

A trait aggression in young Hungarian practitioners of Japanese martial arts

Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Manuscript Preparation
- E Funds Collection

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Abstract

Background and Study Aim:

We hypothesized: (H1) there is a significant difference between genders in the total score of trait aggression and subscales (verbal, physical aggression, hostility and anger) in both groups (budo and control group), wherein the boys exhibit significantly a higher score of trait aggression than girls; (H2) there is a significant difference in the trait aggression total score and the sub-scales scores based on school type, wherein the vocational school students would achieve the highest, whereas high school students the lowest values in both groups (budo and control group); (H3) budo martial arts practitioners are characterized significantly lower trait aggression (total scores) than their counterparts of the same age, and youngsters practicing martial arts also had a significantly lower value for all aggression subclasses than their peers in the control group; (H4) the length of sport practice, the number of workouts, and competitive variables of budo group have a significant correlation, with trait aggression (the total score and the value of the sub-scales). The aim of this study is to verify this hypothesis.

Materials and Methods:

This study examined students between the ages of 14 and 18 ($n = 1,488$). There were 149 people in the budo group who had been practicing for at least a year spending at least one and a half hours twice a week in martial arts classes. The control group consisted of 1,339 students. The Buss-Perry Questionnaire (AQ) was used. IBM SPSS Statistics 22.0. were used for statistical analysis. Results were considered as significant if $p < 0.05$.

Results:

In the control group, the score for trait aggression and the score for the physical sub-scale for the boys was significantly higher than for the girls. However, in the verbal aggression category and the anger subcategory there is a significant difference in favor of girls. In the martial arts group there was only a significant difference in the physical aggression subscale score for males; but not in the total score and other sub-scales. There was a significant difference in scores based on the type of schooling in the control group. In both groups, those in vocational school had the highest trait-aggression score. Budo practitioners had a lower trait-aggression level; their trait-aggression overall score and the sub-scale scores were also significantly lower than those of the control group. However, competitors have significantly lower levels of hostility.

Conclusions:

Negative prejudices against martial arts athletes practitioners to the effect that they would be more aggressive than average were not proven in the investigation.

Key words:

aggressiveness • budo • Buss-Perry Questionnaire • iaido

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Authors have declared that no competing interest exists

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Budo (Budō) – originally a term denoting the “Way of the warrior”, it is now used as a collective appellation for modern martial arts of *kendō*, *jūdō*, *kyūdō* and so on. The primary objective of these “martial ways” is self-perfection (*ningen- kessei*) [64].

Japanese martial arts – “The recent definition of budo (Japanese martial arts) in Japanese dictionaries is that a general term for judo, kendo, kyudo, karatedo, aikido, etc., and martial arts and bushido, the way of samurai. Practitioners practice each budo safely under set rules; many schools of budo include martial arts that can be used in actual fighting” [65, p. 166].

Iaido (iaidō): abbreviated with *iai* – is a Japanese martial art that emphasizes being aware and capable of quickly drawing the sword and responding to a sudden attack [66].

Aggression (in psychology) – is deliberate behaviour by the perpetrator intended to either hurt the opponent, harm or distress him/her in any other way, cause pain (regardless of whether this aim is achieved), or destroy things [67, 68].

Aggression (in praxeology) – is to initiate destructive fight or move in a verbal dispute from material arguments to those causing distress to the opponent [69].

Aggressiveness – a human characteristic manifesting itself in inclinations to hurt others, to destructive behaviour. **Aggressive** = virulent, truculent, attacking [69].

A Likert scale – is a psychometric scale commonly involved in research that employs questionnaires. It is the most widely used approach to scaling responses in survey research, such that the term (or more accurately the **Likert-type scale**) is often used interchangeably with **rating scale**, even though the two are not synonymous [70].

