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PSYCHOLOGY OF SPORT

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Aggression among Slovak males training in martial arts versus other sports disciplines

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Abstract
Background. Research shows that sports training allows for reducing aggressive behaviors. However, the influence of certain sports disciplines can also intensify them. Results of studies on the influence of sports on aggression levels are inconclusive. Well-founded psychological theories are relatively rarely used to explain these differences.
Materials and methods. 480 men training in hockey, basketball, volleyball, martial arts, individual sports, and soccer (junior league, 5th – 4th league, major league) participated in the study. The control group comprised 83 men not participating in any sport. The study was carried out in Slovakia, using Buss and Durkee's Aggression Questionnaire.
Results. Four hypotheses concerning the relationship between aggression levels and duration of training, age, and skill level were tested.
Conclusions. 1. In the group of men training in martial arts, the correlations between the duration of training and aggression-related variables, such as *assault, irritability, negativism, suspicion*, and *verbal aggression* were negative and of medium strength. 2. Training in martial arts lowers aggression levels. 3. In the group of men training in basketball, a negative correlation between the duration of training and *negativism* was noted, which means that basketball players do not violate the law or social conventions. 4. In the group of men training in individual sports, a positive correlation between the duration of training and *guilt* was found. 5. In the group of junior league soccer players, the Pearson's correlation coefficient for the variable of *assault* was negative, while it was positive in the 5th – 4th league group, and statistically insignificant in the major league group. 6. The hypothesis stating that sports training lowers aggression levels was not confirmed. It is true only for select sports disciplines.

Introduction

Knowledge of the "master" model possessing traits which are especially important for each sports discipline is necessary for accurately selecting candidates for future champions. An optimal solution would be to continuously update such models based on the global leaders. However, this is not always possible in practice, as only very basic information about the master athletes is available in literature, most often their height and weight. These traits, though important, do not allow for creating a full morphological and psychological profile. The master model is thus created on the basis of the national leaders. In turn, the accuracy of this model depends on the position these athletes take in relation to the national or global leaders.

As [Czajkowski 2001] writes, the master model might have significance in "simple" sports involving only one interoceptive-motor habit of a closed, motor type (athletics, weightlifting, cycling, swimming, etc.). In sports with many open, cognitive-motor habits (martial arts, games), even though the best athletes show some common traits, there also exist great interpersonal differences. For example, world champions and Olympic medalists in fencing differ with regards to their personality and temperament traits (aside from melancholics), morphology (body type, height, weight, limb length, fat tissue, etc.), brain hemisphere lateralization, preference towards offensive or defensive movements, predictable or improvised movements, rapid or slow movement, school and training, etc.

Research shows that well-organized physical activity can lower aggressive behaviors in young people [Rotter

et al. 2015]. However, according to Rotter *et al*. [2015], the influence of specific sports disciplines can cause an increase in these behaviors.

An interesting research was published by [Shahar 2011], who found on a sample of socially underprivileged children, that regularly engaging children in sports reduces their aggression, improves self-control and discipline. The sample consisted of 649 children and a complex improvement in behavior was observed among them. [Vertonghen, Theebom 2010] have carried out a meta-analysis of studies on martial arts and aggressive behaviors, showing that a longer duration of training is related to lower levels of aggression [Daniels, Thornton 1990, 1992; Nosanchuk 1981; Rothpearl 1980; Skelton, Glynn, Berta 1991]. Research indicates that aggression often increases along with age [Conory *et al*. 2001; Romand *et al*. 2009].

[Bjorkqvist, Varhama 2001] have reported that men training karate have a more positive attitude towards conflict resolution than do wrestlers and boxers. Moreover, they found that women training karate were more likely to engage in violent conflict resolution than did women from the control group. The authors suggest that women might associate karate with the right to physical defense against assault, while men – with non-violent defense.

[Steyn, Roux 2009] have used Buss and Perry's Aggression Questionnaire to compare aggression levels in 15- to 18-year-olds training in taekwondo, hockey, or not participating in any sports. Their results have shown that verbal aggression and hostility scores of the participants training in taekwondo were much lower compared to the other two groups.

