# The Positional Demands of Inter-County Camogie

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Running Performance | Positional Variation | Game-Demands

## Headline

Camogie is a field-based stick and ball game, played by female amateur athletes in Ireland. Currently, no published research exists on the positional demands of camogie, with coaches relying on intuition, anecdotal evidence and other female field sport literature [1]. Establishment of objective metrics will give insight into the positional demands, and if specific training requirements are necessary.

## Aim

The aim of this study was to examine the positional running demands of inter-county camogie.

## Methods

### Athletes

24 athletes (age: 23.54 ± 3.37 years; height: 168.16 ± 6.4cm; body mass: 68.49 ± 7.42kg) competing in Division One of the National League participated in this study. Before participating, health screening questionnaires and informed consent forms were completed. Data collection procedures conformed to the Declaration of Helsinki recommendations. Only full-game datasets were included.

### Design

Observational analysis.

### Methodology

Participants wore individual GPS units (Playertek by Catapult, Australia) sampling at 10-Hz, in a protective pouch between the shoulder blades. Metrics measured included: Total Distance (km), High Speed Running Distance (m), Peak Speed ($m \cdot s^{-1}$), Relative Distance ($m \cdot min^{-1}$), Sprint Distance (m) and Relative Sprint Distance ($m \cdot min^{-1}$). High Speed Running (HSR) and Sprint thresholds were set at 4.4 $m \cdot s^{-1}$ and 5.5 $m \cdot s^{-1}$, respectively, in line with previous research [2]. Positional groups (Defenders, Mid-Fielders and Forwards) were designated according to playing position during games.

### Data Analysis

A Two-Way MANOVA was conducted to determine if a significant difference existed for position, time, or position and time interaction. Statistical significance was set at $p<0.05$, with Bonferroni adjustments. To determine meaningful differences, standardised effect sizes (ES) were calculated. Magnitudes of effect were defined as trivial (<0.2), small (0.21-0.6), moderate (0.61-1.2), large (1.21-2.0), very large (2.01-4.0) and nearly perfect (>4.0) [3].

## Results

Data is presented as mean ±SD in Table 1 and 2 for full-game and half by half descriptive statistics, respectively. Data analysis revealed significant differences exist between defenders and mid-fielders ($p<0.05$) for Total (ES=1.07) and Relative Distance (ES=0.98). No other significant positional differences were identified ($p>0.05$), with no significant difference for time or position and time interaction ($p>0.05$). Mid-fielders covered greater Total (ES=0.88) and Relative Distance (ES=0.74) compared to forwards. Defenders performed less HSR (ES=0.29-0.38), Sprint (ES=0.42-0.46) and Relative Sprint Distance (ES=0.39-0.46) compared to other positions. A small main effect exists between defenders and mid-fielders for Peak Speed (ES=0.3). Mid-fielders exhibited small-to-moderate temporal performance decreases. Both defenders and forwards displayed small and trivial temporal changes, with trivial increases in some instances.

## Discussion

Mid-fielders cover greater total and relative distance compared to other positions. Camogie players mean relative distance is similar to rugby sevens athletes [4], but lower than field-hockey and soccer competitors [5][6]. This suggests female athletes display different game-movement characteristics, dependant on sporting discipline. Sprint distance demands differ across position. Defenders cover less sprint distance than other positions, therefore altered sprint training may be necessary. This is not a new phenomenon, with defenders reported to complete lower total and sprint distance compared to mid-fielders [7][8]. Hodun [1], speculated this could be due to the anticipatory positioning requirements of marking an opponent.

Small positional variation in sprint capability exists within this cohort. Movement between positions is commonplace in camogie and broad capabilities are required, limiting position specific characteristics. This cohort recorded peak speeds lower than those of other female athletes [9][10]. Alternative game demands and constraints may have prevented players reaching higher speeds.

The temporal reduction in total distance (6.8%) covered by mid-fielders is higher than previously reported in international soccer [7], with defenders decrease of 4.56% similar to previous research. Furthermore, mid-fielders exhibit temporal reductions of 14.84 and 29.9% in both HSR distance and sprint distance, respectively. The ability to repeatedly perform at high-intensity has been shown to distinguish elite athletes from lower-level peers [11], therefore minimising this decrease should be a key consideration for coaches. Temporal reductions in relative distance (1.9-5.6%) is slightly lower when compared to field hockey [8]. Given the use of rolling substitutes in field hockey, this may not be expected. The greater playing numbers and distance the ball travels during camogie match-play may give rise to this finding.