INTRODUCTION

Budo and other forms of martial arts from the Far East have spread explosively through the world beginning in the 1980s; additionally, studies examining their impact have also appeared in large numbers over the last thirty years. Examining the number of workshops and posters for combat sports at the annual conferences for the European College of Sport Sciences (ECSS) Distaso et al. [1] found a significant increase between 1999 and 2008. This clearly indicates the growing popularity of martial arts both among its practitioners and researchers.

In the literature published on the topic, the same duality can be observed as is typical of the general public’s view of martial arts. It is an often-asked question how martial arts change the personality of combatants and practitioners. The following questions are important: is whether practitioners of martial arts are more aggressive than the average person; whether they are more likely to engage in violent acts; whether the frequency of aggressive behavior increases or decreases with the practice of martial arts.

When exploring the prejudices that have formed around martial arts, Lu [2, p. 33] points to “two potential reasons behind the concern that teaching martial arts fosters violence: *ignorance*, resulting from the lack of knowledge of the nature of martial arts; and *misunderstanding*, due to misleading representations of the Westernized martial arts through commercialized media.”

The most noteworthy features of budo (Japanese martial arts – see glossary) are an oriental philosophical background, the expectation for character development, the pursuit of non-violent conflict resolution, a special training environment, the practice of formal exercises and the so-called dojo etiquette.

The study focused exclusively on examining trait aggression among practitioners of those martial arts that are grounded in oriental philosophy (such as karate, judo, aikido, kendo, jiu jitsu, iaido), and so excludes other martial arts disciplines (such as wrestling, boxing, fencing).

Some authors have shown the positive effects of budo on personality development, such as a diminished willingness to use violence [3, 4], lessened hostility [5, 6] as well as aggressivity [7-9]. Some authors emphasize the growth of self-confidence [10, 11]. Katz [12] and Grabert [13] could not prove that practitioners of karate would be more aggressive than other athletes and non-athletes; neither was it proven that these practitioners would be more inclined to use aggression in conflict situations.

Main assumption of own research: the study focused exclusively on examining trait aggression among practitioners of those martial arts that are grounded in Oriental philosophy (such as aikido, iaido, judo, ju-jitsu, karate, kendo and so excludes other martial arts disciplines (such as wrestling, boxing, fencing etc.).

Hypotheses

(H1) there is a significant difference between genders in the total score of trait aggression and subscales (verbal, physical aggression, hostility and anger) in both groups (budo and control group), wherein the boys exhibit significantly a higher score of trait aggression than girls. (H2) there is a significant difference in the trait aggression total score and the subscales scores based on school type, wherein the vocational school students would achieve the highest, whereas high school students the lowest values in both groups (budo and control group). (H3) budo martial arts practitioners are characterized significantly lower trait aggression (total scores) than their counterparts of the same age, and youngsters practicing martial arts also had a significantly lower value for all aggression subclasses than their peers in the

control group. (H4) the length-of sport practice, the number of workouts, and competitive variables of budo group have a significant correlation with trait aggression (the total score and the value of the sub-scales).

The aim of this study is to verify this hypothesis.

MATERIAL AND METHODS

Participants

The participants in the study were Hungarian pupils between the ages of 14 and 18 ($n = 1,488$). The control group ($n = 1,339$; mean age 15.99 ± 1.28 years, range 14-18) was of the same age group as the budo group ($n = 149$; mean age 16.16 ± 1.45 years, range 14-18). For inclusion in the budo group, the respondent had had to practice some kind of Japanese martial arts (aikido, iaido, judo, ju jitsu, karate and kendo) twice a week for at least one year. Practitioners of other martial arts (Thai boxing, boxing, fencing, wrestling) were excluded.

At the time of the survey, 48.5% of the respondents were boys and 51.5% were girls, 14.81% were 14 years of age, 22.06% were 15 years old, 27.90% were 16, 18, 92% were at the age of 17 and 16.31% were 18 years old.

In the budo group ($n = 149$) 69.13% of the respondents were boys and 30.87% were girls, which is not surprising, since – even though the practice of martial arts is becoming more and more popular among girls as well – boys are still over-represented in self-defense sports. At the time of the study, 18.12% of the budo group was 14 years old, 18.79% were 15 years of age, 16.11% were at the age of 16, 22.82% were 17 while 24.16% were 18 years old.

