Ethnic Differences in Success in Cricket

Edward Dutton
University of Oulu, Finland.

Richard Lynn
University of Ulster, UK.

Address for correspondence: ecdutton@hotmail.com

Evidence is presented that success in cricket is associated with ethnicity, such that South Asians, Europeans, and Coloreds are over-represented, and Northeast Asians, Pacific Islanders and sub-Saharan Africans (with the exception of those from the West Indies), are under-represented. It is argued that these racial differences in cricket success are significantly explained by racial differences in somatotype and muscle fiber type. Alternative sociological explanations are examined but found to be unconvincing.

Key words: Cricket; Ethnicity; Race; Somatotype

1. Introduction

There is considerable evidence for racial differences in success in a variety of sports, including short- and long-distance running, American football, baseball, and swimming (Entine, 2000; Epstein, 2013; Irving and Charlton, 2010; Sailes, 1998). It has been argued that these differences are likely to be partly genetic because different races tend to succeed in the sports which require the physical characteristics which they possess (Epstein, 2013). This argument has been strengthened by evidence showing that racial differences in sporting ability exist at very young ages (see Entine, 2000). It is widely assumed that the younger the age at which a difference appears, the more likely it is to be strongly genetic. An alternative argument has been that racial differences in success in different sports are attributable to sociological factors including racial discrimination, something which has been examined in relation to many sports including cricket (e.g. Williams, 2001; Majumdar & Gemmell, 2007).

Hitherto, there has been no study examining the abilities required for success in cricket, racial differences in success in cricket, and the degree to which these may be attributable to genetic differences. This is the objective of the present study.[1]

2. Race Differences in Somatotypes and Other Characteristics

We now examine racial differences in somatotype (body shape and composition) and their relevance to cricketing ability. Somatotypes are to a significant degree genetically determined, both at an individual and group level (Bouchard et al., 1997), and race differences in somatotype are present in infants (Malina, 1969). The somatotypes are:

1. *Endomorph* (Fat)*.* A rounded body shape (stocky, relatively short), characterized by relatively short limbs, large trunk, fat in the abdominal and lower body region, short neck, narrow shoulders, large chest, wide hips and poorly developed muscles but muscle strength is gained easily.

2. *Ectomorph* (Slim)*.* Tall, thin, linear body, long extremities, short upper body, narrow chest and shoulders, very lightly muscled.

3. *Mesomorph* (Muscular)*.* Large head, muscular chest, narrow waist, large shoulders, large heart, heavily muscled arms and legs, minimal body fat, short trunk and long limbs.

Within these categories there are the following subdivisions: *Mesomorphic Endomorph* (endomorphy dominant, mesomorphy greater than ectomorph), *Mesomorph-Endomorph* (the two characteristics are equal but with less ectomorphy), *Ectomorphic Mesomorph, Mesomorph-Ectomorph, Endomorphic Ectomorph, Endomorph-Ectomorph*, and *Ectomorphic Endomorph*. When one category is dominant but the other two are equal then the body is described as balanced, for example, 'balanced endomorph.' These are the most extreme body types. Somatotypes are denoted with three numbers (1-1-1) in the order endomorph, mesomorph, ectomorph. These numbers are expressed up to one decimal place, as in 1.1-1.1-1.1 (endomorph-mesomorph-ectomorph). The range of measurement is between 1 and 7 with 1 designating extremely low and 7 extremely high.

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[1] We define race here, as in common usage, as a breeding population that genetically differs from other populations as a result of geographical isolation, cultural separation and endogamy, and which shows patterns of genotypic frequency for a number of inter-correlated characteristics compared with other breeding populations. A refutation of the criticisms of the race concept can be found in Lynn (2006, Ch. 1).

The modal racial somatotype and other physiological characteristics relevant to sporting ability are now described.

1. *West Africans*. This is the most mesomorphic of the races, with long limbs, short torso, heavy skeleton, a well-muscled body and very little body fat. West Africans have around 75% fast twitch (anaerobic, or white) muscle fibers compared with around 25% in East Africans (Hochachka, 1998). This aids bursts of speed and power but has the effect that West Africans have low endurance. Blacks from the West Indies are principally of West African origin, with varying small amounts of European admixture (Epstein, 2013).

