IMPACT OF PHYSICAL CHARACTERISTICS ON PERFORMANCE RELATED
FITNESS VARIABLES OF FOOTBALLERS AND BASKETBALLERS OF
SUZhou UNIVERSITY, CHINA

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Abstract
The study investigated the impact of physical characteristics on performance related
fitness variables of basketballers and footballers of Suzhou University, China. The
participants were fifty-seven players (34 footballers and 23 basketballers). Their ages
ranged from 20-26 years. They were randomly selected from the football and basketball
players in the University. Data were collected on age, height, body weight, reaction time,
and 50m dash using a stopwatch for timing the participants and standardised modified
long form International Physical Activity Questionnaire (IPAQ, 2003). Two hypotheses
were tested at 0.05, level of significance. Mean, standard deviation and t-test were used
to analyse the data. There was a significant difference in the performance related
variable of reaction time of participants while there was no significant difference in the
performance-related variable of 50m dash. Coaches should put body physique into
consideration when selecting the players that would represent them in competitions so as
to enhance better performance in their players.

Keywords: Physical Fitness, Reaction Time, Speed, Body Physique

Introduction
Maintaining a high level of physical fitness should be an aspiration for all because of its
immense contribution to health, and meaningful life. Otinwa (2010), described physical
fitness as the ability of an individual to carry out daily tasks with vigor and alertness
without undue fatigue and with ample reserve energy to enjoy leisure time pursuits and to
meet unforeseen circumstances and emergencies. It is also the ability to last, bear up and
preserve energy under difficult circumstances where an unfit person would give up.

One of the components of physical fitness is the performance-related component, which
relates to specific exercises and sports, individual jobs and other activities. They include
speed, agility, muscular power, coordination, reaction time and balance.

Speed is the capacity of the individual to perform successive movements of the same
pattern at a fast rate. It is essential for successful performance in many motor activities.
Speed like reaction time, concerns many body parts and may vary from one part to
another. Speed can be measured by a short dash of 40 to 60 metres. The distance depends
on the age and condition of the person being tested. However, the best way of measuring speed is through the 50m dash.

In related development, Watson (1993), posited that speed is distance covered in a given time. Speed according to him is measured in terms of distance per unit time, kilometer per hour (kph) and metres per second (m/s). William (2011), opined that speed is critical for sports performance and is the basis for sports selection and that sports performance requires one – dimensional power and the translation of that power into change – of – direction power for performance. He further submitted that the energetic requirement for competition is significantly different, sprinters and sports performers have similar, anaerobic and aerobic capacities suggesting an equivalent metabolic conditioning.

The way athletes react to a given situation depends on the physique of the individual as observed by Abernathy (2005), that the somatotypes of athletes within given sports activities, although similar to some extent, were dissimilar relative to size and proportions within given events and positional play.

Mesomorphs were found to be superior to their endomorphic and ectomorphic counterparts in terms of strength, speed, agility, and endurance, while middle distance runners were found to be classified within moderate ranges of mesomorphy and ectomorphy, strength–and speed–dependent athletes tended to be ranked high in mesomorphy and low in ectomorphy.

It was observed that smaller and lighter athletes may be better predisposed to activities demanding quick movement acceleration and continued motion over a period of time. Taller athletes with longer limbs and a higher centre of gravity may have a biomechanical advantage over shorter participants with shorter limbs relative to activities that are power-oriented.

Shorter athletes with shorter limbs and a lower centre of gravity would have a greater stability and a greater advantage in activities where speed generation and rotational abilities are mandated. Similarly, weight may play a role in propulsive activities against the reactive resistance of the environment (Boileau, 2000). In their own submission (Carter, 1990, & Behnke, 1968), observed that sprinters were short and muscular, distance runners were small and lean, throwers were tall and heavy bodied, basketballers were tall and lean and football players were large and muscular.

In soccer, speed plays an important role; the accelerated pace of the game calls for rapid execution of typical movements implementation by every member in a team. In many instances, successful or tactical maneuvers by different team members are directly related with the degree of velocity developed (Kollath & Quade, 1991).