In the budo group, most of the respondents practiced karate (51.68%), 34.90% practiced judo, 5.37% practiced kendo, 3.36% pursued aikido, 3.36% did jiu jitsu, 1.34% iaido.

More than half of the respondents (56.38%) had been practicing their chosen form of martial arts for more than five years, 6.04% for four years, 7.38% for three years, 10.07% for two years, 8.05% for one year (4.03% did not answer the question). Most of the respondents (28.86%) attend three training sessions a week, 25.50% two, 18.12% more than five, 16.78% five, and 10.74% attended four training sessions per week.

Design and procedure

The participants completed a trait aggression questionnaire originally developed by Buss and Perry [14], which was translated into Hungarian and validated for the Hungarian population by Gerevich et al. [15, 16] (BPAQ). The questionnaire was further supplemented by general demographic questions (school type, place of residence, gender, etc.) and, in the case of the budo group, questions related to sports (type of martial arts, number of training session attended per week, length of time with the sport, history in competition). Since this was designed to be a large-scale survey encompassing all of Hungary, online data collection was chosen - done by means of an online, easy-to-fill questionnaire query (riplet.hu – questionnaire editor). This approach is more in line with the general preferences of the age group (14-18 year olds) for electronic format rather than a paper-based query. Thus, we could count on a higher response rate, and the procedure made it easier to obtain the data nationwide. Over the last decade, the popularity of online data collection has grown and it has been accepted as the standard procedure for surveys [17-20]. In the case of the martial arts group, the official Hungarian martial arts associations (Hungarian Judo Association, Hungarian Karate Federation, Hungarian Kendo, Iaido and Jodo Federation) encouraged participation in the research. Responses were voluntary and anonymous, given after the reading and the acceptance of a consent form.

The standardized Aggression Questionnaire (AQ / BPAQ), developed by Buss and Perry [14], measures trait aggression by using a 5-level Likert scale (1 = none at all 5 = very characteristic). In addition to the total score determining trait aggression overall, the score of the interviewees can be calculated for four sub-scales, such as verbal aggression, physical aggression, anger, and hostility.

The internal consistency values of the original English-language test were $\alpha = 0.72$ (verbal aggression) and $\alpha = 0.89$ (total score of aggression), and when the survey was repeatedly administered nine weeks later the values of $\alpha = 0.72$ (anger) and $\alpha = 0.80$ (physical aggression) [14].

The internal consistency test of the Hungarian questionnaire was also based on the Cronbach alpha coefficient. The Cronbach alpha values of

Dojo (dōjō) – originally used in reference to places where Buddhism is studied, it is now also used to denote a training hall for the martial arts [64].

Trait aggression – (...) childhood aggression predicted antisocial behavior in adulthood, such as serious criminal behavior and intimate partner violence. Whereas the durability of aggressive tendencies across ages was substantial, it was even more powerful across generations within the same family unit, with a profound degree of similarity between the aggressive tendencies of participants, their parents and offspring when at comparable ages. This intra-family aggressive similarity suggests that an aggressive disposition may have a strongly heritable aspect (...) Such research demonstrates that aggressive tendencies are, in fact, stable enough to be considered as a personality trait, defined as an enduring and pervasive characteristic that predicts future outcomes and behavior. This now-accepted conceptualization of trait aggression has re-defined the way researchers approach the topics of hostility, anger, aggression and violence." [71].

Kata – prescribed patterns or sequences of techniques [64].

the Hungarian version were as follows: physical aggression $\alpha = 0.82$, verbal aggression $\alpha = 0.68$, anger $\alpha = 0.70$ and hostility $\alpha = 0.75$ [15, 16]. Alpha values indicated high internal consistency for physical aggression and hostility, and indicated moderate reliability for verbal aggression and rage [16]. The Cronbach alpha values in our survey were comparable to those obtained by Buss-Perry [14] and Gerevich [15, 16] (BPAQ full index for the budo group $\alpha = 0.85$, control group $\alpha = 0.89$). However, the values for verbal aggression showed low reliability ($\alpha = 0.42$). Harris [21] also found our questionnaire suitable and reliable for measuring trait aggression.