2. *East Africans*. This is the most ectomorphic race with long limbs, low body fat, and not very well muscled. For example, Roberts and Bainbridge (1963) have shown that the Nilotic peoples have an average somatotype of 1.6-3.5-6.2, which makes them extreme ectomorphs. They also have around 75% slow-twitch (aerobic, or red) muscle fibers and a large lung capacity (Hochachka, 1998), which gives them very high endurance in long distance running. It is appreciated that 'East Africans' involve many clines. We use the term here, therefore, to refer to the Nilotic peoples.

3. *North East Asians*. These are the Chinese, Japanese and Koreans, the Mongoloids of classical anthropology. This race is the most endomorphic with short arms and legs, a large trunk, and a high level of body fat, around 5% more than Europeans (Hu, 2008). They have relatively light skeletons (Weber, 2007, p. 543) and are the least muscular of the main races (e.g. Rushton, 2003, p.178). Their slow and fast twitch muscle fiber distribution is about equal (Entine, 2000).

4. *Europeans*. This race is moderately endomorphic but less so than Northeast Asians and more so than West Africans and East Africans. There is also a strong upper body, broad shoulders, a longer and thicker trunk and shorter extremities, giving a lower center of gravity (Wagner & Heyward, 2000), and average lung capacity. Their slow and fast twitch muscle fiber distribution is about equal (Ama et al, 1986; Entine, 2000).

5. *South Asians*. This race is more ectomorphic, less mesomorphic and less endomorphic than Europeans (Berry & Deshmukh, 1964; Carter & Heath, 1990, p.171; Rangan, 1982; Singh, Sidhu and Malhotra, 1988). Compared with Northeast Asians, they are more muscular with longer limbs (Ming, 2012). Compared with Europeans, South Asians have a higher level of body fat (Lear et al., 2009), despite overall being less endomorphic and more ectomorphic than Europeans. They have slightly longer limbs (Nightingale et al., 2010), a lighter bone structure (Ward et al., 2007) and a narrower waist, are physically shorter even at young ages and controlling for socio-economic status, and have a relatively low height/weight ratio (Nightingale et al., 2010).

6. Pacific Islanders.   These are highly endomorph and very muscular (Grainger, 2008).

7. Cape Coloreds.   Cape Coloreds are a mix of southern African blacks (whose body type is closer to East than West Africans), Europeans and, to a lesser extent, South Asians (Stokes, 2009, p.136).

8. *Mixed*.   This category, common in the West Indies, designates those of mixed West African, European and, to a lesser extent, South Asian ancestry. Many of those classified as 'black' in the West Indies are partly mixed. For example, European admixture in the black population of Jamaica is around 7% (Parra et al., 1998).

3. Racial Differences in Cricketing Ability

We set out in this section a number of lines of evidence for racial differences in cricketing ability.

A. Presence in Test Match Cricket

The highest level of cricket is test match cricket. Only the consistently best national sides are given test match status by the International Cricket Council. These sides play test matches against each other. They are the longest matches in professional cricket, lasting up to 5 days. Cricket was invented in England and spread throughout most of the British Empire, but only certain members of the former British Empire and now Commonwealth countries are sufficiently good at cricket to have gained test match status. As of 2013, there are 10 test match teams. These gained test match status between 1877 and 2000. They are: England (1877), Australia (1877), South Africa (1889), the West Indies (1928), New Zealand (1930), India (1932), Pakistan (1952), Sri Lanka (1982), Zimbabwe (1992) and Bangladesh (2000). Thus, by the year 2000, all the South Asian Commonwealth countries have been represented at the highest level of cricket. There are also many former British Empire countries in Africa in which cricket was and is played but which do not have test match status.

B. ICC Player Rankings in 2013

The International Cricket Council Player Rankings 2013 (ICC Player Rankings, 2013) are given in Table 1. We can see that of the best test players in 2013, the overwhelming majority are either European or South Asian. None of the best Test or ODI (One Day International) batsmen were black, Northeast Asian or Pacific Islander.

