BEGINNING AGE, WRESTLING EXPERIENCE AND WRESTLING PEAK PERFORMANCE–TRENDS IN PERIOD 2002–2012

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Abstract:

The aim of this study was to establish the trend of beginning age, years of experience and peak performance age of wrestlers who won their first European Championships' (ECh) medal in the period from 2002 to 2012, and to determine probable differences in those parameters between the weight categories. The study was conducted on a sample of 180 wrestlers. Winners of ECh medals began with wrestling at the age of 10.27±2.79 years, they had had 14.61±4.02 years of wrestling experience before they won a medal and they won the medal at the age of 24.86±3.29 years. The obtained statistical differences (p<.05) are: experience 2010<2004, peak performance 2003>2007, 2011, and age 2004>2006, 2007, 2010, 2011. The differences between weight categories are: beginning 120>60, 66, 74, 84, 96; age of experience 55<74, 84, 96; peak performance 55<66, 96; 60<66, 96, 120. The findings suggest one should begin with wrestling approximately at the age of 10 years. Years of experience and peak performance age are significantly correlated variables. In the lightest and the heaviest weight categories the wrestlers began with wrestling at a later age and the period of wrestling before winning the first medal was shorter. In heavier categories it was necessary to reach mature wrestling age. This study offers wrestling coaches a precise set of information on when to begin with wrestling and at which age one can expect a wrestler to win the first major competition in accordance with his weight category.

Key words: European championships, Greco-Roman wrestling, weight categories, adult wrestlers

Introduction

Modern Greco-Roman wrestling pertains to sports of the greatest complexity from technical-tactical aspect as well as from aspect of physical fitness (Kraemer, et al., 2001; Utter, Stone, O'Bryant, Summinski, & Ward, 1998). Creating elite wrestlers is a long-lasting and complex process. Age at which one commences with wrestling is important since it should ensure that the complex process of learning wrestling and of the development of psychophysical abilities would be done in a quality and thorough manner. It is difficult to give a precise answer to the question at which age to begin with wrestling training; the timespan suggested by literature is wide (Šprem, 2013). Bompa suggests to begin with wrestling between 11 and 13 years (Bompa, 1999); Petrov investigated this issue in his book 35 years ago; a number of authors from the German Democratic Republic and the former Soviet Union suggested the beginning between at the age period 7-13 years, whereas Petrov suggested to begin earlier at the age of 6 years (Petrov, 1997). Regardless of the differences between biological and chronological

age, the suggested range of seven years to begin with wrestling is hardly acceptable. At this age a series of sensitive phases of growth and development of different abilities are interchanged (Viru, et al., 1998). A lack of recent scientific studies, which explore that issue in wrestling can be noticed.

A long lasting process of training and preparation of wrestlers is necessary before any important international medal can be won; Olympic winners in Greco-Roman wrestling are 27.15 years old on average (Curbi, 2004). To win a gold Olympic medal, it is necessary to train for approximately 15 to 20 years (Curbi, 2004; Bompa, 1999). Wrestlers of a higher quality level differ significantly from wrestlers of a lower quality level in terms of years of training experience (Pallares, Lopez-Gullon & Torres-Bonete, 2012; Garcia-Pallares, Lopez-Gullon, Muriel, Diaz, & Izquierdo, 2011; Karnincic, Tocilj, Uljevic & Erceg, 2009). The question is how many years of training are necessary to win a medal at the European Championships? A precisely determined information on how long one needs to train before winning the first major competition medals

would be of use to coaches and wrestlers who often do not have the patience to wait too long.

Wrestlers achieve their best sports results at the so called mature age. Wrestlers older than 25, who have rich experience in fighting at international competitions have matured mentally, and that mental advantage against the opponent can be an important factor of wrestler's success (Pettersson, Ekstrom, & Berg 2013; Lopez-Gullon, et al., 2011). Elite wrestlers are significantly older than athletes from other sports (Lopez-Gullon, et al., 2011; Starczewska-Czapowska, Faff, & Borkowski, 1999). Hypothetically, a wrestler could have began with wrestling at the age of three years; after 15 years of wrestling he/she would be 18 years old and would have enough training experience but not the maturity of a 25-year-old wrestler. Experience and wrestling maturity must be highly correlated because they are both increased with time, but what about the relation between them?

