

**RELATIVE AGE EFFECT AMONG YOUNG CROATIAN TAEKWONDO COMPETITORS****Matej Babić<sup>1</sup>, Dražen Čular<sup>1,2,3</sup>, Igor Jelaska<sup>1</sup>**<sup>1</sup>University of Split, Faculty of Kinesiology, Split, Croatia<sup>2</sup>European Institute for Talents, Education, Research & Development, Split, Croatia<sup>3</sup>Einstein, Craft for Research, Development, Education, Trade & Service, Split, Croatia

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Original scientific paper

**Abstract**

Aim of this research was to identify and analyse relative age effect (RAE) on sample composed of young Croatian taekwondo competitors. In order with aim of research, for medal winners (n1=72) and other competitors (n2=187) who competed at Croatian taekwondo cadet championship 2015, date of birth, weight category and sport success were extracted. By conducting of Chi-square test on all competitors (n=259) it is proven there is non-significant difference ( $\chi^2=12.28$ ;  $p=0.34$ ) between expected and observed frequencies according to month of birth. Furthermore, significant difference between observed and expected frequencies according to year of birth of medal winners ( $\chi^2=45.31$ ;  $p<0.01$ ) is confirmed. Results of this research are pointing on presence of RAE which could lead to mistakes in selection of young athletes. Authors are suggesting to minimize allowed age range for competition, or to separate competitors in more age categories, which would enable more equal competitions and reduce effect of age on sport success.

**Keywords:** *taekwondo, age, relative age, competition success***Introduction**

Relative Age Effect is a phenomenon which occurs in almost all sport competitions, and is giving advantage to ones who are born later in same year, from same category.

The chronological age difference between subjects of the same age group is known as relative age (Roberts, Fairclough, 2013) and its consequences as a Relative Age Effect (RAE) (Gutiérrez Díaz del Campo, 2015). RAE seems to exist, partially, due to biological maturation differences within members of the same cohort, although social or behavioral factors, among others, can be decisive (Hancock et al., 2013; Wattie et al., 2015).

Various studies have demonstrated the advantages in physical abilities, cognitive knowledge, and psychological capacity in individuals with a greater chronological age (Cobley et al., 2009; Delorme et al., 2009; Malina et al., 2015; Sherar et al., 2007; Vincent and Glamser, 2006; Altimari et al., 2021). Furthermore, it has been shown that the month of birth exerts influence on differences in body size (Carling et al., 2009; Altimari et al., 2021). RAE impact not only player selection, but the short-term

and long-term competition performance of athletes (Rađa et al., 2018; la Rubia et al., 2020; Kalén et al., 2020). This phenomenon is particularly evident at higher levels of competition when athletes are selected into talent pathways (Baker et al., 2009). However, the impact of RAE may not necessarily be consistently strong throughout an athlete's development, whereby it often decreases as the chronological age of an athlete increases, and RAE may plateau as they reach adulthood (Brustio et al., 2018).

Previous knowledge unequivocally suggest that biological age has huge influence in process of selection, which can lead to the trap of talent mis-selection, apropos incorrect team selection which cannot be justified with current success in one isolated tournament or game (Rađa et al., 2018). Mentioned problem occurs in success of sport teams too, who would hypothetically have more benefit from one biologically stagnant if they gave him an opportunity and same training process as they give it to accelerants who will finish their growing and maturation sooner. With reduction of this problem, we would prevent talented, biologically stagnant children from giving up sports and competitions. In accordance with previously stated facts, aim of this

investigation is to determine existence of Relative Age Effect (RAE) on the sample of young cadet taekwondo competitors.

## Methods

Sample is composed of total  $n=259$  participants, male and female taekwondo competitors (Female  $n=117$ ; Male  $n=142$ ), who competed at Croatian taekwondo championship 2015. They were segregated in ten male (CM-33, CM-37, CM-41, CM-45, CM-49, CM-53, CM-57, CM-61, CM-65, CM+65) and ten female weight categories (CF-33, CF-37, CF-41, CF-44, CF-47, CF-51, CF-55, CF-59, CF+59). Competitors come from all active taekwondo clubs around Croatia. For purpose of research, participants were divided into two sub-samples: a) successful-medal winners ( $n=72$ ) and b) other competitors ( $n=187$ ). For all participants, data (dates of birth) were ceded to use by Croatian taekwondo federation.

All statistical analyses were done using Chi-square tests under null hypothesis that all observed frequencies are equal (i.e. uniform distribution). Statistical analysis data system Statistica 14. (TIBCO Inc) was used for calculation and graphical representation of obtained results. Type I error was set at 5%.

## Results and discussion

Within table 1, observed and expected frequencies according to month of birth, are presented.

Table 1- Observed frequencies, differences between observed and expected frequencies for birth date according to month of birth, overall sample of competitors on Croatian taekwondo cadet championship 2015 ( $n=259$ ).