Table 1. *Top 10 cricketers in 2013 by race.*

Ability	Breakdown by Team[1]	European	South Asian	Southern African	Caribbean Black
Test Batsmen	3 SA, 2 PAK, 1 NZ, 1 AUS, 1 SL, 1, IND, 1 WI	4	6	-	-
Test Bowlers	2 SA, 2 AUS, 2 IND, 2 ENG, 1 SL, 1 PAK	6	4	-	-
Test All Rounders	1 IND, 1 BA, 1 WI, 2 ENG, 3 AUS, 2 SA	6	3	-	1
ODI Batsmen	3 IND, 2 SA, 2 SL, 1 AUS, 1 ENG, 1 PAK	3	7	-	-
ODI Bowlers	2 SA, 2 ENG, 1 AUS, 1 SL, 1 IND, 1 WI, 1 PAK	4	5	1	-
ODI All Rounders	2 PAK, 2 SL, 1, BA, 1 AUS, 1 IND, 1 WI, 1 IR, 1 SA	3	6	-	1

[1] AUS=Australia, BA=Bangladesh, ENG=England, IND=India, IR=Ireland, NZ=New Zealand, PAK=Pakistan, SA=South Africa, SL=Sri Lanka, WI=West Indies.

C. Cricketing records

Data on test match records are given in Table 2 and again show that blacks are poorly represented and there are no East African players.

The results given in Table 2 show that most of the ESPN cricketing records are held by Europeans or South Asians. These hold all records in bowling and fielding. The only exception is for batting where of the ten records, four are held by South Asians, two by Europeans and four by West Indian Blacks Brian Lara and Sir Viv Richards, who may have some European or South Asian admixture. Though this admixture cannot be proven, it is extremely likely because, as discussed, Caribbean blacks generally have some European admixture. Brian Lara is from Trinidad, where Blacks have an average of 25% European admixture (Saha & Samuel, 1987). Unfortunately, it has not been possible to find the average

level of white admixture amongst Blacks from Antigua and Barbuda, the home of Sir Viv Richards.

Table 2. *Test Match records by race (ESPN, 2013)*

Record	Name	Year	Nationality	Race[1]
Batting				
Most career runs	S. Tendulkar	-	IND	S. As
Highest career average	D. Bradman	1928-1948	AUS	Euro
Highest individual score	B. Lara	2003	WI	W. Af
Most runs in a series	D. Bradman	1930	AUS	Euro
Most runs in an over	B. Lara	2003	WI	W. Af
Most test centuries	S. Tendulkar	-	IND	S. As
Fastest test centuries	V. Richards	1985	WI	W. Af
Most double test centuries	D. Bradman	-	AUS	Euro
Most triple test centuries	D. Bradman	-	AUS	Euro
Quadruple test century	B. Lara	-	WI	W. Af
Bowling				
Most career wickets	M. Muralitharan	-	SL	S. As
Best career average	G. Lohmann	-	ENG	Euro
Most 5 wickets in an innings	M. Muralitharan	-	SL	S. As
Most 10 wickets in an innings	M. Muralitharan	-	SL	S. As
Most wickets in a series	S. Barnes	1913-1914	ENG	Euro
Best figures in an innings	J. Laker	1956	ENG	Euro
Best figures in a match	J. Laker	1956	ENG	Euro
Fielding				
Most catches in a test career	R. Dravid	-	IND	S. As
Most dismissals	M. Boucher	-	SA	Euro
Most catches	M. Boucher	-	SA	Euro
Most stumpings	B. Oldfield	-	AUS	Euro
Other				
Most matches played	S. Tendulkar	1989-2013	IND	S. As

[1] Euro=European, S. As=South Asian, W. Af=West African.

D. Racial representation in multiracial test cricket sides

For our fourth source of evidence we analyzed the racial compositions of the 2013 Test Match squads in six countries from information available online. The numbers in the full squads given by the relevant cricket councils varied from 49 in the West Indies to 17 in England. The analysis was straightforward except for Zimbabwe for which the population figures are estimates, and for the West Indies, for which the squad draws upon citizens and subjects of the following countries or dependencies which are part of the West Indies Cricket Board: Antigua and Barbuda, Barbados, Dominica, Grenada, Guyana, Jamaica, St. Lucia, St. Vincent

and the Grenadines, Trinidad and Tobago, St. Kitts and Nevis, Anguilla, Monterserrat, the British Virgin Islands, the US Virgin Islands, and the Dutch part of Saint Martin (Sint Maarten) (Beckles, 1999). We could find reliable demographic information about all of these from census information available online with the exception of Montserrat (pop. 5164), for which we could find no break-down for the non-black minority of 12%, and Sint Maarten (pop. 37,000), so we excluded these from our analysis. This gave an approximate West Indies population in 2013 of 5,956,548. Of these, 57.4% were classified as black, 15.6% mixed, 2.25% white, 15.6% South Asian, and the remainder were other races, including Chinese. With each team, we conducted a chi-square test of statistical significance based on racial compositions of each nation's population. This analysis found the following results:

1. *England*. Team (N=17): 88% European, 5% South Asian, and 5% black. England population (2011): 88% white, 7% South Asian and 2.5% black. Racial over-representation: European: 0.96:1, South Asian: 0.71:1, Black: 1.75:1. At p=0.7 these differences were not significant, due to the small N.

2. *South Africa*. Team (N=29): 48.3% European, 24.1% Colored, 13.7% South Asian and 13.7% black. South African population (Statistics South Africa, 2013): 79% black, 9% European, 9%, Colored, 2.6% South Asian.. Racial over-representation: European: 5.5:1, blacks 0.12:1, Coloreds: 2.6:1, South Asian: 3.8:1. At p<0.00001 these differences were highly significant.

3. *Australia*. Team (N=29): 93% European and 7% South Asian. Australian population (Statistics Australia, 2011): 92% European and 2% South Asian. Racial over-representation: White: 1:1, South Asian: 3.5:1. These differences were non-significant at p=0.17.

4. *New Zealand.* Team (N=26): 90% European, 8% South Asian, 2% Maori. Population (New Zealand Trade and Enterprise, 2013 and Statistics New Zealand, 2013): 69% European, 2.5% South Asian, 14.6% Maori, 6.9% Pacific Islander. Racial over-representation: European: 1.3:1, South Asian: 3.2:1, Maori: 0.1:1. These racial differences were significant at p<0.01.

5. *Zimbabwe*. Team (N=35): 28.5% European, 65% black, 2.8% South Asian and 2.8% Colored. Zimbabwe is over 98% black, 1% South Asian and Colored and less than 1% European (Index Mundi, 2013). Racial over-representation: Black: 0.6:1, White: 28.5:1, South Asian: 5.6:1, Colored: 5.6:1. These differences were highly significant at p<0.00001.

6. *West Indies*. Team (N=49): 30% South Asian, 2.3% European, 38% clearly black. Others uncertain. Population: 57.4% black, 15.6% mixed, 2.25% European, 15.6% South Asian (ethnic Indian), and the remainder were other races including Chinese. Racial over-representation: South Asian: 1.92:1. European: 1:1. Black: Uncertain, for reasons discussed. However, with regard to those clearly black: 0.66:1. These differences were significant at $p < 0.00003$.

The results from these six countries show that Europeans and South Asians are generally over-represented among top cricketers, while blacks (and Maoris) are under-represented and, in most cases, significantly so. England is an exception with its over-representation of blacks and under-representation of South Asians, possibly attributable to sampling error because of the small sample size. Coloreds are over-represented in South Africa and Zimbabwe which may be due to their being relatively central in somatotype terms between East African and European.

These conclusions are further confirmed by the large number of British Commonwealth countries where cricket is played but is not played well enough for listing by the International Cricket Council. These include the African countries Nigeria, Ghana, Kenya and Uganda, and the East Asian Hong Kong.[2]

4. The Cricketing Body Type

Research on the body type of good cricketers has shown that they are relatively tall and athletic, indicating that they are endo-mesomorphs. Jones et al (1965) found an average somatotype of 3.4-4.7-2.3 for English county level cricket players. Stretch (1987) found that male provincial cricketers had an average somatotype of 2.5-5.3-2.1 in South Africa, and Stretch (1990), also in South Africa, found that it was 3.1-5.5-2.0, making them endo-mesomorphs. Stretch (1991) found that the average somatotype for 2 county teams in South Africa (N=35) was 3.1-5.5-2.0. The level of endomorphy was statistically significantly higher amongst Stretch's county sample when compared to his provincial sample but other differences were not significant. Peens (1996) found that for county cricketers in South Africa the average profile was 3.8-4.4-2.4. Provincial batsmen were 2.5-5.2-2.0 (Stretch, 1987) and 3.0-5.2-2.0 (Stretch, 1990). County batsmen have been found to be 3.7-4.5-2.4 (Peens, 1996). Stretch (1987 and 1990) also found that batsmen tend to be shorter and lighter than

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[2] For an historical discussion of cricket in Nigeria, for example, see Nwakanma, 2010, p.54.

bowlers, but with greater fat mass. Stuelcken, Pyne and Sinclair (2007) found that elite bowlers (N=26 female, 26 male) in Australia tend to be endo-mesomorphs.