Statistical analysis

Data was encoded and processed in Microsoft Excel 2010 and in IBM SPSS Statistics 22.0. In the descriptive and inferential statistical procedures, the results were considered as significant if $p < 0.05$. The normality test showed that our sample did not have a normal distribution – this was verified by the Kolmogorov-Smirnov and Shapiro-Wilk tests. Based on the results, non-parametric statistical tests were performed ($p < 0.05$). Applied statistical procedures: Mann-Whitney, Kruskal-Wallis, Pearson’s correlation coefficient.

RESULTS

An analysis of the correlation of trait-aggression total score and sub-scales to gender

In the control group, the relationship (examined through the Mann-Whitney test) between gender and trait-aggression showed that the boys’ overall score for trait aggression was significantly higher than girls’ in our sample ($Z = -4.343.46$, $p < 0.05$). The average score of the boys regarding the total score for trait aggression is 77.76 ± 14.03 , while the values for girls are 74.72 ± 15.28 . We found a significant difference in the physical aggression subclass for the boys of the control group (boys mean 24.54 ± 6.14 ; girls mean 20.02 ± 6.64). However, in the case of verbal aggression, a significant difference was found in favor of girls ($Z = -2.103$, $p < 0.035$): girls mean 15.55 ± 3.11 ; boys mean 15.15 ± 2.90 . In the case of anger, we also found a significant difference for girls ($Z = -1.907$, $p < 0.050$): girls mean 18.14 ± 4.54 ; boys mean 17.73 ± 4.24 . However, there was no significant difference between the genders regarding hostility (Figure 1).

The average of the total score for trait aggression in the budo group was: mean 66.33 ± 12.07 and mean 68.82 ± 11.78) for the boys. In the athlete’s

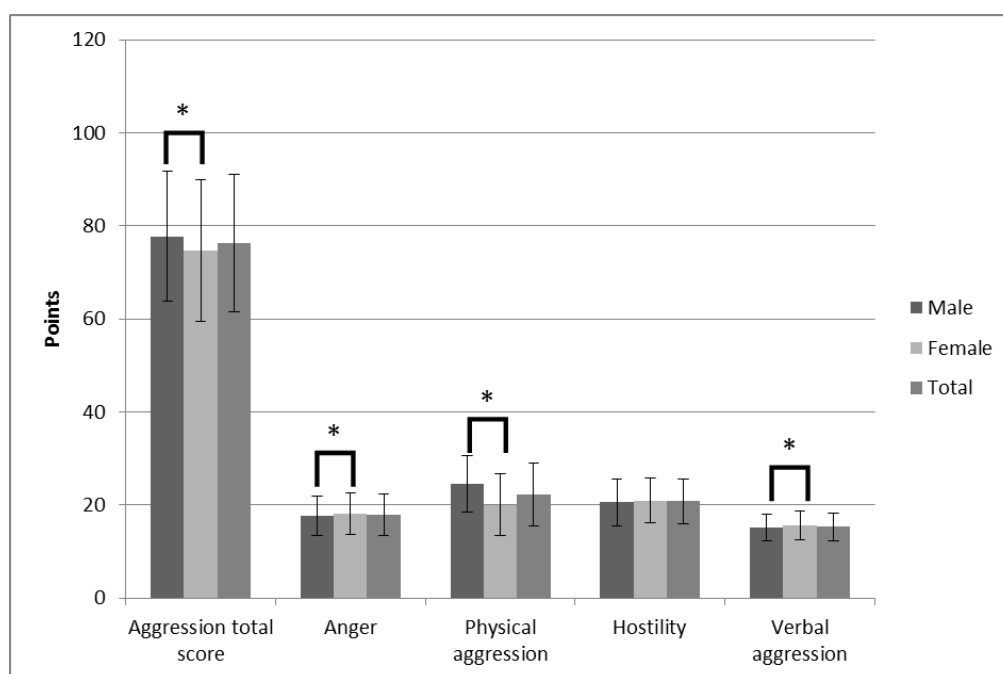


Figure 1. Correlation of gender to the total score for trait aggression and the average sub-scale scores in the control group (n = 1,339).

