



## Original research

## Epidemiology of injury in male adolescent Gaelic games

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## ABSTRACT

**Objectives:** There is a lack of epidemiological research in adolescent Gaelic games, with previous research primarily focusing on elite adult males. This study aimed to prospectively capture the epidemiology of injury in male adolescent Gaelic games over one year.

**Design:** Prospective cohort study.

**Methods:** Two hundred and ninety two (15.7 ± 0.8 years) male adolescent Gaelic footballers and hurlers took part in a one year prospective epidemiological study. Injuries were assessed weekly by a certified Athletic Rehabilitation Therapist and an injury was defined as any injury sustained during training or competition resulting in restricted performance or time lost from play. An injury report form was utilised to standardise injury information.

**Results:** Match injuries were more frequent in Gaelic footballers (9.26 per 1000 h) and hurlers (11.11 per 1000 h) than training injuries (2.69 and 3.01 per 1000 h, respectively). Over a quarter of injuries in adolescent Gaelic footballers (26.7%) and hurlers (26.5%) were overuse in nature. Recurrent injuries were also frequent, particularly in adolescent Gaelic footballers (47.3%). Lower limb injuries predominated (football 74.7%, hurling 58%), particularly in the knee (18.7%, 20.0%) and ankle (12.0%, 10.0%). Hamstring injuries were more frequent in footballers (13.3%), with lower back injuries more common in hurlers (22.0%). Minor injuries were common in hurling (61.7%), with moderate (20.8%) and severe (37.5%) injuries predominant in Gaelic football.

**Conclusions:** Injuries are frequent in adolescent Gaelic games and this study sets the scene for the establishment of injury prevention strategies for this at risk population.

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## 1. Introduction

Gaelic football and hurling (Gaelic games) are Ireland's national sports. They last up to 60 min for adolescent players and consist of two opposing teams of 15 players (goalkeeper, six defenders, two midfielders and six forwards).<sup>1,2</sup> Gaelic games are played on a rectangular field (length 130–145 m, width 80–90 m) and are multidirectional contact games that necessitate players performing at a high level of intensity and velocity.<sup>3</sup> Gaelic football has been described as a mixture of soccer and rugby and is similar to Australian Rules football.<sup>4</sup> Essential movements include sprinting, tackling, kicking, soloing (kicking the ball to yourself when running), shouldering (shoulder to shoulder charge), jumping, turning and catching.<sup>5</sup> Hurling on the other hand is similar to shinty, lacrosse or field hockey and participants use a stick called a hurley to hit a small, hard leather ball (sliotar).<sup>2</sup> Movements essential to

hurling include sprinting, catching, striking (throwing the sliotar into the air and hitting it using the hurley), shouldering, blocking the sliotar with the hurley, soloing (running while keeping the sliotar balanced or bouncing on the hurley) and hooking (using the hurley to prevent the opposition swinging their hurley to hit the sliotar).<sup>2</sup>

While participation in sport provides numerous health and social benefits, an innate risk of injury exists.<sup>6,7</sup> The trauma, pain and loss of function accompanying injury can be substantially detrimental to the participant, by preventing sports participation or negatively affecting performance.<sup>5,8</sup> However, the occurrence and magnitude of the effects of many injuries may be reduced with the implementation of injury prevention strategies.<sup>7,9</sup> The initial step to prevent injury is to establish the incidence of injury in the sport.<sup>10</sup> The amount of published epidemiological studies in Gaelic games is small in comparison to international sports, with only six studies in Gaelic football and three in hurling. Not only do these studies vary in their research design, study length, definition of injury and reporting procedures, they also have primarily focused on elite adult players.<sup>5,11,12</sup> In fact, no epidemiological data is

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available on adolescent hurling injuries and only a single study has been published on adolescent Gaelic footballers.<sup>13</sup> In addition, it is relatively common for adolescents to play both Gaelic football and hurling. Thus, this study will prospectively examine the epidemiology of injury for one year in adolescent Gaelic games.

## 2. Methods

This was a prospective cohort study in under-16 male adolescent Gaelic footballers and hurlers for one year. To standardise the information gathered, an injury report form was developed. The injury report form was developed by three clinicians; a sports medicine physician and two certified athletic rehabilitation therapists. The form was primarily based on the National College Athletic Association Injury Surveillance System<sup>14</sup> and was also influenced by epidemiological research studies in Gaelic games and consensus statements on epidemiological research studies. The developed form was then externally reviewed by three clinicians and researchers with extensive experience researching the epidemiology of sporting injuries. The injury report form captured information on the injury received, including: the sport injured in, onset of injury, side of injury, location of injury, type of injury, nature of injury, how many minutes into sporting activity the injury occurred at, severity of injury, mechanism of injury, month injury occurred, protective equipment worn if any and any further investigations required. The number of days absent from sport was also noted. Ethical approval was granted by the X Ethics committee.

