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The Judo World Ranking List and the Performances in the 2012 London Olympics

Emerson Franchini[1,*] and Ursula Ferreira Julio[1]

[1]School of Physical Education and Sport, University of Sao Paulo (USP), Sao Paulo, Brazil

*Corresponding author: Emerson Franchini, School of Physical Education and Sport, University of Sao Paulo (USP), Sao Paulo, Brazil. Tel: +55-1130912124, Fax: +55-1130913135, E-mail: emersonfranchini@hotmail.com

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Background: In 2009, the International Judo Federation (IJF) created a World Ranking List (WRL) to classify athletes according to their performance in international-level competitions and to qualify athletes for the Olympic Games.
Objectives: Considering that this ranking system provides useful information concerning athletes' performance in competitions during a 2-year period and during Olympic Games, the objective of this paper was to verify how long- and short-term performances in WRL competitions predict the performance in the 2012 London Olympic Games.
Patients and Methods: Data from 233 male and 154 female athletes who took part in the London Olympic Games were analyzed considering: measures of long- and short-term performance, as well as measures of athlete approach to the Olympic Games and the points obtained in the 2012 London Olympic Games. Athletes were divided into male and female groups. Stepwise linear regression was conducted to predict points acquired in the Olympic Games. Significance level was set at 5% for all analyses.
Results: The equation found for females was: 46.055 + 0.142 (points valid in the two years period) - 14.422 (number of competitions in 2012) (adjusted $R^2 = 0.240$, standard error = 130 points, $P < 0.05$). For males, the equation found was: -38.079 + 0.102 (points valid in the two years period) + 1.088 (percentage of matches won in 2012) (adjusted $R^2 = 0.257$, standard error = 109 points, $P < 0.05$).
Conclusions: Thus, only 24% to 26% of female and male judo performance in the 2012 London Olympics could be predicted, respectively, by variables derived from the IJF WRL.

Keywords: Sports; Martial Arts; Athletes

1. Background

In 2009 the International Judo Federation (IJF) created a World Ranking List (WRL) to classify athletes according to their performance in international-level competitions (1). This raking system, inspired by the ATP tennis tour (2), is used to place athletes in specific positions in competitions' seeds, to avoid that the best athletes competing against each other in the first competition phases. However, the main use of this ranking is to qualify athletes for the Olympic Games. Thus, for the first time in judo competition history there was systematic criteria to compare athletes from different countries in an official established World Ranking List. Although it is possible to infer that some athletes also take part in other competitions (nationals, for example) than those from the World Ranking List, it is assumed that international-level judo athletes focus on the official international competitions to sum up points to participate in the Olympic Games. During the classificatory process to the 2012 London Olympics, athletes took part in World Cups, Continental Championships, Grand Prix, Grand Slams, World Masters and World Championships. The title in each of these competitions represented a specific amount of points accumulated, according to the IJF criteria (1) 100 for World Cups, 180 for Continental Championships, 200 for Grand Prix, 300 for Grand Slams, 400 for World Masters and 500 for World Championships. The silver medal represented 60% and the bronze medal represented 40% of the points given to the gold medal in each of these competitions. Smaller amounts of points were given for fifth, seventh, other positions and even for participation. The points were accumulated during a 2-year period, considering the best five performances in each year. Furthermore, the points accumulated in the first year were computed as 50% of their original value and the points acquired in the last year were considered in their full value (1).

2. Objectives

Thus, considering that this ranking system provides useful information concerning athletes' performance in competitions during a 2-year period and during the most prestigious competition in judo (i.e. the Olympic Games), the objective of this paper was to verify how long and short term performances in World Ranking List com-

petitions predicted the performance in the 2012 London Olympic Games.

3. Patients and Methods

3.1. Sample

Data from 387 athletes who took part in the Olympic Games were analyzed (n = 233 males and 154 females). Table 1 presents the number of athletes for each weight category during the 2012 London Olympic Games.

Table 1. Number and Percentage of Athletes Who Took Part in Judo Competitions During the London 2012 Olympic Games [a]

Weight Categories	Male	Female
Extra-light-weight	37 (16)	19 (12)
Half-light-weight	36 (15)	23 (15)
Light-weight	34 (14)	25 (16)
Half-middle-weight	34 (14)	24 (16)
Middle-weight	30 (13)	22 (14)
Half-heavy-weight	30 (13)	21 (14)
Heavy-weight	32 (13)	20 (13)
Total	233 (100)	154 (100)

[a] Data are presented as No. (%).