As to insure equal conditions to all competitors in martial arts, weight categories have been determined. FILA (Fédération Internationale des Luttes Associées) has set, according to the up-to-date international rules, seven weight categories (55 kg, 60 kg, 66 kg, 74 kg, 84 kg, 96 kg and 120 kg). However, the population weight average of a particular country may vary from the international weight average. Categories that are close to the national weight average have the biggest number of contestants. The competition is the highest in the weight category with the abundant number of contestants. Thus, the wrestlers who have just started wrestling, who have no experience, have small or no chance to succeed.

The aim of this study was to determine the trend of beginning age, experience and peak performance age of wrestlers who won their first European Championships' medal in the period from 2002 to 2012, and to determine the differences in those parameters between the weight categories.

Methods

Subject sample

The subject sample included 180 male wrestlers who won their first European Championships' medal in the period between 2002 and 2012. To determine the differences between the observed years, the sample was divided into 10 groups according to the year of winning the first medal in the period from 2002 to 2012. To determine the differences between the weight categories, the sample was divided into 7 weight categories according to the current FILA rules. As all subjects were winners of European medals in wrestling, we can say that the sample of subjects was highly homogenous.

Variables

The sample of variables consists of three variables: wrestler's age at which he began doing wrestling (Beginning), years of wrestling training before he won his first medal (Experience), wrestler's age at which he won his first medal at the European Championship (Peak performance).

Procedures

All the data on wrestlers were obtained by reviewing the results of the European Championships from 2002 to 2012 and wrestlers' personal records published at the official web sites of FILA.

Statistical analysis

All the data were analysed by using the Statistica 11 software package (Statsoft, USA). All the variables were analysed by descriptive statistics: means, standard deviations and the minimum and maximum values. The Kolmogorov-Smirnov test was used to determine the normality of distribution for all the variables according to the year and weight category. The differences between the observed years and weight categories were analysed by one-way analysis of variance (one-way ANOVA), with the use of the Fisher's LSD test. Correlation between experience and peak performance was determined by correlation analysis. The level of significance was set at $p < .05$.
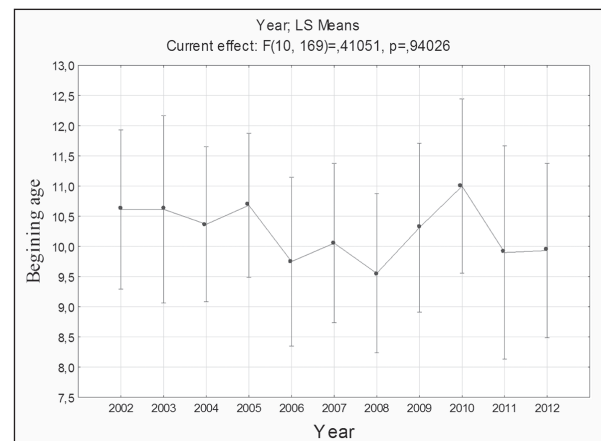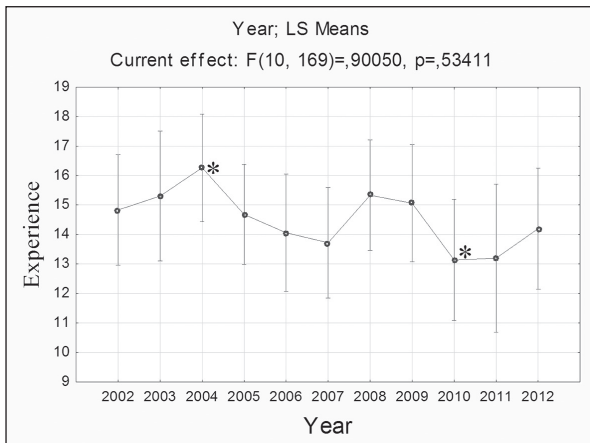
Results

Figure 1. Beginning age when the subjects started with wrestling – trend from 2002 to 2012, with the differences between the years.