[Pacesova, Putala 2017] examined the level of aggressiveness of swimmers, combative athletes and non-athletes in adolescent age. In their research they used a BPAQ questionnaire [Buss, Perry 1992] which measures four items, namely physical aggression, verbal aggression, anger and hostility. Research found that the highest rates of overall aggression and verbal aggression were found in non-athletes.

Opposite results were reported by [Reynes, Lorant 2001, 2002]. They have compared changes in aggression levels between children training *judo* and *karate*. Endresen and Olweus [2005] have also pointed towards the negative effects of training in martial arts among adolescents.

[Fory1985] compared the aggressiveness of groups of combat sports, non-combat sports and the general population in his work, in which he recorded significantly higher values of physical aggression in group of combat sports compared to the general population.

As [Czajkowski 2001, 2004] writes, athletes can be divided into the so-called technique-oriented athletes and warriors. At the beginning of their career, in the little/intermediate league, or even junior/senior league stages, most athletes represent the warrior type, quickly achieving their goals. For the technique-oriented athletes, their initial results remain below their skills for a long time. In the beginning stages of their career, they often lose to players who are much worse technically.

The warrior, who is characterized by an aggressive, active, offensive stance, achieves success much earlier than the technique-oriented athletes (their results are greater than their actual skill). However, the older the athlete, the lesser this lead, due to their lack of a solid technical basis.

An analysis of the careers of master fencers shows that:

1. The greatest achievements in large international competitions have been displayed for many years by athletes with high technical-tactical skills and very good basic training, who possess a variety of traits characteristic for the technique-oriented athlete and appropriately developed (inborn or trained) traits characteristic of the warrior.
2. Similar results are achieved by those athletes in whom the warrior traits dominate. These athletes are able to supplement their aggressive motivation with appropriate technical skills, often creating an individual, unorthodox fencing style.
3. Athletes with extreme, one-sided manifestations of the technique-oriented or warrior types usually did not achieve high international, or even national, results. The technique-oriented athlete with low initiative and aggression becomes, in the words of [Czajkowski 1979], a "mediocre regular," who fences nicely, though ineffectively.

In their literature review on the role of aggression in sport success [Rui, Cruz 2017] have noted that the results on the relationship between sports and aggression levels are inconclusive. The authors have noticed higher aggression levels among participants in contact sports and in studies with younger and/or less experienced participants.

The work of [Butt, Cox 1992] stated that tennis players with a higher performance level (representatives) showed significantly higher aggressiveness than recreational players.

The results of a study by [Coulomb-Cabgano, Rascle 2006] have shown that men show higher levels of aggressive behaviors than women, regardless of the sport, competition level, or the character of the measured aggressive behavior. Instrumental aggression increases and hostile aggression decreases along with the increase in competition level.

The study by [Rotter *et al*. 2015] has shown that people participating in team sports display a higher tendency towards physical aggression than do people participating in individual sports. The authors have also reported a higher level of physical aggression among adolescents participating in sports 3-4 times per week compared to physically non-active and very active (more than 5

times per week) adolescents. They posit that people with a greater tendency towards physical aggression take up sports and this tendency is reduced only after a high level of engagement in the sport.

On the other hand, the results of [Gee, Leith 2007] disprove the commonly held belief that aggressive behaviors in hockey are a natural consequence of frustration. According to these authors, they can be understood as learned reactions which first become modeled, and then reinforced by subsequent modeling.

As can be seen from the above studies, aggression in sports has a varied character. Study results are often contradictory [Korobeynikov *et al.* 2019]. However, this might only seemingly be a contradiction, as the character of the studied sports disciplines is also varied.

Because aggression differs in terms of the type of sport in its manifestation, quantity and potential occurrence, Slepica [2009] has divided sports into the following groups:

Combat sports – all combat sports, fencing. In these sports, aggression is part of the competition but according to certain rules.

Contact sports – aggression is not the basis of competition but may occur during the fight. These include sports such as hockey, football, rugby, in which we currently see more and more injuries, which is due to hard collisions as part of team tactics.

