea: North	9.66	El Salvador	14.88
Korea: South	9.66	Honduras	15.00
Singapore	11.53	Mexico	15.10*
Taiwan	10.78	Nicaragua	16.26*
Mean	10.66	Panama	16.27*
		Paraguay	15.53
South East Asians		Peru	16.03*
Cambodia	10.04	Mean	15.99
Indonesia	11.67		
Malaysia	11.49	*Mixed Race*	
Philippines	10.85	Belize	15.75*
Thailand	10.16	Brazil	16.10
Vietnam	11.47	Cape Verde	14.05
Mean	10.95	Costa Rica	15.01
		Dominican Republic	15.99*
		Eritrea	14.39*
Inuit		Ethiopia	13.53*
Greenland	13.87*	Mongolia	12.77
		Panama	16.27*
		Puerto Rico	16.01*
		Surinam	14.67*
		Sudan	16.47*
		Venezuela	17.03

* Self-reported

Table 4
Statistical significance of paired comparisons.

Group comparisons	*t*	Scheffé
Negroids–European Caucasoids	.000	.000
Negroids–South Asian/North African Caucasoids	.000	.000
Negroids–Amerindians/Mestizos	.799	1.000
Negroids–Mongoloids	.000	.000
Negroids–South East Asians	.000	.000
European Caucasoids–South Asian/North African Caucasoids	.082	.577
European Caucasoids–South East Asians	.000	.000
European Caucasoids–Amerindians/Mestizos	.000	.022
European Caucasoids–Mongoloids	.000	.000
Mongoloids–South Asian/North African Caucasoids	.000	.000
Mongoloids–Amerindians/Mestizos	.000	.000
Mongoloids–South East Asians	.492	.999
Amerindians/Mestizos–South East Asians	.000	.000
Amerindians/Mestizos–South Asian/North African Caucasoids	.002	.001
South Asian/North African Caucasoids–South East Asians	.000	.000

erect penis length in a sample of 800 adult men consisting of 200 from each group of blacks, Hispanics, whites and Asians. The majority of the group identified as Asians will have comprised Chinese and Koreans, but may have included some South and Southeast Asians). These data are reported in http://www.targetmap.com/viewer.aspx?reportId=3073. Retrieved 20 June, 2011 and are given in Table 2. The results confirm Rushton's theory of differences in penis length by finding that both objectively measured erect penis was greatest in Negroids (6.9 inches), intermediate in Caucasoids (6.1 inches) , and smallest in Mongoloids (5.3 inches). The same differences are present for self-assessed penis length but objectively measured penis length is likely the more reliable result. This study also showed that Hispanics had an objectively measured penis length of 6.5 inches, intermediate between that of Negroids and Caucasoids. Standard deviations were not given, so it is not possible to calculate the statistical significance of the differences between the groups.

(2c) The third new data set consists of a worldwide summary of a number of studies of erect penis length in adult men reported for 113 countries in 2010 in http://www.everyoneweb.com/worldpenissize/. Retrieved 20 June, 2011. The information in this website has been collated from data obtained by research centres and reports worldwide. The references for the studies from which the composite data have been compiled are given in the website. The results of this worldwide summary of studies of penis length are shown in Table 3. This gives data for seven racial groups and for a further group of thirteen mixed race populations. In some of these studies erect penis length was self-reported (denoted by asterisks) and in others it was measured by others. The statistical significance of the differences in penis length between the groups is tested by *t* tests and Scheffé tests in a series of paired comparisons shown in Table 4. Both tests give the same results.

3. Discussion

The data presented in the present paper confirm and extend Rushton's theory of race differences in penis length. Rushton's theory that penis length is greatest in Negroids, intermediate in Caucasoids and smallest in Mongoloids is confirmed in the three data sets given in Tables 1–3. Templer's data given in Table 1 also confirm Rushton's theory by showing that the same differences are present for penis circumference. Rushton's theory is further supported by the data in the New York City study, given in Table 2, and more extensively in the 113 nation study given in Table 3, where penis length is greatest in Negroids (16.07), intermediate

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in Caucasoids (13.89: the average of European and North African/South Asian Caucasoids), and smallest in Mongoloids (10.66.