In Figure 1 we can see that there were no statistically significant differences between wrestlers who won their first European medals in the period 2002–2012 in reference to the age at which they began doing wrestling.
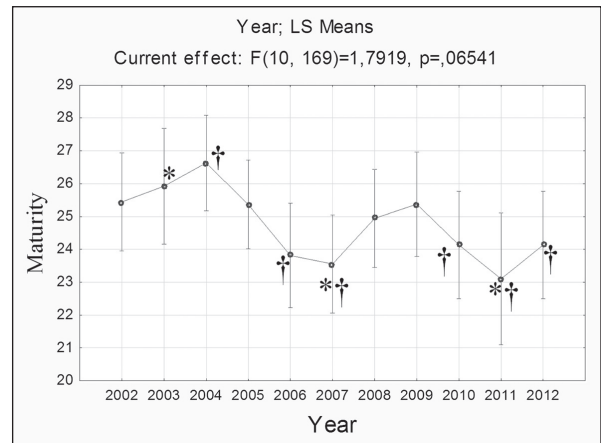
*Fisher's LSD=2004>2010

Figure 2. Wrestling experience before the first European was won – trend from 2002 to 2012, with the differences between the years.

*Fisher's LSD 2003>2007, 2011; † Fisher's LSD 2004>2006, 2007, 2010, 2011, 2012

Figure 3. Age at the time of winning the first European medal, peak performance – trend from 2002 to 2012, with the differences between the years.

In Figure 2 we can see the trend of years of experience among wrestlers who won a European medal in the period 2002–2012. A noticeable decrease of the trend was in 2010; the experience in wrestling training was significantly shorter in relation to the year 2004.

In Figure 3 we can see the trend in peak performance age in the period from 2002–2012. The wrestlers who won their first medals in 2003 were significantly older than the wrestlers who won medals in 2007 and 2011 (p<.05); also the wrestlers who won their first medals in 2004 were significantly older than the wrestlers who won their medals in 2006, 2010 and 2011 (p<.05), whereas those who won medals in 2007 were significantly older at the level significance of p<.01.

Table 1. Descriptive statistics (Mean±SD, Min/Max), Kolmogorov-Smirnov test of all variables according to weight categories, and correlation coefficient (r) between experience and peak performance

| KG	Variables	N	Mean±SD	Min/Max	KS-p	r
55	Beginning age	28	10.79±2.47	5.00/14.00	p>.20	0.77
	Experience	28	13.11±3.77	8.00/22.00	p>.20	
	Peak performance	28	23.89±3.41	19.00/31.00	p>.20	
60	Beginning age	26	9.65±3.12	4.00/15.00	p>.20	0.72
	Experience	26	13.88±4.45	4.00/22.00	p>.20	
	Peak performance	26	23.54±2.79	19.00/29.00	p>.20	
66	Beginning age	26	9.62±2.70	5.00/13.00	p>.20	0.72
	Experience	26	15.12±3.84	9.00/26.00	p>.20	
	Peak performance	26	24.73±3.09	20.00/32.00	p>.20	
74	Beginning age	29	10.24±2.54	5.00/32.00	p>.20	0.74
	Experience	29	15.48±3.78	10.00/24.00	p>.20	
	Peak performance	29	25.76±2.84	22.00/33.00	p>.20	
84	Beginning age	27	9.78±1.93	7.00/13.00	p>.20	0.80
	Experience	27	15.26±2.86	8.00/19.00	p<.10	
	Peak performance	27	25.04±3.11	19.00/30.00	p>.20	
96	Beginning age	21	10.05±2.80	5.00/14.00	p>.20	0.80
	Experience	21	15.86±4.66	9.00/25.00	p>.20	
	Peak performance	21	25.90±3.71	20.00/33.00	p<.20	
120	Beginning age	23	11.89±3.51	7.00/18.00	p>.20	0.56
	Experience	23	13.65±4.38	8.00/24.00	p>.20	
	Peak performance	23	25.35±3.75	20.00/34.00	p<.15	
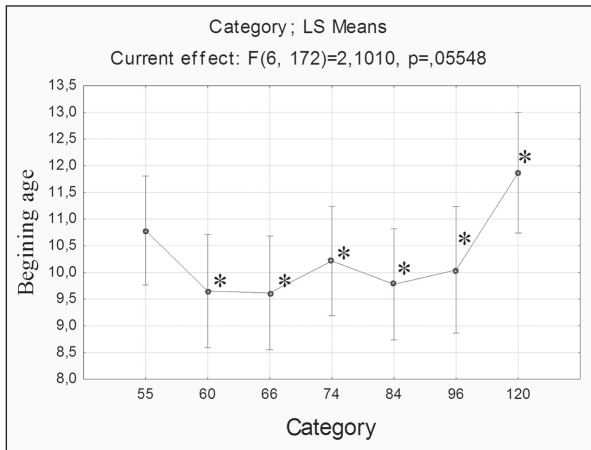
*Fisher's LSD 120>60, 66, 74, 84, 96