Individual non-contact sports – we usually do not see the aggression but it cannot be excluded since athletes compete in close proximity. These are sports such as cycling, motoring or running disciplines in athletics.

Individual or team sports in which the competitors are not in contact or close proximity. Athletes are in the limited area. This space is separated in a certain way, such as a net (tennis, badminton, volleyball, race track (swimming, canoeing). If aggression occurs, then only in a verbal form.

This variety can be seen in the fact that martial arts create conditions in which the participants can, though they do not have to, become aggressive. It must also be noted that literature reviews of aggression in sports rarely make reference to various theories of aggression which would explain the achieved results.

Theories of aggression include, among others, (a) the ethological perspective: aggression as internal energy [Lorenz 1974], and (b) the sociobiological perspective: aggression as a product of evolution [Archer 1988: 257, 1995; Buss, Shakelford 1997; Daly, Wilson 1994]. Psychological theories include, among others, (a) the psychoanalytic theory: aggression as a destructive instinct [Freud, 1994], (b) the frustration-aggression theory: aggression as a goal-oriented drive [Dollard, Miller, Doob et al. 1939], (c) cognitive neoassociationism: the role negative affect [Berkowitz, 1993], (d) excitation-transfer theory: anger and attribution of arousal [Zillmann 1979], (e) the social cognitive approach: aggression scripts and processing of social cognitive information [Huesmann 1988], (f) learning theory: the role of reinforcement and modeling [Bandura 1973, 1983], and (g) the social interactional model: aggression as a coercive social influence [Tedeschi, Felson 1994], Rene Girard's "Mimetic Theory"[Leyva 2019].

As [Makarowski 2012] writes, it is crucial to distinguish between aggression and aggressiveness, two similarly sounding terms. Aggression is a process, a series of consequent relations or causally determined changes, constituting the subsequent phases or stages of an individual's behavior. Aggressiveness, on the other hand, is a personality trait, differentiating an individual from others in their surroundings. Aggressiveness involves the frequent occurrence of aggressive reactions. In both scientific and lay understanding, aggression is a synonym of evil (in a moral sense) or sin (in a religious sense).

Aggression is a certain trait that is present to a greater or lesser degree in each person and is determined biologically (by inheritance), cognitively (by learning) and psycho-socially (emotional area and environmental impact). Hostility is used in connection with expressions of anger, rivalry or aggressive behaviour. It is an attitude (personality focus) that is characterized by hostility, negativity, bitterness, cynicism, and irony. In contrast to aggressiveness, which is largely determined biologically, hostility is predominantly shaped by psychosocial effects [Harsa *et al.* 2012].

Aggression and violence can be encountered in many areas of life, including sports [Szmajke 1993; Szmajke, Pawłowska, Wilinski 2005; Szmajke 2005; Gorner, Greganova, Kusnierz 2019]. As [Husman, Silva 1984] distinguish three types of aggression in sports (a) proactive assertiveness, (b) instrumental aggression, and (c) reactive aggression. Instrumental aggression is understood as a means towards achieving a goal. The authors assume that aggression is a decisive and energetic striving towards a goal. On the other hand, Thirer [1993] claims that aggression in sports can take two forms:

1. Nondestructive aggression, related to assertiveness. It is characterized by self-defense and goal achievement orientation.
2. Hostile aggression, which involves destructiveness, anger, harm, hate, revenge, and rage.

[Rychta 2004: 196] writes that sports can also involve the understanding of aggression as a normal and positive, adaptive behavior, close to nondestructive aggression or assertiveness. Many coaches and sports journalists consider aggression in sports to be a positive behavior and an expected means towards achieving success [Donahue, Rip, Vallerand 2009; Jarvis 2003; Kalina, Kaluzny 2002: 48].