3.2. Variables Considered

Competition results in the World Ranking List were searched for each of these athletes and the following variables determined: (a) Measures of athletes' performance in the two years before the Olympic Games (the classificatory list was divulgated by IJF on 10th May and the first weight category was disputed in 28th July, in London Olympic Games) (i) final position in the IJF ranking list, excluding athletes from the same country of the athlete, as used in the qualification system to the Olympic Games; (ii) total points obtained to qualify to the Olympic Games; (b) Measures athletes' performance close to London Olympics: (i) total points obtained in 2012, including competitions performed after the end of the Olympic Games classificatory period; (ii) matches won and lost in 2012, including competitions performed after the end of the Olympic Games classificatory period; (c) Measures of athlete approach to the Olympic Games, i.e., indicators of competition schedule strategy to prepare to the Olympic Games: (i) number of competitions in 2012 before the Olympic Games, including competitions disputed after the end of the classificatory period; (ii) interval (in days) between the last competition and the Olympic Games. Points at the Olympic Games varied as follows: gold medal = 600 points; silver medal = 360 points; bronze medal = 240 points; 5th place = 120 points; 7th place = 96 points; 1/16th = 72 points; 1/32nd = 48 points; 1 match won = 24 points.

3.3. Group Divisions

As the criteria for classification through the World Ranking List differed between males (best 22 athletes) and females (14 best athletes), athletes were divided into male and female groups and the points obtained in the 2012 London Olympic Games were considered, as the points system used the final position of each athlete as in the World Ranking List.

3.4. Ethical Issues

The results of the competitions analyzed were obtained from the website of the International Judo Federation (http://www.ijf.org) and these archive data are from open-access. Morley and Thomas (3) affirm that there are no ethical issues in analyzing or interpreting these data since they were obtained in secondary form and not generated by experimentation. In addition, athlete's personal identification was replaced by a code, ensuring anonymity and confidentiality. This process was used in a previous study analyzing home-advantage in competitions of the World Ranking List (1).

3.5. Statistics

When the homogeneity of variances was confirmed through the Levene test the Pearson correlation was used to determine the relationship between variables. Stepwise multiple linear regression was conducted to predict points conquered in the Olympic Games. The dependent variable was points conquered in the Olympic Games. The independent variables were all variables associated with long-and short-term performances in World Ranking List competitions. Colinearity analysis was also conducted. The descriptive results were presented as the coefficient of correlation value (R), the coefficient of determination value (R^2), adjusted R^2 value ($adjR^2$), standard error and a significance level of (P). All analyses were conducted separately for female and male athletes. Significance level was set at 5% for all analyses (4). The data were analysed using Statistica for Windows, version 12.

4. Results

For females, the following regression equation was found:

Points at Olympic Games = 46.055 + 0.142 (points valid in the two years period) – 14.422 (number of competitions in 2012) (Equation 1)

$R = 0.500$, $R^2 = 0.250$, adjusted $R^2 = 0.240$, Standard error = 130 points, $P < 0.05$

For males, the following regression equation was found:

Points at Olympic Games = -38.079 + 0.102 (points valid in the two years period) + 1.088 (percentage of matches won in 2012) (Equation 2)

$R = 0.514$, $R2 = 0.264$, adjusted $R2 = 0.257$, standard error = 109 points, $P < 0.05$

5. Discussion

The main results of our study were that two-year IJF World Ranking List performance and short-term performance (competition performance in the year of the Olympic Games) could predict approximately 24% and 26% of the points at Olympic Games for female and male groups, respectively. Considering that the maximum amount of points in the Olympic Games was 600, the standard error for the equation determined for male judo athletes was 18%, while for females the standard error was 22%. For females, the two significant variables inserted in the predictive model were points valid in the 2-year period and number of competitions in 2012. While points valid in the last two years had a positive association with performance in the Olympic Games, increased competition participation in 2012 was negatively associated with performance in this competition. Thus, for females it seems that the regularity in competitions is important for future performance, while participation in a competition near the main event has negative effects, suggesting that opponents may take advantage of the technical-tactical analysis of recent performance of the most competitive athletes. For males, points valid in the previous 2-year period and percentage of matches won in 2012 were associated with the final performance in the Olympic Games, suggesting that both long-term and short-term performances had an addictive effect to predict the competitive result in the Olympic Games. The small predictive value of the IJF World Ranking List concerning the performance in the 2012 London Olympic Games can be explained by the way this ranking was established, i.e. many competitions disputed in one single continent (Europe) or in a few countries in the other continents, resulting in a home-advantage effect (1). The fact that the best five results of each year were considered made the economical status of a given country to have a strong influence on the final position in the ranking, as many athletes from poor countries had difficulty to take part in these competitions. However, as these athletes were able to qualify via the continental quota (approximately 26% of all places to the Olympics were distributed via continental quotas), they could succeed in the Olympic Games despite the fact they were not well positioned in the World Ranking List. The recent changes promoted by the IJF in the World Ranking List competitions, as the inclusion of more competitions on each continent will probably decrease the effect of economical status of different countries on the qualification system for the next Olympic Games. Female and male judo performances in the 2012 London Olympics were only partially predicted (24% and 26%, respectively) by variables derived from the IJF World Ranking List. This ranking system is probably not measuring only judo performance, because it was affected by many intervenient variables (e.g. home-advantage, economical constraints for poor countries). Another possibility is that the Olympic Games judo competition is a very specific tournament, which cannot be properly predicted by other performances from judo athletes taking part in this event.

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