Month	$f_o$	$f_e$	Chi-square
January	30	21.42	
February	25	21.42	
March	23	21.42	
April	22	21.42	
May	18	21.42	
June	17	21.42	$\chi^2(11)=12.28$
July	17	21.42	$p=0.34$
August	29	21.42	
September	19	21.42	
October	21	21.42	
November	24	21.42	
December	14	21.42	

Legend:  $f_o$  – observed frequencies,  $f_e$  – expected frequencies,  $\chi^2$  – difference between observed and expected frequencies,  $p$  – significance level

Furthermore, in table 2 observed and expected frequencies considering year of birth among successful competitors are presented.

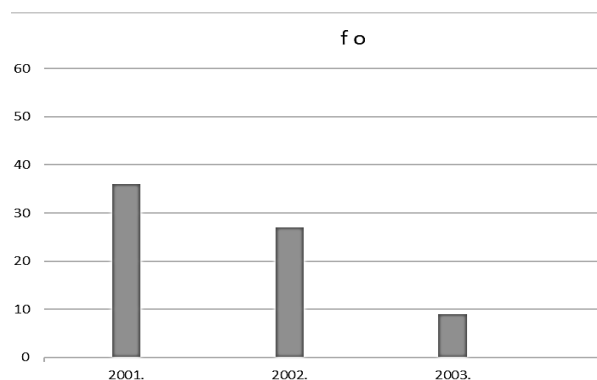
Table 2- Observed frequencies, difference between observed and expected frequencies according to year of birth, successful competitors cadets ( $n=72$ ) who won medal on Croatian taekwondo championship 2015.

YEARS	$f_o$	$f_e$	Chi-square
2001	36	18	$\chi^2=45.31$
2002	27	18	$p<0.01$
2003	9	18	

Legend:  $f_o$  – observed frequencies,  $f_e$  – expected frequencies,  $\chi^2$  – value of Chi-square test,  $p$  – significance level

Graph 1 likewise presents observed and expected frequencies according to year of birth among successful competitor cadets.

Graph 1- Observed frequencies, differences between observed and expected frequencies according to year of birth, successful competitors cadets ( $n=72$ ) who won medal on Croatian taekwondo championship 2015.



Legend:  $f_o$  – observed frequencies according to year of birth

Table 3 represent observed and expected frequencies according to month of birth for cadets who won medal on Croatian cadet taekwondo championship.

Table 3- Observed frequencies, difference between observed and expected frequencies according to month of birth, cadets who won medal at Croatian taekwondo championship 2015 (n=72).

Month	f o	f e	Chi-square
January	11	6	$\chi^2 = 16.34$ $p = 0.13$
February	5	6	
March	7	6	
April	3	6	
May	3	6	
June	6	6	
July	6	6	
August	11	6	
September	1	6	
October	7	6	
November	7	6	
December	5	6	

Legend:  $p$ - significance level,  $f o$  - observed frequencies,  $f e$  - expected frequencies,  $\chi^2$  - value of Chi-square test

Analysis (Table 1) of frequencies among all competitors on Croatian taekwondo cadet championship 2015 ( $n=259$ ) did not determine existence of statistically significant difference between observed and expected frequencies according to month of birth ( $\chi^2 = 12.28$ ,  $p = 0.34$ ) which can be compared to similar research in other sports (Kalinski, Jelaska & Knežević, 2017).

Analysis (Table 2) on subsample of successful competitors- medal winners determined existence of statistically significant difference between observed and expected frequencies according to year of birth ( $\chi^2 = 45.31$ ,  $p < 0.01$ ). Number of 72 medal winners in total of 10 male and 10 female weight categories in which number of medals could theoretically be 80 (4 per category, one gold, one silver and two bronze), points that in certain categories number of competitors were below four, so term „successful“ according to medal winning should be used with certain dose of caution. In next researches number of competitors in each weight category should be counted too.

Frequencies of birth years from successful competitors (medal winners) presented on Graph 2 point on ascending trend connected with age, so analysed data shows that competitors who were born in 2001 won 36 medals, born in 2002 - 27 medals, and born in 2003 - 9 medals.

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Analysis of results presented in Table 3 did not determine existence of asymmetry ( $\chi^2 = 12.28$ ,  $p = 0.34$ ) between expected and observed frequencies according to month of birth, on sample of successful competitors- medal winners on Croatian taekwondo championship 2015 similarly as has been identified in gymnastics (Jelaska, Kalinski, & Crnjak, 2017). Largest number of successful competitors ( $n=72$ ) were born in January (11) and August (11), but smallest number of them were born in September (1), April (3) and May (3).

## Conclusion

Presence of relative age effect (RAE) and successful trend related to age could easily bring to mistakes in selection of younger athletes, and age categories should be reconsidered and redefined more precisely or divide cadet category in three different categories (for example younger cadets, cadets and older cadets), which would enable more equal and fair competition, and reduce influence of age on sport success too. Considering that in couple cases results showed smaller number of competitors than medals per category (four per category) term „success“ and „medal winners“ should be used with certain dose of caution. For extractment of better conclusions in following investigations it is necessary to: a) determine existence of certain trend in junior category, b) conduct an analysis according on weight categories, and c) determine influence of RAE on other success parameters like: number of successful/unsuccessful attacks, number of successful/unsuccessful defences, number of achieved points per fight/contest, or number of winnings per competition.

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