There are also differences between players in different cricketing positions. In a study of provincial cricketers, Stretch (1987) found the typical batsman somatotype was 2.5-5.2-2.0, the typical bowler somatotype was 2.4-4.8-2.4, and typical all-rounder somatotype was 2.5-5.7-1.8. Thus, the significant difference between bowlers and the batsmen was that the bowlers were more ectomorphic and balanced mesomorphic. However, when this was repeated by Stretch (1991) with 25 county players batsmen were 3.0-5.7-2.0, bowlers were 3.0-5.2-2.2 and all-rounders were 3.5-6.4-0.9. The all-rounder findings were statistically significantly different from the findings in Stretch (1987). This may imply that county all-rounders are more endomorph and mesomorph and less ectomorph than provincial players. Thus, the evidence indicates that bowlers, when compared to batsmen, are more ectomorphic and less mesomorphic. The conclusion of these studies is that the modal (optimum?) body type of the good cricketer is endo-mesomorph.

5. Racial Differences in the Cricketing Body Type

A number of predictions can be made from the conclusion that the optimum body type of the good cricketer is endo-mesomorph.

1. *Races whose average body type is extreme ectomorph or extreme endomorph will be under-represented in test match cricket.*

The data reviewed above confirm this. The most endomorphic races are Northeast Asians and Pacific Islanders. Northeast Asians are completely absent in test cricket while Pacific Islanders and Maori are very substantially under-represented in the New Zealand team and not represented among the best cricketers in 2013 or among cricketing record holders. Black South Africans and black Zimbabweans, whose body type is closer to East African than West African but is less ectomorph than East Africans, are also greatly under-represented in their national test match cricket squads.

2. *Races that are extremely mesomorphic will be under-represented in test match cricket.*

The data reviewed above show that a moderate but not an extreme mesomorphic body type is associated with success in cricket. We would therefore not expect over-representation in cricket from races with an extreme mesomorphic body type. This is confirmed by the lack of representation in test match cricket from West African countries. The West Indies have a presence at

high level cricket, but black West Indians have a small amount of European admixture. As such, we would expect them to be better represented than West Africans and thus to be represented roughly in proportion to their numbers. This can be observed with the cricketing success of certain black West Indian players who are likely to be of West African descent, such as Sir Viv Richards. Blacks from the Caribbean are overwhelmingly of West African origin (Epstein, 2013). However, as would be predicted, their presence is relatively small. They are modestly over-represented in the England 2013 squad (though the differences were not significant), not represented at all in those of Australia or New Zealand, only modestly over-represented in the West Indies 2013 squad, and scarcely at all among the OCC Top 10 cricketers.

3. Black West Indians, where they have cricketing success, will gain it as batsmen. Europeans and South Asians will be better represented in bowling and fielding.

Batsmen are more mesomorphic than bowlers and their success is attributable to bursts of power and speed (predicted by mesomorphy and a predominance of fast-twitch fibers). Thus, we would expect that records broken by black West Indians would be for batting. We have seen that this is the case: the only Test Match records currently held by black West Indians are for batting. Conversely, as Europeans and South Asians have around 50% slow twitch fibres we would expect them to dominate fielding as this is more endurance based, with fielders on the pitch for much longer stretches of time than batsmen. Likewise, bowling requires great endurance when we consider the potential length of play. Thus, again, we would predict than bowling would be dominated by South Asians and Europeans and with low representation from West Africans. This is indeed the case.

4. Races whose body type is relatively central will be over-represented in Test Match Cricket.

This is confirmed. Europeans and South Asians are closest to the optimum good cricketing body type. Probably the 'mixed' and 'Colored' are relatively central in their body type and this explains their over-representation among good cricketers in South Africa and Zimbabwe.