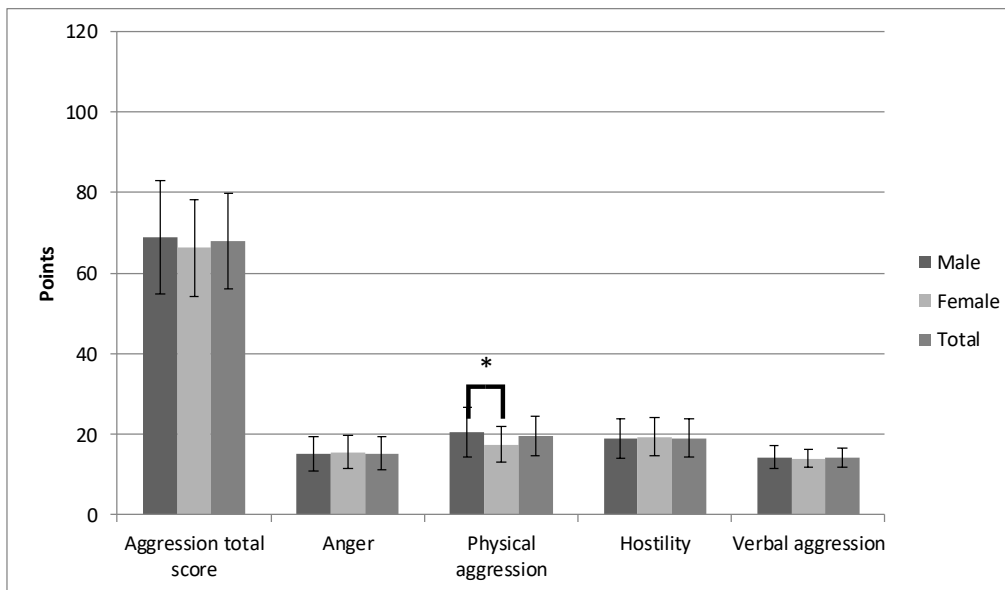


Figure 2. Correlation of gender to the total score for trait aggression and the average sub-scale scores in the budo group (n = 149).

group, only the average score for the physical aggression subclass was statistically significant ($Z -3.577$, $p < 0.05$) between the genders (boys mean 68.82 ± 11.78 ; girls mean 66.33 ± 12.07), but in the case of the total score and the other sub-scales we did not find any significant difference in the Mann-Whitney test (Figure 2).

Correlation of school type to the total trait-aggression score and to the sub-scales

For the control group the Kruskal-Wallis test showed significant differences in the types of schools attended ($p < 0.05$). The average total score for the aggression index was highest for students attending vocational school (mean 82.19 ± 13.88), while high school students (mean 72.08 ± 13.87) showed the lowest trait aggression. The difference was 10 points between those entering the two school types, which is quite significant.

Using the Mann-Whitney U-test and adjusting the value of p with the Bonferroni correction, the total score of aggression for grammar school and vocational school pupils showed a significant difference – vocational school students proved to be more aggressive in the control group. Similarly, in the case of the sub-categories, there was a significant ($p < 0.001$) difference between

vocational school students, vocational-technical high school students and high school students. We found significant differences between vocational school students, vocational-technical high school students and high school students in the sub-categories of anger, physical aggression and hostility. Regarding verbal aggression, there was no distinction between the groups based on school type.

