A comparison of the physiological profiles of elite Gaelic footballers, hurlers, and soccer players

M C McIntyre

**Background:** Gaelic football, soccer, and hurling are prominent field games in Ireland and involve participants undertaking a variety of playing tasks and skills which place various physiological demands on the participants. The aim of this study was to evaluate and compare the mid-season physiological profiles of elite players.

**Methods:** Physiological assessment was carried out on 29 inter-county Gaelic footballers, 30 inter-county hurlers, and 21 League of Ireland soccer players.

**Results:** Significant differences were reported for % body fat ($p<0.05$), aerobic capacity ($p<0.05$), flexibility ($p<0.05$), upper body strength ($p<0.05$), upper body strength endurance ($p<0.05$), abdominal endurance ($p<0.05$), and speed endurance ($p<0.05$), while there were no differences recorded for height, weight, or speed levels. A relatively heterogeneous body size is evident for all three sports. Soccer players had lower body fat levels, greater aerobic capacity, greater strength endurance, and greater flexibility compared to both Gaelic footballers and hurlers, possibly due to specific training and conditioning programmes or physical adaptation to match play. The greater strength of both Gaelic footballers and hurlers and the superior speed endurance levels of Gaelic footballers also reflect the physical nature of the sport. Similar speed levels amongst all three sports reflect the importance of speed for performance.

**Conclusions:** The various physiological attributes for Gaelic football, soccer, and hurling reflect the physical requirements for success and participation in each of these field games.
Table 1: Physiological data for Gaelic football, hurling, and soccer players

<table>
<thead>
<tr>
<th></th>
<th>Football (n = 30)</th>
<th>Hurling (n = 29)</th>
<th>Soccer (n = 21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>24 (6)</td>
<td>24 (5)</td>
<td>23 (6)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>179 (6)</td>
<td>177 (6)</td>
<td>177 (5)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>81 (9)</td>
<td>83 (9)</td>
<td>78 (5)</td>
</tr>
<tr>
<td>% Body fat</td>
<td>13.4 (3)</td>
<td>18.4 (3)</td>
<td>12.2 (2)</td>
</tr>
<tr>
<td>Est. Vo2 max</td>
<td>48.7 (7)</td>
<td>47.4 (7)</td>
<td>57.6 (5)†‡</td>
</tr>
<tr>
<td>Sit and reach</td>
<td>25 (6)</td>
<td>23 (7)</td>
<td>30 (4)</td>
</tr>
<tr>
<td>Straight leg raise</td>
<td>65 (8)</td>
<td>88 (9)†</td>
<td>88 (8)‡</td>
</tr>
<tr>
<td>1 rep max</td>
<td>73.7 (12)†</td>
<td>63.2 (15)</td>
<td>68.1 (13)†</td>
</tr>
<tr>
<td>Upper body end</td>
<td>46.8 (10)</td>
<td>42.6 (10)</td>
<td>59.1 (11)†‡</td>
</tr>
<tr>
<td>Abdominal end</td>
<td>47 (11)</td>
<td>42 (9)</td>
<td>64 (11)†</td>
</tr>
<tr>
<td>Speed end.</td>
<td>817 (79)†</td>
<td>667 (44)</td>
<td>774 (25)†</td>
</tr>
</tbody>
</table>

Values are means (SD). Est., estimated; end., endurance. *Significantly different for hurling vs soccer (p < 0.05); †Significantly different for hurling vs football (p < 0.05); ‡Significantly different for football vs soccer (p < 0.05).

Footballers and hurlers. Soccer players were found to possess greater flexibility levels for the sit and reach test than hurlers (p < 0.05), while they also had greater hamstring flexibility in the straight leg raise than footballers, while hurlers also had greater hamstring flexibility than footballers (p < 0.05). Gaelic footballers had greater levels of strength during the 1 rep max than both hurlers and soccer players (p < 0.05), while soccer players had greater 1 rep max values than hurlers (p < 0.05).

Soccer players had greater upper (p < 0.05) and abdominal endurance (p < 0.05) in comparison to both hurlers and footballers. Footballers were found to have greater speed endurance levels than both hurlers (p < 0.05) and soccer players (p < 0.05), while soccer players (p < 0.05) had significantly greater speed endurance than hurlers. There was no difference in sprint times between any of the groups.

DISCUSSION

The age profiles of all teams were very similar. The age profiles of both the football and hurling teams were similar to mean (SD) values reported in the literature to range from 23.5 (4.9) to 26.8 (3.9) years for inter-county Gaelic footballers, while the League of Ireland soccer team had a profile similar to that of an English third division club (25.8 (4.7) years) but slightly higher than an English Premier League club (22.5 (3.6) years).

There were no differences reported for body mass between players of the three games. The values were similar to those reported for inter-county Gaelic footballers (79.9 (8.2) to 82.6 (4.8) kg), while the Ireland soccer team had a profile similar to an English third division club (77.7 (7.6) kg).