South Asians are more over-represented than Europeans in good cricket. A possible explanation for this is that South Asians are particularly strong bowlers and this outweighs weaknesses in other cricketing skills. The typical good bowler is less mesomorphic and more ectomorphic than the typical batsman, but the level of endomorphy is about the same. The South Asian body type is more

ectomorphic than the European and less mesomorphic and endomorphic (Carter & Heath, 1990, p.162).

6. Sociological Explanations

It has frequently been suggested that there are sociological reasons for race differences in ability in sports (e.g. Margolis, 2008; Sailes, 1998; Stark, 1992), and this argument might be applied to the race differences in cricketing ability. We will now consider these possible arguments.

Firstly, it might be argued that differences in nutrition and lifestyle, and simply practice levels (e.g. Gladwell, 2008), explain the differences in body type and thus the differences in cricketing ability. This is unlikely because somatotypes are strongly heritable. Arden and Spector (1997) found that around 50% of the variability in lean body mass was due to genetic factors. The heritability of stature has been estimated at 85% based on a meta-analysis (Peeters et al., 2009). A study involving a genome-wide linkage scan found that athletic ability (meaning the ability to engage in sustained physical exercise) in 700 British female dizygotic twins had 66% heritability (De Moor et al., 2007), which means that 66% of the variation between individuals in the population can be attributed to genetics.

Secondly, it might be argued that some races are stereotyped not to be good at cricket and this impairs their ability. In so far as this may be true, a stereotype normally develops because it is at least partly true (Helmreich, 1982).

Thirdly, it might be argued that the only modest black representation in South African cricket is due to discrimination. This is improbable because Coloreds and South Asians are over-represented. Furthermore, blacks are under-represented in black-dominated Zimbabwe.

Fourthly, it might be argued that European over-representation is because of the association between cricket and the socioeconomic elite. By 1900, cricket was widely regarded as a 'game for English gentleman' (Elmsley, 2007, p.47) with 'gentleman' meaning a member of the socioeconomic elite (Corfield, 1996). The English phrase 'It's just not cricket!' (meaning 'fundamentally unfair and dishonest') reaches into a discourse in which cricket represents 'gentlemanly' conduct (Rumford, 2013, p.86). Williams (2001, p.54) notes that 'The MMC had strong connections with the economic and social elite.' It was noted in 2013 that 66% of England's Test Match players had attended private schools (*The Economist,* 12 May 2013). But this association would not explain why Coloreds are over-represented in cricket in South Africa as compared with Europeans, despite having lower socioeconomic status and lower incomes (Lundahl, McCarthy and Petersson, 2003, p.155). Furthermore, South Asians are over-

represented in Australia and New Zealand, where the socioeconomic elite is overwhelmingly white.

Fifthly, it might be argued that West African countries and Northeast Asian countries are absent in test cricket because they have no culture of playing cricket. This is not the case because cricket was introduced to every country of the British Empire. For example, membership of the ICC (International Cricket Council) includes, as of 2013, Fiji, Hong Kong, Japan, Kenya, Malaysia, Nepal, Nigeria, Singapore, and Uganda. However, none of these teams have proven good enough to gain test match status.

7. Conclusion

We have shown that Europeans, South Asians and Coloreds are over-represented among good cricketers; Northeast Asians, East Africans, South African blacks, West Africans and Pacific Islanders are under-represented; and West Africans (with European admixture) in the West Indies and England are moderately represented. We argue that these differences are partly genetic because the modal body types of the races that are over-represented among good cricketers are closer to the modal cricketing body type than are those of the races that are under-represented. Northeast Asians, West Africans and Pacific Islanders are under-represented because of their less suitable body types. North East Asians and Pacific Islanders are too endomorphic and West Africans are too mesomorphic to be good at cricket. The European moderately endomorphic somatotype makes them good at cricket. The South Asian endo-mesomorphic body type is the optimum for cricket and explains why they are the most over-represented in good cricket, especially in bowling. In addition, racial differences in muscle fiber distribution help to explain why the success of the West Indies in cricketing records has tended to be in batting (which is predicted by bursts of speed) but not bowling or fielding, which require higher levels of endurance.

References

Ama, P., Simoneau, J., Boulay, M. et al (1986). Skeletal muscle characteristics in sedentary black and Caucasian males. *Journal of Applied Physiology* 61: 1758-1761.