Figure 4. Beginning age – analysis by weight categories with the differences between them.
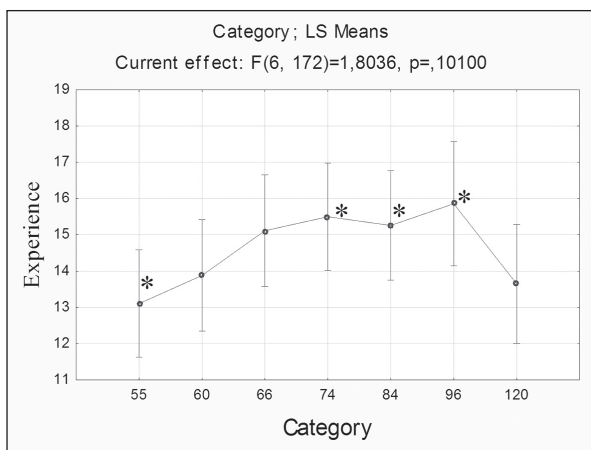
*Fisher's LSD 55<74, 84, 96

Figure 5. Wrestling experience before winning the first European medal – analysis by weight categories with the differences between them.
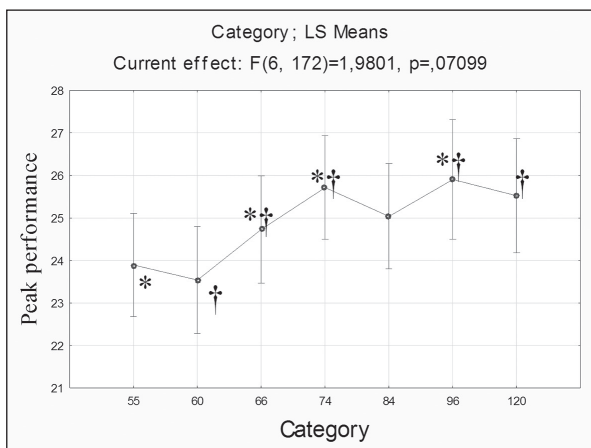
*Fisher's LSD 55<66, 74, 96; † Fisher's LSD 60<66, 74, 96, 120

Figure 6. Age at the time of winning the first European medal, peak performance – analysis by weight categories with the differences between them.

Results in Table 1 (descriptive statistics values for all the variables in all the analyzed weight categories) indicate that this was a homogenous group of wrestlers. The results of the Kolmogorov-Smirnov test show that all the variables were normally distributed. There was a statistically significant correlation ($p<.05$) between years of experience and peak performance age in all categories and the correlation coefficient r is high for all categories except for the 120 kg weight category ($r=.56$).

In Figure 4 the beginning of doing wrestling age is displayed. The wrestlers in the 120 kg category began with wrestling at a significantly later age ($p<.01$) than the wrestlers in the 66 kg and 84 kg category, and then those in the 74 kg and 96 kg category ($p<.05$).

It can be seen in Figure 5 that experience necessary to win the first medal is the lowest in the 55 kg category, and these wrestlers had been wrestling for a shorter period of time than the wrestlers in the 74, 84 and 96 kg categories (at the statistical significance level of $p<.05$).

It can be seen in Figure 6 that the wrestlers in the 55 and 60 kg categories won their first European medals at an earlier age than the wrestlers in other weight categories. The wrestlers in the 55 kg category were younger than the wrestlers in the 66, 74 and 96 kg category when they won their first European medal (the statistical significance level of $p<.05$). The wrestlers in the 60 kg category were younger than the wrestlers in the 66, 74 and 120 kg category at the statistical significance level of $p<.05$, and they were younger than the wrestlers in the 96 kg category at the statistical significance level of $p<.01$.