In his own submission, Dawson (2003), opined that the large majority of sprints performed in soccer takes six seconds or less to complete, over distances of only 10 – 30m, and many of the sprints involve at least one change of direction. Howe (1996), submitted that as running speed increases and longer strides are taken, in this instance, the swing phase involves greater knee flexion, hip extension, and greater hip flexion in the later part of the phase.
Montgomery (2010), submitted intuitively, the forward/backward contribution from the additional running up and down the court increased physical load and physiological response. Similarly, there may also be increased movement intensity during offensive evasive and defensive reactive movements, which may also contribute to an increase in physical demand. Abdelkrim (2007), submitted that players may cover several kilometers during a basketball game, comprising many high speed movements in forward and lateral directions combined with decelerations from frequent sprint effects. Explosive vertical jumps may be executed up to 50 times per game.

There is little research on the impact of physical characteristics on performance-related fitness variables of footballers and basketballers of Souzhou University, China. Therefore, this study seeks to determine the impact of physical characteristics on performance-related fitness variables of football and basketball players of Souzhou University, China.

Hypotheses
1. There will be no significant difference in the reaction time of footballers and basketballers of Suzhou University, China.
2. There will be no significant difference in the speed of footballers and basketballers of Suzhou University, China.

Methods
The sample consisted of fifty-seven students as players (34 Footballers and 23 basketballers) of Suzhou University, China, who volunteered to participate in the study. Their ages ranged from 20 – 26 years.

The age, height and weight of the players were measured following the standard procedure, (Ross & Marfell – Jones, 1991). The height and weight of the participants were measured with a stadiometer and weight scale. The speed of the participants was determined with a 50m dash. The collected data were analysed with descriptive statistics of range, mean and standard deviation. Inferential statistics of t-test was used to analyse the data at 0.05, alpha level.

Results

| Table 1: Descriptive Statistics for the Anthropometric Characteristics of Footballers |
|---------------------------------|-----------------|-----------------|-----------------|
| Variable                        | N       | Range            | Mean            | Standard Deviation |
| Height                          | 19      | 168.8 -186.4     | 175.763         | 5.0522             |
| Weight                          | 19      | 58.2 - 87.6      | 72.421          | 7.7442             |
| Age (yrs)                       | 19      | 20 – 26          | 21.368          | 1.9210             |
| Reaction Time (secs)            | 19      | 24.8 – 0.4       | 12.00           | 8.34               |
| 50m Dash (secs)                 | 19      | 157.6 – 5.7      | 6.58            | 0.43               |

Table 1 shows the descriptive statistics of footballers. The footballers anthropometric values showed a mean of 175.76cm and a standard deviation of 5.05, for height; a mean of 72.42 kg and a standard deviation of 7.74, for weight; a mean of 21.37, and a standard deviation of 1.92 for age, a mean of 23.67, and a standard deviation of 2.17 for reaction
time, a mean of 12.00, and a standard deviation of 8.34 for a 50m dash, a mean of 6.58, and a standard deviation of 0.43.

Table 2: Descriptive Statistics for the Anthropometric Characteristics of Basketballers

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Range</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
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<td>176.8 - 192.8</td>
<td>185.758</td>
<td>5.0971</td>
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<tr>
<td>Weight</td>
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<td>66.9 - 109.9</td>
<td>86.425</td>
<td>13.3806</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>12</td>
<td>20.0 - 22.0</td>
<td>20.250</td>
<td>.6216</td>
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<tr>
<td>Reaction Time (secs)</td>
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<td>0.4 - 0.3</td>
<td>0.39</td>
<td>0.03</td>
</tr>
<tr>
<td>50m Dash (secs)</td>
<td>11</td>
<td>6.7 - 6.2</td>
<td>6.56</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Table 2 shows the descriptive statistics of basketballers. The basketballer’s anthropometric mean value for height was 185.76cm and a standard deviation of 5.10 with a range of 176.8 – 192.8. The weight mean value was 86.43; the standard deviation was 13.38 with a range of 66.9 – 109.9. The age mean value was 20.25, and a standard deviation of .62 with a range of 20.0 – 22.0. Reaction time mean value was 0.39, and a standard deviation of 0.03 with a range of 0.4 – 0.3. 50m dash, mean value was 6.56, and the standard deviation was 0.15 with a range of 6.7 – 6.2.