Arden, N. & Spector, T. (1997). Genetic influences on muscle strength, lean body mass, and bone mineral density: A twin study. *Journal of Bone Mineral Research* 12: 2076-2081.

Beckles, H. (1999). *The Development of West Indies Cricket: The Age of Nationalism*. London: Pluto Press.

Berry, J.N. & Deshmukh, P.Y. (1964). Somatotype of male college students in Nagpur, India. *Human Biology* 36: 157-176.

Bouchard, C., Malina, R. & Perusse, L. (1997). *Genetics of Fitness and Physical Performance*. Champaign, IL: Human Kinetics.

Carter, J. & Heath, B. (1990). *Somatotyping: Development and Applications*. Cambridge: Cambridge University Press.

Corfield, P. (1996). The rivals: Landed and other gentlemen. In: N. Harte & R. Quinault (eds), *Land and Society in Britain, 1700-1914*. Manchester: Manchester University Press.

De Moor, M., Spector, T., Cherkas, L. et al (2007). Genome-wide linkage scan for athlete status in 700 British female DZ twin pairs. *Twin Research and Human Genetics* 10: 812-820.

Elmsley, C. (2007). *The English and Violence since 1750*. London: Continuum.

Entine, J. (2000). *Taboo: Why Black Athletes Dominate Sports and Why We're Afraid to Talk About It*. New York: Bantam Press.

Epstein, D. (2013). *The Sports Gene: What Makes the Perfect Athlete*. New York: Random House.

ESPN (2013). http://stats.espncricinfo.com/ci/engine/records/index.html

Gladwell, M. (2008). *Outliers: The Story of Success*. New York: Little Brown & Co.

Grainger, A. (2008). *The Browning of the All Blacks: Pacific Peoples, Rugby, and the Cultural Politics of Identity in New Zealand*. Ann Arbor, MI: ProQuest Publishers.

Helmreich, W. (1982). *The Things They Say Behind Your Back: Stereotypes and the Myths Behind Them*. New York: Doubleday.

Hochachka, P. (1998). Mechanism and evolution of hypoxia tolerance in humans. *Journal of Experimental Biology* 201: 1243-1254.

Hu, F. (2008). Metabolic consequences of obesity. In F. Hu (ed): *Obesity Epidemiology*. Oxford: Oxford University Press.

ICC Player Ranking (2013). http://www.lgiccrankings.com/ranking/test/batting/

Index Mundi (2013). Zimbabwe. http://www.indexmundi.com/zimbabwe/demographics_profile.html

Irving, R. & Charlton, V. (eds) (2010). *Jamaican Gold: Jamaican Sprinters*. Kingston: University of the West Indies Press.

Jones, P., Worth, W., Stone, P. et al. (1965). The influence of somatotype and anthropometric measures on heart-rate during work in students and specialist sporting groups. Loughborough: College of Technology.

Lear, S., Kohli, S., Bondy, G. et al. (2009). Ethnic variation in fat and lean body mass and the association with insulin resistance. *Journal of Clinical Endocrinology and Metabolism* 94: 4696-4702.

Lundahl, M., McCarthy, C. & Petersson, L. (2003). *In the Shadow of South Africa: Lesotho's Economic Future*. Aldershot, Hants: Ashgate.

Lynn, R. (2006). *Race Differences in Intelligence: An Evolutionary Analysis*. Augusta, GA: Washington Summit Publishers.

Majumdar, B. & Gemmell, J. (2007). *Cricket, Race, and the 2007 World Cup*. London: Routledge.

Malina, R. (1969). Growth and physical performance of American Negro and European children. *Clinical Pediatrics* 8: 476-483.

Margolis, J. (2008). An unlikely metaphor: The color line in swimming and computer science. In: J. Margolis et al (eds), *Stuck in the Shallow End: Education, Race, and Computing*. Detroit: MIT Press.

Ming, X. (2012). Comparison of somatotypes of 29 ethnic groups in China. *Acta Anatomica Sinica* 43: 130-134.

New Zealand Trade and Enterprise (2013). http://www.nzte.govt.nz/en/export/export-markets/india-middle-east-and-africa/india/

Nightingale, C., Rudnicka, A., Owen, C. et al. (2010). Patterns of body size and adiposity among UK children of South Asian, black African-Caribbean and European origin: Child Heart and Health Study in England (CHASE Study). *International Journal of Epidemiology* 40: 33-44.