The greater physical workload required to compete as a mid-fielder suggest these players may need exposure to higher workloads in preparation for match-play. A position specific training approach may work best for elite camogie players, with a broad capability required, regardless of position. This study provides insight into the positional demands of camogie, assisting coaches in designing and reviewing training and match performance.

**Table 1. Mean (±SD) Running metrics for inter-county camogie players by position.**

| | Group (n = 45) | Defenders ( n = 22) | Mid-fielders (n = 5) | Forwards (n = 18) |
|---|---|---|---|---|
| Total Distance (km) | 5.8 ± 0.9 | 5.57 ± 0.97* | 6.54 ± 0.46 | 5.87 ± 0.82 |
| High Speed Running (m) | 732.74 ± 244.51 | 693.43 ± 263.72 | 792.68 ± 253.29 | 764.13 ± 222.78 |
| Peak Speed ($m \cdot s^{-1}$) | 6.86 ± 0.35 | 6.9 ± 0.33 | 6.8 ± 0.36 | 6.84 ± 0.37 |
| Relative Distance ($m \cdot min^{-1}$) | 85.03 ± 13.57 | 81.51 ± 14.66* | 95.03 ± 7.93 | 86.56 ± 12.18 |
| Sprint Distance (m) | 205.77 ± 92.5 | 184.83 ± 88.2 | 221.76 ± 90.23 | 226.91 ± 97.49 |
| Relative Sprint Distance ($m \cdot min^{-1}$) | 3.04 ± 1.38 | 2.73 ± 1.32 | 3.25 ± 1.34 | 3.36 ± 1.44 |

* Significantly different from Mid-Fielders ($p<0.05$).

**Table 2. Mean (±SD) Temporal Changes in running metrics across halves of play by position.**

| | Total Distance (km) | High Speed Running (m) | Peak Speed ($m \cdot s^{-1}$) | Relative Distance ($m \cdot min^{-1}$) | Sprint Distance (m) | Relative Sprint Distance ($m \cdot min^{-1}$) |
|---|---|---|---|---|---|---|
| **Defenders** | | | | | | |
| 1st Half | 2.85 ± 0.53 | 355.42 ± 136.3 | 6.66 ± 0.39 | 83.6 ± 15.08 | 89.02 ± 45.18 | 2.62 ± 1.36 |
| 2nd Half | 2.72 ± 0.51 | 338.01 ± 143.43 | 6.73 ± 0.38 | 79.42 ± 15.59 | 95.13 ± 53.28 | 2.8 ± 1.56 |
| Main Effect | 0.25 | 0.12 | 0.18 | 0.27 | 0.12 | 0.12 |
| **Mid-fielders** | | | | | | |
| 1st Half | 3.38 ± 0.2 | 428.11 ± 137.35 | 6.75 ± 0.35 | 97.73 ± 7.27 | 130.4 ± 66.29 | 3.82 ± 2.03 |
| 2nd Half | 3.15 ± 0.27 | 364.56 ± 120.5 | 6.46 ± 0.39 | 92.3 ± 8.71 | 91.36 ± 48.21 | 2.69 ± 1.4 |
| Main Effect | 0.97* | 0.49 | 0.78* | 0.68* | 0.67* | 0.65* |
| **Forwards** | | | | | | |
| 1st Half | 2.94 ± 0.47 | 381.38 ± 126.18 | 6.79 ± 0.38 | 87.4 ± 12.81 | 119.31 ± 59.16 | 3.55 ± 1.76 |
| 2nd Half | 2.93 ± 0.44 | 382.75 ± 126.09 | 6.6 ± 0.36 | 85.72 ± 13.69 | 107.6 ± 53.52 | 3.17 ± 1.57 |
| Main Effect | 0.02 | 0.01 | 0.51 | 0.13 | 0.21 | 0.23 |

* Moderate main effect between playing halves (>0.6)

## Practical Applications

- Mid-fielders cover greater total and relative distance, but also show greater temporal performance decrements compared to other positions. Improving players ability to minimise these decrements should be prioritised.
- Camogie players peak speeds are lower than those reported in other field sports and is an area for improvement with appropriate sprint training.
- Forwards cover greater sprint distance than defenders and should be considered when preparing forwards for competitive match-play.
- Game-based scenarios exposing defenders to both cognitive and physical workloads should be incorporated also.

## Limitations

- The small sample of datasets included is a limitation to this study. However, it will provide a platform to extend research in this area to further establish match-play demands.

## Conflict of Interest

This study was funded by the President's Fellowship Award Institute of Technology Carlow, Carlow, Ireland.

## Acknowledgements

The authors wish to acknowledge The Camogie Association and respective teams involved in this study.

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