Rushton's theory of race differences in penis length is extended by the data presented here for a number of new populations. First, the new data extend Rushton's theory by distinguishing between European Caucasoids and North African/South Asian Caucasoids, who are combined by Rushton into one group. Templer's data given in Table 1 show that European Caucasoids have greater flaccid penis length and circumference than South Asian Caucasoids represented by a sample from India. This result is confirmed in the 113 nation data set given in Table 3, where European Caucasoids have greater penis length (14.51) than North African/South Asian Caucasoids (13.28). Although this difference is not statistically significant, both these and Templer's results are in the opposite direction from what would be predicted from Rushton's theory that when early peoples migrated from sub-Saharan Africa into North Africa and South Asia, and later into Europe and North East Asia, penis length became smaller and intelligence became greater in more cognitively demanding cold winter environments. This theory predicts that intelligence should be greater and penis length should be smaller in European Caucasoids than in South Asian/North African Caucasoids, because Europe has had colder winters than South Asia and North Africa. This prediction is confirmed for intelligence and brain size given by Rushton (2000, pp. 40, 214, 279–280) and Lynn (2006) but in the present two data sets not for penis lengths. These results are therefore anomalous for Rushton's theory and present a problem for it.

Second, the present data make it possible to distinguish between the penis length of Northeast Asians (Chinese, Japanese and Koreans) and Southeast Asians (Indonesians, Thais, Malays, etc.), that Rushton aggregated into a single group as East Asians. It can be predicted from Rushton's theory that Northeast Asians (Mongoloids) should have smaller penis length than Southeast Asians because they evolved in a colder environment. The penis length differences given in Table 3 show that this prediction is confirmed (Northeast Asians: 10.66; Southeast Asians: 10.95), although this difference is not statistically significant.

Third, Rushton does not consider the penis length of Hispanics and Mestizos for which data are given in Tables 2 and 3. Hispanics and Mestizos can be regarded as comparable peoples because while Hispanics are not racially homogeneous, most resemble Mestizos as mixed peoples with European and Native American Indian ancestry. The New York City study shown in Table 2 gives data for penis length for Hispanics compared with European Caucasoids, and the 113 nation study shown in Table 3 gives data for penis length for Mestizos in Latin America compared with European Caucasoids. In both data sets, penis length is greater for Hispanics/Mestizos than for European Caucasoids at 6.5 inches and 6.1 inches, respectively, in the New York City data, and 15.99 cm and 14.51 cm, respectively, in the 113 nation study. Although Rushton does not consider Hispanics or Mestizos in his *r-K* theory, these results are consistent with his theory because Hispanics and Mestizos have lower IQs than Europeans at 89 for Hispanics in the United States calculated in the meta-analysis of Roth, Bevier, Bobko, Switzer, and Tyler (2001) and 86 for Mestizos in Latin America calculated by Lynn (2006). These results in the two studies are therefore predictable from Rushton's theory and provide further strengthening for it.

Fourth, Table 3 gives the penis lengths of Latin American Mestizos (15.99) compared with those of the Negroids (16.07). This difference is very small and not statistically significant but is nevertheless in the direction that would be predicted from Rushton's theory because Mestizos have higher average IQs than Negroids given in Lynn (2006) as 67 and 86 respectively, and would therefore be expected to have smaller penis length. It may, however, be regarded as something of an anomaly that this difference is not greater than that given in Table 3.

Fifth, the penis length of the Inuit (13.87) is greater than that of Mongoloids (10.66) and smaller than that of Negroids (16.07). This result is predictable from Rushton's theory because the IQ of 91 of the Inuit is also midway between that of Mongoloids and of Negroids, given as 105 and 67, respectively, adopting the figures given in Lynn (2006).

Sixth, we consider now the thirteen countries that have mixed race populations for which penis length data are given in Table 3. The percentages of the races in populations of these countries are taken from Philips (1996) unless otherwise stated. In Belize, the penis length of 15.75 is about what would be predicted in this mixed race of the population consisting of 55 percent Amerindians and Mestizos (penis length: 15.99), 30 percent Mulatto, a mix of European Caucasoid (penis length: 14.51) and Negroids (penis length: 16.07), the average of which is 15.29.

In Brazil, the penis length of 16.10 is virtually the same as that of Amerindians and Mestizos (15.99) and that of Negroids (16.07), who together comprise 47 percent of the population, although it is greater than that of European Caucasoids (14.51), who comprise 53 percent of the population.

In Cape Verde, the population consists of 28 percent Negroids and 71 percent Mulattos. Penis length of 14.05 is smaller than that of Negroids (16.07) and Mulattos (15.29). This result is an anomaly for Rushton's theory from which it would be expected that the penis length would be intermediate between that of Negroids (16.07) and Mulattos.