In the budo martial arts group, unlike in the control group, no significant difference was found based on school type. Although there was no significant difference, it should be noted that the highest trait-aggression scores in the budo martial arts group belonged to students attending vocational school (mean 83.00 ± 14.38). The lowest total trait aggression score in the sample was found among high school students (mean 67.68 ± 11.59) and technical high school students (mean 67.06 ± 10.32). In our sample there is a significant difference of 15.94 points between vocational school students and technical high school students.

In the case of technical high school students, about 10 points of difference in trait aggression scores were found between the control group (mean BPQA = 77.95 ± 14.58) and budo martial arts group (mean BPQA = 67.06 ± 10.32). It

is worth noting that the score of the vocational schoolchildren in the two examined groups (control and budo) is almost the same (vocational student control mean 82.19 and vocational student budo mean 83.00).

Comparison of trait aggression scores and sub-scale scores in the two examined groups (budo and control)

The Mann-Whitney test was used to compare the total score of trait aggression and sub-scales in the budo martial arts and control groups. The average trait aggression score of the budo group was 8.159 points lower (mean 68.047 ±11.89) than of the control group (mean 76.206 ±14.756), and similarly the scores for all the sub-scales were lower in the budo group than in the control group. There was a significant correlation between the budo group and the overall score for trait aggression, and for each sub-scale (p<0.05) in the sense that the budo group had a lower score across the board (Table 1).

DISCUSSION

In our first hypothesis (H1) it was that there was a significant difference between the two sexes as regards the total score for trait aggression and the mean values of the subscales (verbal, physical aggression, hostility and anger) in

both examined groups (budo and control group). Similar to the previously published results of other authors, we hypothesized that males exhibit significantly higher traits of aggression than women.

The difference between the sexes is not surprising since many studies and authors have shown that men’s aggression is significantly higher than that of women and that men are more likely to engage in physical aggression [14, 22-27]. The root causes are extremely complex, but many factors are proven to influence the degree and type of aggression. The type of school, the school climate [28], the environmental, family background and socioeconomic status [29-32] as well as genetic and psychological factors [33] can be highlighted.

An important element of our research of the budo martial arts group was relating to variables such as history with the sport, number of workouts. Many authors emphasized that length of history with the chosen branch of martial arts, the number of training sessions [6, 7] and competition (modern and traditional conceptions) [34, 35] are decisive for aggression, so we also examined the possible correlations of these variables for the budo martial arts sample. Pearson’s correlation coefficient found no significant correlation between the length of a person’s history with the sport and

Table 1. Correlation between the average total score for trait aggression and sub-scales both in the budo and control group.

Variable	Control Group (n = 1,339)		Budo athletes (n = 149)		Mann-Whitney U value	Significance (p)
	mean	SD	mean	SD		
Aggression total score (BPAQ)	76.206	14.756	68.047	11.890	63509.000	p<0.05
Anger	17.944	4.398	15.262	4.046	62914.500	p<0.05
Physical Aggression	22.210	6.784	19.490	4.916	75398.500	p<0.05
Hostility	20.808	4.887	19.081	4.775	76368.000	p<0.05
Verbal Aggression	15.354	3.014	14.215	2.244	76085.000	p<0.05

trait-aggression overall scores. Neither was there a significant correlation between the length of a person's history with the sport and any of the individual aggression sub-scales. So in our sample it was not decisive how long the martial artist had spent with his chosen branch of martial arts. The number of workouts (mean 3.73 ± 1.46) did not correlate with any other variables, so in our sample it was not a decisive factor for aggressiveness how often a martial artist practices.

The relationship between trait aggression, the sub-scales and competition was investigated using the Mann-Whitney test, and we found a significant difference ($Z = -1.940$, $p < 0.05$) in the case of the hostility sub-scale (mean 18.54 ± 4.46) between competitors and non-competitors (mean 20.66 ± 5.35). Based on this, it can be assumed that budo sports can reduce aggression even without participation in competition. Lorenz [36, p. 214] concludes: "Sporting contests between nations are beneficial not only because they provide an outlet for the collective militant enthusiasm of nations, but also because (...) they promote personal acquaintance between people of different nations or parties and they unite, in enthusiasm for a common cause, people who otherwise would have little in common".