Discussion and conclusions

The wrestlers who won their first European medal in the period 2002–2012 began with wrestling at the age 10.27±2.79 years. Even though there were no statistically significant differences in this trend among the last ten years, a slight decrease of the trend can be noticed. It is interesting that the wrestlers in the 120 kg category began with wrestling at the age of 11.89±3.51 years, which is statistically significantly later than the wrestlers in all other categories, except for those in the lightest one (55 kg). It is known that the number of wrestlers, consequently the competition among them, is the highest in the medium weight categories, while it is lower at the weight extremes. Therefore it can be assumed that this is the reason why one could begin with wrestling at a later age and still achieve good sport results in the highest weight category. Early selection in sports such as artistic gymnastics and figure skating creates popular child athletes. However, numerous mental and physical problems remain concealed, from eating disorders to different

physiological traumas (Anderson, et al., 2000; Malina, 2010; Capranica & Millard-Stafford, 2011; Bar-Or, 2011). Such examples can easily mislead others to early selection. Cases such as that of a US coach who made his 5-year-old wrestler lose 5% of his total weight to reach a lower weight category is a warning of how risky it is to begin with serious wrestling training and competition too early (Sansone & Sawyer, 2005). On the other hand, it is very important for skill development to begin learning wrestling techniques on time; if one begins doing wrestling at the age of 14 years, throwing techniques will not be acquired well enough (Bompa & Calcina, 1995). The curent study showed that winners of European medals began doing wrestling at the age of 10 years, so we would recommend chronological age of 10 years at which one should begin with wrestling training. Determination of biological age of an individual is, however, required; accelerants can begin somewhat earlier and retardants should begin somewhat later.

The wrestlers who won their first European medal in the period 2002–2012 were training for 14.61±4.02 years. However, the analysis of the last ten years shows a decrease of that trend; the wrestlers who won their first medals in 2010 were training for 3.13 years less than those who won a medal in 2004, which is a statistically significant difference at the level of p<.05. The decrease of the trend can hardly be attributed to an earlier maturation or genetic adaptation because the observed period of 10 years is too short for such conclusions. The cause for this can be traced in the improvement of sports training process and better periodization, regardless of the lack of quality scientific confirmation for such a claim (Cissik, Hedrick, & Burnes, 2008). The reason could also be found in the development of sports diagnostics and sports pharmacology. Substance abuse is becoming increasingly present in Olympic sports (Prendergast, et al., 2003), which could have caused the decrease in the years of experience trend. In the category of wrestlers under 55 kg significantly less training experience was required than in the categories under 74, 84 and 96 kg. Further, although not statistically significant, the wrestlers in the 120 kg had also less experience than the others.

Information can be found in literature saying that wrestlers achieve their best results at the age between 24 and 27 years (Bompa, 1999). It is an interesting fact that various strength parameters also peak at this age. From 2002 to 2012 the trend of wrestlers' peak performance age was decreasing; the wrestlers won their first European medals at a younger age despite the fact that better wrestlers were older according to more recent studies (Lopez-Gullon, et al., 2011; Pallares, et al., 2012). The trend decreased from 2003–2004 to 2010–2011 for approximately three years. The explanation for the decrease of the trend should be looked for in the