Nwakanma, O. (2010). *Christopher Okigbo, 1930-67: Thirsting for Sunlight*. Woodbridge, Suffolk: Boydell and Brewer.

Parra, E. et al. (1998). Estimating African-American admixture proportions by use of population specific alleles. *American Journal of Human Genetics* 63: 1839-1851.

Peens, J. (1996). *Kinantropometriese profiel van Suid-Afrikaanse klubkampioens-kapkrieketspelers*. Unpublished masters thesis, Potchefstroom Universiteit vir Christelike Hoer Onderwys, Potchefstroom, South Africa.

Peeters, M., Thomis, M., Beunen, G. & Malin, R. (2009). Genetics and sports: An overview of the pre-molecular biology era. In: M. Collins (ed), *Genetics and Sports*. Lexington, KY: Medicine and Sport Science.

Rangan, S. (1982). *Validity of Age, Socioeconomic Belonging and Dietary Type as Somatotype Determinants in Boys of Secondary Schools*. PhD Thesis: Bangalore University.

Roberts, D. & Bainbridge, D. (1963). Nilotic physique. *Journal of Physical Anthropology* 21: 341-370.

Rumford, C. (2013). *The Globalization of Strangeness*. London: Palgrave MacMillan.

Rushton, J.-P. (2003). Race differences in *g* and the Jensen effect. In: H. Nyborg (ed): *The Scientific Study of General Intelligence: A Tribute to Arthur R. Jensen*. Amsterdam: Pergamon.

Saha, N. & Samuel, A. (1987). A genetic study of blacks from Trinidad. *Human Heredity* 37: 365-370.

Sailes, G. (ed) (1998). *African Americans in Sport*. New Brunswick, NJ: Transaction Publishers.

Singh, S., Sidhu, L. & Malhotra, P. (1988). Body measurements and somatotypes of young adult Jat-Sikh men of Punjab, India. *Anthropologischer Anzeiger* 46: 261-267.

Stark, R. (1992). *Sociology*. Belmont, CA: Wadsworth.

Statistics Australia (2011). http://www.indexmundi.com/australia/demographics_profile.html

Statistics New Zealand (2013). http://www.indexmundi.com/new_zealand/demographics_profile.html

Statistics South Africa (23 July 2010). Mid-year estimates. http://www.statssa.gov.za/publications/P0302/P03022010.pdf

Stokes, P. (2009). *The Peoples of Africa and the Middle East*. New York: Facts On File, Inc.

Stretch, R. (1987). Anthropometric profile of first-class cricketers. *South African Journal for Research in Sport, Physical Education and Recreation* 10: 65-75.

Stretch, R. (1990). Somatotype and body composition changes in first-class cricketers. Communication to the International Congress on Youth, Leisure and Physical Activity and Kinanthropometry IV, Brussels, Belgium, 21-25 May.

Stretch, R. (1991). Anthropometric profile and body composition changes in first class cricketers. *South African Journal for Research in Sport, Physical Education and Recreation* 14: 57-64.

Stubbe, J., Boomsma, D., Vink, J. et al. (2006). Genetic influences on exercise participation in 37,051 twin pairs from seven countries. *PLoS ONE* 1:e22.

Stuelcken, M., Pyne, D. & Sinclair, P. (2007). Anthropometric characteristics of elite cricket fast bowlers. *Journal of Sports Sciences* 25: 1587-1597.

The Economist (12th May 2013).   Class and cricket: A lower order collapse. http://www.economist.com/blogs/gametheory/2013/03/class-and-cricket

Wagner, D. & Heyward, V. (2000). Measures of body composition in blacks and whites: A comparative review. *American Journal of Clinical Nutrition* 71: 1392-1402.

Ward, K., Roy, D., Pye, S. et al. (2007). Forearm bone geometry and mineral bone content in women of European and South Asian origin. *Bone* 41: 117-121.

Weber, J. (2007). *Nurses' Handbook of Health Assessment*. New York: Lippincott, Williams & Wilkins.

Williams, J. (2001). *Cricket and Race*. Oxford: Berg.