It is important, therefore, to ensure that, in addition to traditionalism, martial arts competitions following the modern conception should be given a place, on the one hand for the reasons above, and, on the other hand, in order to foster the dynamic development of martial arts. Following the introduction of one of the Japanese martial arts – judo – at the 1964 Olympic Games (Tokyo), karate (World Karate Federation) will be the second type of Japanese budo martial arts to be added to the 2020 Tokyo Olympics (taekwondo has been an Olympic sport since 2000).

Hostility is likely to be lower in budo martial arts competitors because competitors have to match their knowledge with a number of foreign opponents, and national affiliation and skin color does not, and cannot, matter in competition, as matches are bound by strict rules and adjudicated by an impartial panel of judges. In the fight, the opponent's nationality or skin-color do not matter since competitors must defeat their opponent in close-quarters combat. In

competitions and training camps acquaintances and friendships are formed with sportsmen from other nations, so athletes get to know the culture and mentality of other nations and consequently can accept these more easily. According to Lorenz [36, p. 214], "mutual acquaintance is not only a prerequisite for complicated aggression mechanisms, but in itself weakens aggression".

In the control group we demonstrated that boys' trait aggression score was significantly higher than the girls' ($p < 0.05$); and also that there is a significant difference in physical aggression between genders. However, on the subscale of verbal aggression as well as the rage sub-scale, we found a significant difference in favor of girls. There was no significant difference between the two sexes as regards hostility.

In the sample consisting of budo martial artists, only the average score of the physical aggression subscale revealed a significant difference between the sexes in favor of the boys; however, no significant difference was found for the total score or for the other sub-scales.

Gerevich et al. [16] when comparing the two sexes found that there was a significant difference between physical and verbal aggression, but there was no detectable difference in hostility and anger. Österman et al. [22] showed that boys resort to physical aggression in greater proportion than girls. Males have consistently been found [14, 23, 37] to be more physically aggressive than women by several authors. So our first hypothesis was partially justified, while our second hypothesis was fully justified.

We have assumed that there is a significant difference in the trait-aggression scores and sub-scales according to the type of school attended. In line with the results of previous studies, we also assumed that vocational school students scored the highest, whereas high school students scored the lowest in both groups (budo and control), in other words that the type of school was dominant in terms of trait aggression (H2).

We found significant differences in the control group based on the type of school attended ($p < 0.05$). The average total score of the aggression index (BPAQ) was the highest in vocational schools, while high school students scored the

lowest. Hajdú and Sáska [38] also came to this conclusion when they showed that trait aggression scores are lower in high schools and higher for students in vocational schools. In their sample, high school students are less aggressive than the national average, while students in vocational schools show aggression over the national average. The decisive factors are: the type of school, school climate [28], environmental and family background, socio-economic status [29-32], as well as genetic and psychological factors [33]. For the control group, vocational school students produced the highest trait-aggression values.

Examining the budo group, unlike the control group, no significant difference was found based on school type. Regardless of this, it must be emphasized that the highest trait-aggression score was reached by students attending a vocational school. The lowest trait-aggression score in the budo sample was found among high school students and technical high school students. Interestingly, the number of vocational schoolchildren in both groups (control and budo) is almost the same. Hence, Hajdu and Sáska [38] seem to be justified in their hypothesis that, in addition to economic and social stratification and academic success, trait aggression also contributes to the choice of further education. Rucska and Kiss-Tóth [39] have also shown that less success at studies leads to higher levels of aggression. Therefore, specialists need to pay more attention to aggression when dealing with vocational students.

Our third hypothesis (H3) was proven, namely that 14 to 18 year old budo martial artists have significantly lower trait aggression scores and lower physical and verbal aggressiveness, hostility, and anger than non-combat sportspeople of similar age or their non-athletic counterparts.

The total trait aggression score of the budo martial artists was 8.15 points lower than the score of the control group; and similarly, there was a significant difference on the sub-scales in favor of the budo martial artists ($p < 0.05$).