Male under-16 adolescents that played Gaelic games were eligible for this study. Two hundred and ninety two ( $15.7 \pm 0.8$  years) adolescents were recruited from six secondary schools. 46.8% of participants primarily played Gaelic football, 33.9% hurling and 19.3% played Gaelic football and hurling to similar extents.

An injury was defined as any injury sustained during training or competition resulting in restricted performance or time lost from play.<sup>15</sup> Injury severity was defined according to days missing from full participation and was sub-classified into minor injuries (<7 days), moderate injuries (8–21 days) and severe injuries (>21 days).<sup>11</sup> A recurrent injury was any injury of the same type and site as the original injury that occurred after a participant returns to full participation.<sup>16</sup> This was further sub-classified as early recurrent (<2 months), late recurrent (2–12 months)<sup>16</sup> and persistent injuries. "Muscle tightness" was classified according to the Munich consensus statement on muscle injuries in sport as fatigue-induced muscle disorder.<sup>17</sup>

Recruited participants attended an information session in their school to explain the purpose, benefits and testing procedure of the study. Informed consent was obtained from participants and their legal guardians. Weekly injury clinical examinations took place in the school by the primary researcher (a certified athletic rehabilitation therapist) alongside two final year students recruited from an athletic rehabilitation therapy degree course. Each tester immediately filled out the injury report form after each clinical examination. At the end of each clinical examination session, the primary researcher reviewed the injury report forms and injuries.

Incidence proportion, repeat incidence proportion and injuries per 1000 h were calculated. Incidence proportion was measured using the following calculation:

Incidence proportion (IP)

$$= \frac{\text{Number of injured participants during a specified time}^*}{\text{Number of participants at risk during a specified time}}$$

\*Number of participants who sustain at least 1 injury.  
95% confidence intervals were calculated using:

$$95\% \text{ CI} = \text{IP} \pm 1.96 \times \text{SE}(\text{IP})$$

where, the Standard error (SE) was calculated using:

$$\text{SE}(\text{IP}) = \frac{\sqrt{\text{IP} \times (1 - \text{IP})}}{N}$$

where,  $N$  is the number of participants at risk.

Incidence proportion does not account for participants who become injured multiple times, thus repeat incidence proportion was calculated:

Repeat incidence proportion

$$= \frac{\text{Number of repeat injured participants during a specified time}}{\text{Number of injured participants during a specified time}}$$

Incidence rate per 1000 h was calculated as follows:

$$\text{Incidence rate (IR)} = \frac{\text{Number of injuries}}{\text{Total hours playing sport}} \times 1000$$

95% confidence interval was calculated using:

$$95\% \text{ CI} = \text{IR} \pm 1.96 \times \text{SE}(\text{IR})$$

With the Standard error (SE) calculated using:

$$\text{SE}(\text{IR}) = \frac{\sqrt{\text{Number of injuries}}}{\text{Total hours playing sport}}$$

Frequency of sports played, onset, type, side, location, nature, severity, mechanism, month, protective equipment and further investigations were also measured.

## 3. Results

There were 125 injuries in 292 adolescent Gaelic footballers and hurlers. Ninety five participants became injured with 25 of these receiving two or more injuries. Incidence proportion indicated that 32.5% (95% CI: 27.1%–37.9%) of adolescent players became injured in a single year. Of the participants that became injured, 26.3% (95% CI: 17.4%–35.1%) developed a subsequent injury. Match injuries accounted for a higher injury incidence than training in both Gaelic football and hurling; however, the match injury incidence in hurling was higher (Table 1). Acute injuries were predominant with just over a quarter of injuries being overuse in nature (Table 2). A larger proportion of footballers (47.3%) sustained a recurrent injury than hurlers (33.3%), in particular early recurrent and late recurrent (Table 2).

A similar percentage of right sided injuries occurred (41.9%, 38.8%); however, bilateral injuries were more frequent in hurlers (18.4%), with left sided injuries more common in football (50.0%). Lower body injuries were predominant; however, they were more common in footballers (74.7%) than hurlers (58%). Injuries to the lower back (22.0%), knee (20.0%), ankle (10.0%) and pelvis and groin (10.0%) were predominant in hurlers (Table 2). Injuries to the knee (18.7%), hamstring (13.3%) and ankle (12.0%) were most frequent in Gaelic footballers. The regional distribution of injury was similar between both sports; however, injuries to the trunk/spine were more frequent in hurlers (34.7%) than footballers (5.3%) and hip/groin/thigh injuries in footballers (34.7%) than hurlers (17.0%).

Strains (30.7%), sprains (22.7%) were the primary nature of injury noted in footballers with fatigue-induced muscle disorders (28.6%), contusions (20.4%), strains (14.3%) and sprains (14.3%) common in hurlers (Table 2).

A similar percentage of Gaelic footballers (66.7%) and hurlers (68.1%) continued playing and training after the injury occurred. Minor injuries were more common in hurling (61.7%), conversely moderate (20.8%) and severe (37.5%) injuries were more predominant in football (Table 2). Just 6.7% of footballers and 8.0% of hurlers required surgery due to an injury. Further investigations were

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