In Costa Rica, the population consists of 94 percent European Caucasoids and Mestizos. The penis length (15.01) is intermediate between that of Amerindians and Mestizos (15.99) and European Caucasoids (14.51), so this result is about what would be predicted from Rushton's theory.

In the Dominican Republic, the population consists of 73 percent Mulattos, 16 European Caucasoids and 10 percent Negroids. Penis length of 15.99 is greater than that of Mulattos (15.29) and European Caucasoids (14.51) but smaller than that of Negroids (6.07). This result is about what would be predicted from Rushton's theory.

In Eritrea and Ethiopia, the populations are a mix of Negroids and North Africans (Cavalli-Sforza, Menozzi, & Piazza, 1994, p. 191), and the penis lengths of 14.39 and 13.53 are intermediate between those of Negroids (16.07) and North Africans (13.28), as would be predicted from Rushton's theory.

In Mongolia, the population consists of a mix of Mongoloid, Kazakh and Kirghiz peoples (Cavalli-Sforza et al., 1994, pp. 223, Fig. 4.9.1). Penis length of 12.77 is greater than in any of the seven Mongoloid samples (average 10.66), and smaller than that of the two central Asian peoples represented by Turkmenistan (14.48) as would be predicted from Rushton's theory.

In Puerto Rico, 76 percent of the population identify themselves as white, but 53.6 percent have some Amerindian ancestry (Madrigal, 2006, p. 121). There are also significant numbers of predominantly African descent, estimated at about a quarter of the population, so the population is a mix of European Caucasoid, Mestizos and Negroids. Penis length (16.01) is virtually identical to that of Mestizos (15.99), fractionally smaller than that of Negroids (16.07) but larger than that of Europeans (14.51), so this result is about what would be predicted from Rushton's theory.

In Panama, the population is 64 percent Mestizo, 14 percent Negroid and Mulatto, and 10 percent European Caucasoids. Penis length (16.27) is greater than that of Mestizos (15.99), Negroids (16.07) and Mulattos (15.29), so this result is anomalous for Rushton's theory.

In Sudan, 49 per cent of the population are Muslim northerners identified as "Sudanese Arab" according to Philips, 1996, p. 39 and the remainder are Christian/Animist southerners. The term "northerner" includes groups like the Fur and the Nubians who are pre-

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dominantly black African, and even the term "Arab" includes subgroups that are predominantly black African. It is likely that the data come largely from black African subjects. If this is so, penis length (16.47) is fairly close to that of Negroids (16.07), so this result is consistent with Rushton's theory.

In Surinam, the population is 35 percent Negroid and Mulatto, 33 percent South Asian, and 16 percent Indonesian. Penis length (14.67) is intermediate between that of Negroids (16.07), Mulattos (15.29), South Asians (13.28) and Indonesians (11.67), as would be predicted from Rushton's theory.

In Venezuela, the population is a mix of European Caucasoids, Amerindians, Mestizos and Negroids. Penis length is high at 17.03 and somewhat greater than would be predicted from Rushton's theory.

4. Conclusions

The data given in Tables 1–3 provide three confirmations of Rushton's theory that penis length is greatest in Negroids, smaller in Caucasoids and smallest in Mongoloids. In addition, Rushton's theory has been extended in the data presented here by distinguishing between Northeast Asians and Southeast Asians, and between European Caucasoids and North African/South Asian Caucasoids, and by giving penis lengths for a number of other peoples including Inuit, Mulattos, Amerindians, Mestizos and Hispanics, and for thirteen mixed race populations. For most of these populations, penis lengths are predictable and confirmed. The only seriously problematic anomaly is that penis length was found to be greater in European Caucasoids than in South Asian/North African Caucasoids in the two studies whose results are given in Tables 2 and 3, while Rushton's theory predicts that it should be smaller. However, this anomaly should not be regarded as fatal to Rushton's theory. A possible explanation for it is that penis length is positively related to height at a correlation of .45 in as study by Fisher (1964), confirmed by Siminoski & Bain, 1988, and European Caucasoids are typically taller than South Asian/North African Caucasoids. There are some minor anomalies in the results for the mixed race populations of Cape Verde and Venezuela, but these can be regarded as sampling errors.

Considering the results as a whole in terms of Popper's (1959) theory of the logic of scientific explanation, Rushton's theory has survived three attempts at falsification, all of which have failed, and has generated predictions for penis lengths in other races and populations most of which have been verified. In both of these respects, Rushton's theory can be regarded as a progressive research program that has been strengthened by the data presented in this paper.

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