



# How they won Rugby World Cup through height, mass and collective experience

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## ABSTRACT

**Objectives** To investigate the evolution of anthropometric characteristics in World Cup rugby players and identify elements associated with performance.

**Design** Age, weight and height were collected for 2692 World Cup rugby players as well as rankings in each World Cup, and collective experience of winners, finalists, semifinalists and quarter finalists in comparison to the rest of the competitors. Anthropometric parameters were compared according to age and position (back and forwards).

**Results** From 1987 to 2007, forwards and backs have become heavier by 6.63 and 6.68 kg and taller by 0.61 and 1.09 cm, respectively. The collective experience of the forwards' pack is a value increasing with the final ranking attained, as well as the weight of forwards and the height of backs.

**Conclusions** For all Rugby World Cups, the highest performing teams have the tallest backs and heaviest forwards with the highest percentage of collective experience.

## INTRODUCTION

The advent of professionalism in rugby was accompanied by an increase in the body size of players,<sup>1</sup> observed either in the French championship or international matches during the Bledisloe Cup.<sup>2</sup> This trend follows the evolution of the constraints of this activity, in which the number of tackles or rucks per game increased by a factor of 4 in 30 years.<sup>2</sup> Eaves and Hughes<sup>3</sup> also showed that the incidence of rucks in five and six nations championships had increased from 62.4 events/game in 1988 to 134.4 in 2002. Austin *et al*<sup>4</sup> suggest that the development of modern rugby union has resulted in an increase in high-intensity activity and has become more physically demanding due to increases in total duration and speed of play.<sup>3</sup> Thus, increased mass and height are desirable characteristics, such as in American football where the largest and most powerful players are selected.<sup>5</sup> Indeed, overall size appears as a predictor of efficiency<sup>6</sup>: a strong association exists between mass, height and the individual and collective performances. Teams with the tallest and heaviest players outperform others in the 1999 Rugby World Cup.<sup>6</sup> However, rugby union generates many phases of contact, tackling, ruck, maul and scrum, which necessitate various physical demands<sup>7-9</sup> requiring players to participate in intensive efforts interspersed with some periods of lower intensity.<sup>1,10</sup> In fact, rugby performance involves a large number of

parameters dependent on the specific constraints of the activity. Among these, strength, speed, aerobic and anaerobic power, ability to change direction and sport-specific attributes are influential.<sup>11</sup> Performance is also related to collective efficacy. Indeed, groups with a strong sense of collective efficacy are more likely to succeed than those who do not share this particular attribute<sup>12</sup> and maintain their group performance longer.<sup>13</sup> In other sports such as soccer, a greater percentage of new recruits is associated with a lower number of points scored per game.<sup>14</sup> In rugby, the score of collective efficacy has been estimated to account for 22% of the variance in positive affect in prematch.<sup>15</sup>

As rugby becomes more physically demanding,<sup>7</sup> we hypothesised that players' mass, height and collective experience are all crucial parameters in World Cup performance progression.

## METHODS

This study aimed to investigate changes in the height and mass of rugby players who took part in all Rugby World Cups and identify elements associated with higher performance.

## Ethics

This study uses a research protocol qualified as non-interventional, in which '...all acts are performed in a normal manner, without any supplemental or unusual procedure of diagnosis or monitoring.' (Article L1121-1 of the French Public Health Code). According to the law, its approval therefore did not fall under the responsibility of a committee for the protection of persons (CPP). For these reasons, it is not necessary to obtain informed consent from the athletes evaluated. This study is designed and monitored by the IRMES (Institut de Recherche bioMédicale et Epidémiologique du Sport) scientific committee.

## Data collection

Data for age, mass and height were collected for all players who participated in the Rugby World Cup from 1987 to 2007. Data were collected from official sites of national teams such as [www.ffr.fr](http://www.ffr.fr), [www.allblacks.com](http://www.allblacks.com) and [www.fijirugby.com](http://www.fijirugby.com), and cross-classified by various sources such as [www.itsrugby.fr](http://www.itsrugby.fr), [www.lionsrugby.com](http://www.lionsrugby.com) or [www.rugbyrama.fr](http://www.rugbyrama.fr). The annual version of Rugbyrama website collects official data (for age, mass and sizes) provided by the clubs. These data were derived from the longitudinal follow-up of players, with measurements done by each team physician.