Likewise, there was no difference in stature between any of the players. Gaelic footballers have previously been reported to range in stature from 1.79 (0.07) to 1.83 (0.05) m, while professional soccer players and hurlers indicate a greater level of aerobic conditioning in soccer. This trend of soccer players possessing greater estimated VO2max values than both footballers and hurlers is evident through the range of values reported in the literature. Values for elite soccer players have been reported to range between 55 and 70 ml kg⁻¹ min⁻¹, while estimated VO2max values for Gaelic football have ranged between 53.8 (3.8) and 58.6 (3.8) ml kg⁻¹ min⁻¹. Therefore, it would seem there is a greater reliance on aerobic metabolism in soccer. However, the physiological strain of match play in soccer and Gaelic football has been estimated to be 70% and 72% of maximum oxygen uptake. As both sports exhibit similar physiological stress during competition, it would seem that better aerobic conditioning in soccer is responsible for this difference in aerobic capacity, particularly since in Gaelic football mean heart rate has been found to exceed 160 beats min⁻¹ for 43% of match play but only 26% of training time. This suggests that training in Gaelic football and hurling is inadequate to induce significant improvement in VO2max; however, more research is required.

Dunbar and Power investigated the flexibility of semi-professional and professional soccer players and found no differences between the groups; the lack of flexibility was attributed to the fact that flexibility is not usually viewed as an important component of fitness for soccer. However, the values reported here exceed those reported by Dunbar and Power and are more similar to values (31 cm) reported by Chin et al. for a professional soccer team in Hong Kong. The differences in sit and reach flexibility found in the present study indicate a greater level of flexibility in soccer players compared to Gaelic footballers and hurlers. It is unclear if this is due to a response to specific training and conditioning programmes or to physical adaptation to match play. However, Gaelic footballers had lower levels of hamstring flexibility during the straight leg raise in comparison to both soccer players and hurlers. Graham-Smith and Lees investigated the risk of hamstring injury while taking a place kick in Rugby Union. They reported that an additional stretch of 10.9° was placed on the biceps femoris muscle in comparison to a maximal assisted stretch, thus placing the hamstrings at greater risk of injury. While the kicking action in Gaelic football is not identical to Rugby Union place kicking, it must also place the hamstrings at increased risk of injury. Overdevelopment of the psoas muscle can very often occur in kicking sports and places extra strain on the hamstrings and may help explain the lack of hamstring flexibility among Gaelic footballers. A comparison of lower back posture between the three groups would be beneficial if poor hamstring flexibility is also related to lower back posture.

Gaelic footballers had superior upper body strength as expected in a sport which requires upper body strength in resisting and instigating physical challenges, both in terms of ball retention and winning possession. This is evident in the upper body strength of the footballers during the 1 rep max. In soccer the physical challenges are not as robust and there is more an emphasis on skill levels when attempting to retain...
possession, and there is therefore less emphasis on upper body strength. Soccer players also differed significantly from hurlers. Agility and speed are crucial in hurling, while skill levels are also important. However, the upper body strength of the hurlers indicates a lack of specific strength training.

The greater upper and abdominal endurance of soccer players in comparison to Gaelic footballers and hurlers indicates the importance of strength endurance in soccer as players are required to repeatedly resist physical challenges during competition.

All three codes require intermittent levels of high intensity exercise and this is evident in the speed endurance scores. The difference in speed endurance levels between soccer and Gaelic footballers can be attributed to the difference in the distance covered while undertaking high intensity exercise. Time motion analysis of Gaelic football revealed that high intensity exercise accounted for 16% of the total distance covered28 while in soccer it amounted to 8%.29 As a result Gaelic footballers are required to possess good speed endurance levels. The difference in speed endurance levels between hurlers and Gaelic footballers maybe due to the fact that in hurling the ball can often travel over 70 yards in one play, reducing the necessity to repeatedly sprint for long distances. Furthermore, players possess a high skill level, particularly at inter-county level where passes are often very accurate.

Speed is an important characteristic in all three codes in winning possession and evading opponents and is reflected in the identical speed scores in these sports.

CONCLUSIONS

The stature and body mass of players of the three sports indicate a relatively heterogeneous body size. Soccer players have lower levels of body fat than both Gaelic footballers and hurlers. This has been attributed to the greater playing time in soccer. The higher levels of body fat among hurlers indicate that leanness is not a prerequisite for participation in the sport. The difference in the aerobic capacities of soccer players and Gaelic footballers and hurlers indicates a greater level of aerobic conditioning in soccer and may be due to an adaptation to training and competition. Sit and reach flexibility compared well to other studies and the greater levels of flexibility of soccer players indicates it is a prerequisite for participation. The poor hamstring flexibility of Gaelic footballers may be linked to kicking and punting in the sport, however more research is required. The upper body strength of Gaelic footballers is somewhat higher than that of both soccer players and hurlers and is due to the physical nature of the game. The greater upper and abdominal endurance of soccer players indicates a greater level of abdominal conditioning. The greater speed endurance levels of Gaelic footballers maybe due to high intensity exercise during competition. Speed is an important physical attribute for participation in all sports. The trend and differences in the various physiological attributes for Gaelic football, soccer, and hurling can be attributed to a reliance on various physical attributes for participation in each of these particular field games.

Competing interests: none declared.

REFERENCES