Table 3: Comparison of Footballers and Basketballers on Physical Characteristics and Performance Related Fitness Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>N</th>
<th>sd</th>
<th>df</th>
<th>t_b</th>
<th>t_c</th>
<th>Remark</th>
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</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>Footballers</td>
<td>19</td>
<td>21.37</td>
<td>1.92</td>
<td>11</td>
<td>1.59</td>
<td>2.20</td>
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<tr>
<td></td>
<td>Basketballers</td>
<td>12</td>
<td>20.25</td>
<td>.622</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>Footballers</td>
<td>19</td>
<td>175.76</td>
<td>5.05</td>
<td>11</td>
<td>-3.94</td>
<td>2.20</td>
</tr>
<tr>
<td></td>
<td>Basketballers</td>
<td>12</td>
<td>185.76</td>
<td>5.10</td>
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<td></td>
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<tr>
<td>Weight (kg)</td>
<td>Footballers</td>
<td>19</td>
<td>72.42</td>
<td>7.74</td>
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<td>-2.55</td>
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<td></td>
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<tr>
<td>Reaction Time (secs)</td>
<td>Footballers</td>
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<td>12.00</td>
<td>8.34</td>
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<td>-7.36</td>
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<tr>
<td>50m Dash (secs)</td>
<td>Footballers</td>
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<td>7</td>
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<td>6.56</td>
<td>0.15</td>
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</table>

Table 3 shows the comparison of footballers and basketballers on physical characteristics and performance related fitness variables. The independent t-test was used to compare these parameters between the participants. The results show that there was a significant difference in the reaction time (secs) t = 7.36 (tc = 2.20, df = 11P <0.05), height (cm) t = 3.94 (tc = 2.20, df = 11P<0.05) and weight (kg) t = - 2.55 (tc = 2.20, df = 11P <0.05) of the participants. No significant difference in the 50m dash (secs) t = -.16 (tc = 2.36, df = 7P > 0.05).

Discussion
The results of the anthropometric assessment are presented in tables 1-3. The comparative analysis of the reaction time and the 50m dash is shown in table 3. There is a significant
difference between reaction time of the participants while that of the 50m dash was not significant.

The hypothesis which stated that there will be no significant difference in the reaction time of footballers and basketballers is rejected while that of the 50m dash which stipulated that there will be no significant difference in the speed of footballers and basketballers is accepted.

The significant difference in reaction time was due to the nature of the two games which are played and the physique of the participants. Positional play is another factor that brings about the significant difference in reaction time. The basketball players are cohesive when the game is on as a result of the space available on the court of play compared to the footballers on field which is more spacious than the basketball court where the players are spaced out on the field of play.

The space between the basketball players makes them more alert to catch the ball from their opponents, this increases the time elapsed between stimulation and the beginning of the reaction to catch the ball or kick the ball.

The findings of this study are in line with that of Abernathy (2005), that the athletes’ reaction to a given situation depends on the physique of the individuals and the somatotypes of athletes within given sports activities; although similar to some extent, they were dissimilar relative to size and proportion within given events and positional play.

Boileau (2000), holds the view that weight may play a role in propulsive activities against the reactive resistance of the environment. The basketballers are taller and heavier than the footballers. This aided their biomechanical advantage over the footballers as opined by Boileau (2000), that weight plays a role in propulsive activities against the reaction resistance of the environment.

On the reaction time, the basketballers are more at an advantage in terms of body physique; this is in line with the submission of Abernathy (2005), that the way people react to a given situation depends on the physique of the individual and that the somatotypes of athletes within given sports activities were dissimilar relative to size and proportions within given events and positional play.

**Conclusion**

The finding of this study showed that physical characteristics have impact on the performance of football and basketball players, this is manifested in the significant differences observed in the height and weight of the participants on reaction time. The implication of this is that body physique has an impact on sports performance.

**Recommendation**

It is recommended that coaches should consider body physique as a determinant factor when selecting their players, so as to enhance better performance in sporting competitions.
References