The fact that budo martial artists have a lower level of trait aggression than their non-athletic and non-martial arts peers was proven by objective test methods, validated questionnaires, and a large sample size. Similarly, Szabo and Parkin [40], and Boostani et al. [41] showed that

martial artists show lower levels of aggressiveness than those in non-athletic control groups. Mroczkowska et al. [42] demonstrated the positive effects of traditional karate training on lowering aggression levels. Kalina's research [43] found that 8 months of complex training (self-defense exercises, judo, relaxation, meditation exercises, verbal actions) resulted in reducing young men's aggression in the long run (validated by resurvey after 3 years). In light of these results, it can be stated that budo martial arts – similar to other sports – can be used within a school framework, even in physical education classes, with the appropriate expertise. To do this, however, these martial arts must be taught with appropriate frequency, duration and methods by well-trained practitioners.

A number of researches deal with differences in aggression between athletes and non-athletes [44, 45]. The results of the research indicate the role of regular sports in reducing aggression [31, 44-48]. Other research has also investigated groups of different sportsmen with regards to trait aggression; and whether the degree of contact permissible affects the degree of aggression in each sport [9, 44, 49].

In the budo martial arts sample, it was assumed that the time spent with the sport, training frequency and competitive variables correlate, thus determining the degree of trait aggression (the total score and the score of the subscales (H4)). However, no significant correlation was found between the time spent with the sport and trait aggression, or each of the aggression sub-scales and so, in this research, the time spent with the sport and training frequency were not seen as decisive factors.

In examining the relationship between trait aggression, the individual sub-scales and competition, a significant difference was only found between the competitors and non-competitors in the case of the hostility subclass. Based on this, we assume that budo sports can be used to reduce aggression even without the competition criterion. Due to the special training methods of martial arts, the emphasis on formal exercises (*kata*), meditation, Japanese philosophical background, and fostering respect, some authors emphasize that the level of aggression in people participating in traditional martial arts classes have a lower level of trait aggression than those pursuing the more

performance-oriented martial arts, where the values listed above are increasingly pushed in the background [5, 50, 51].

It is worth pointing out, therefore, that according to most authors, the most important factors are the time spent with sports (training), the number of training sessions (workout frequency), the training climate, competition, the concept of martial arts (traditional vs. modern), as well as the trainer's personality.

CONCLUSIONS

The strength of this research is the large sample size and the fact that a similar study on the Hungarian budo martial artists had not been conducted before. However, it should be mentioned as a limitation of the research is that a cross-sectional study could not quantify the effects of pre-selection into a given sport [45, 52, 53]. According to some authors, presumably, participants choose martial arts because their personal values are in line with the value system of a particular sport. The authors emphasize that young people whose values and ideas do not agree with the chosen sport opt out of the sport.

Several authors also point out that for this reason it would be desirable to carry out longitudinal studies [54, 55]. However, these studies face hurdles in that they require a lot of time, it is difficult to determine the optimal duration between the first and second (and further) measurements, and it is difficult to prevent a possible change in circumstances such as drop-outs or changes in the trainer, or a

club change. In research by Reynes and Lorant [56] for example, about one third of the total sample of judo practitioners involved in the trial dropped-out during the one-year study.

A further difficulty with longitudinal studies is that the authors often choose a time period that is too short in which to measure the effects, so Edelman [57] chose a twelve, Lakes and Hoyt [58] a sixteen and Zivin et al. [59] a ten-week test period. However, many authors have expressed doubts about the reliability of short-term measurement periods because such a short period does not cause noticeable changes in personality. Nosanchuk and Lamarre [60] argue that training for more than one year would be needed for changes in personality. Konzak and Klarova [61] and Layton [62] emphasize that many years of training are needed to show positive effects. In subsequent studies, it is important to examine individual martial arts and styles separately, Jones et al. [63] emphasizes that besides these, the trainee's personality, perception, and training style are equally important.

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