progress of sports training and all relevant factors related to it, like for the decrease in the training experience trend. It is an interesting fact that wrestlers were the youngest in the lightest weight category, but not in the heaviest weight category. The rule about the decreasing trend being the highest at the extremes does not apply to wrestling peak performance age. Wrestling peak performance age has a trend of increase from the lower to higher weight categories. Such a trend supports the hypothesis that wrestling experience and peak performance age are not quite the same variables; regardless of the significant correlation, their trends differ. All weight categories have relatively high values of the correlation coefficient except the 120 kg category where r=56. As both variables rise by time, a high correlation between them is logically expected. A lower correlation coefficient suggests that in the lightest category the wrestlers had fewer years of experience, but were older when winning a medal. The lower correlation coefficient may be caused by the fact that contestants started to train wrestling too late, or it may by influenced by some other factors. Successful European wrestlers of heavier categories can begin with wrestling later and train for a shorter period of time just like the wrestlers in light categories, but heavy wrestlers must reach mature wrestling age in order to win a European medal, as opposed to the wrestlers in lighter weight categories. Younger wrestlers have less non-fat tissue or less muscle mass, which is negatively reflected on different strength parameters (Terbizan & Seljevold, 1996). It can be assumed that in heavier categories muscle mass differences are proportionally greater and that wrestlers must be older to win medals. In wrestlers' somatotype there are no differences between wrestlers of different weight categories or different quality, but training experience leads to a lesser percentage of endomorphs and a higher percentage of mesomorphs in the population of wrestlers (Yoon, 2002; Charzewski Glaz & Kuzmicki, 1991; Sterkowicz-Przybycien, Sterkowicz, & Zarow, 2011). Somatotype differences are more prominent in wrestlers with a bigger body mass and it is logical that the age increase in the medal winners is linearly followed by the increase of weight category.

The findings indicate that successful European wrestlers began with wrestling at the age of 10.27 years, so we can suggest this age to be the point at which one should begin doing wrestling. Wrestlers have 14.61 years of experience before winning first medals, but trends show that wrestlers need ever less training experience. Wrestlers win medals at the average age of 24.86 years, but this trend is also decreasing significantly. The analysis across weight categories showed that the lightest and the heaviest category wrestlers begin doing wrestling later and train for fewer years before winning their first medal, but in the heaviest category wrestlers

must reach mature wrestling age to win European medals because this trend increased from the lighter to heavier weight categories.

This study offers a precise set of information to wrestling coaches on when to include their trainees in wrestling, for how long one needs to wrestle before winning the first medal and at which age we can expect a wrestler to win the first major competition medal in accordance with the respective weight category.

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DOB U KOJOJ SE HRVANJE POČINJE TRENIRATI, HRVAČKO ISKUSTVO I DOB VRHUNSKIH SPORTSKIH POSTIGNUĆA – TRENDOVI U PERIODU 2002-2012

Cilj ovoga rada bio je utvrditi sljedeće trendove: dob (u godinama) u kojoj se počinje s hrvanjem, iskustvo (u godinama) i dob vrhunskih sportskih postignuća hrvača koji su osvojili svoju prvu medalju na europskim prvenstvima u periodu od 2002. do 2012. godine te utvrditi moguće razlike u tim parametrima među težinskim kategorijama. Istraživanje je provedeno na uzorku od 180 hrvača. Osvajači europskih medalja počeli su se baviti hrvanjem u dobi od 10,27±2,79 godina; imali su 14,61±4,02 godina hrvačkog iskustva prije osvajanja svoga prvoga europskog odličja, a medalju su osvojili u dobi od 24,86±3,29 godina. Dobivene su statistički značajne razlike (p<0,05) u: iskustvu 2010<2004; zrelosti hrvača za postizanje najboljih rezultata 2003>2007, 2011; dobi 2004>2006, 2007, 2010, 2011. Značajne razlike među težinskim kategorijama dobivene su u: dobi početka bavljenja hrvanjem 120>60, 66, 74, 84, 96; godinama iskustva 55<74, 84, 96; zrelosti za postizanje najboljih rezultata 55<66, 96; 60<66, 96, 120. Istraživanje je pokazalo da bi se hrvanjem trebalo početi baviti u dobi od 10 godina. Postoji značajna korelacija između iskustva i zrelosti kada se postižu najbolji rezultati. U najlakšoj se i najtežoj težinskoj kategoriji hrvači počinju baviti hrvanjem kasnije i imaju manje iskustva u trenutku osvajanja prve europske medalje. U najtežoj težinskoj kategoriji hrvači trebaju imati više godina da bi ostvarili najbolje rezultate. Ovo istraživanje nudi trenerima precizne informacije o tome kada početi hrvati te kada od hrvača očekivati da će osvojiti svoje prvo značajno natjecanje sukladno svojoj težinskoj kategoriji.

Ključne riječi: *europsko prvenstvo, grčko-rimski stil, težinske kategorije, seniori*

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