According to the instinct theory or the frustration-aggression theory, sports can reduce aggression in society as they create socially approved conditions for expressing aggressive drives. On the other hand, from the

social learning perspective, participation in the so-called aggressive sports creates the risk of learning new aggressive behaviors. On the basis of social learning theories, it can be expected that learning a set of aggressive behaviors during martial arts training can increase aggression. However, research has shown opposite results: Training martial arts seems to lower aggression levels. Using the [Buss, Durkee 1957; Daniels, Thornton 1992] measured aggression levels among participants training karate. They have found a negative relationship between hostility (the tendency to react with physical violence) and duration of training (r = 0.64). A similar relationship between aggression and level of sport proficiency was also reported by [Nosanschuk 1981].

The study by [Geard *et al*. 2020] verified a hypothesis about the influence of the so-called successful aging, comprised of physical and psychological factors, including cognitive and social ones, on a group of master athletes (N = 764) and adult non-athletes (N = 404). Master athletes were revealed to have better physical and social functioning, but the two groups did not differ with regards to psychological and cognitive functioning. The results of this study suggest that successful aging should be treated as a multifaceted construct comprising various areas of functioning, both for master athletes and adult non-athletes. Compared to non-athletes, master athletes of the same age functioned better in the domains of physical fitness and social life.

[Lenzi *et al*. 1997] found a positive correlation between aggressiveness and sport activity when comparing athletes and the general population. According to Jarvis [2006], previous research has not confirmed the impact of sport on increasing aggression among athletes compared to the general population. [Gregor 1999] compared aggressiveness in the personality of footballers and non-athletes at the age of 18. The hypothesis that footballers will be more aggressive than non-athletes has not been confirmed. [Lemieux, McKelvie, Stout 2002] compared aggression of 86 athletes and 86 non-athletes at universities. The research did not confirm an increased level of aggression in the group of athletes.

Thus, does sport increase or decrease aggression? In an attempt to answer this question, the following research hypotheses were put forward:

H1: Training in martial arts lowers aggression levels.

H2: Among people training in sports, aggression levels decrease as the duration of training increases.

H3: Among people training in sports, aggression levels increase as competition increases.

H4: Among people training in sports, aggression levels decrease with age.

H5: People training in sports have lower aggression levels than people who do not engage in any sport.

Material and Methods

Participants

480 men (eight groups of sportsmen) participated in the study. The control group comprised 83 men not participating in any sport and not having any interest in sports. Pen-and-paper research was carried out in Slovakia in Podbrezova, Ruzomberok, Zlate Moravce, Sasova, Cernova, Podlavice, Rakytovce, Zvolen, Trencín, Lucenec, Zilina, Levice, Povazska Bystrica, Svidnik, Kosice, Presov, and Rakytovce. All participants were informed of the purpose of the study and have their written consent for participation. The study was approved by the ethics committee of [AUTHOR'S AFFILIATION].

Mean age and duration of sports training is shown in Table 1.

Materials

[Buss, Durkee's Hostility Inventory 1957], adapted into Slovak by [Cepelak 1984].

It comprises 75 questions formed into seven scales intended to measure varieties of aggression and hostility, as well as an additional scale measuring guilt. The inventory is not intended to measure causes or inten-

Table 1. Mean Age and Duration of Sports Training in Each Study Group

		Age		Duration of training	
Sport type	*N*	*M*	*SD*	*M*	*SD*
Hockey	64	25.58	5.01	17.97	5.16
Basketball	47	21.26	3.99	11.55	3.53
Volleyball	47	26.62	5.57	16.09	5.76
Martial arts	41	24.88	4.93	11.51	6.12
Individual sports	43	23.88	4.04	11.63	5.04
Soccer – 5th and 4th league	52	24.77	5.53	16.35	5.38
Soccer – junior league	56	15.91	0.92	9,.6	1.73
Soccer – major league	47	25.09	5.17	17.21	4.99
Not participating in any sport	83	22.71	4.07		

tions of aggressive behavior. However, it does allow for capturing the level of intensity of aggression.

Scale I – assault (physical aggression) – involves reactions in which the individual uses physical force against a specific object (human or animal); this term describes physical altercations, but excludes destroying inanimate objects.

Scale II – indirect aggression – involves disordered, seemingly aimless reactions of exhibiting disapproval, bad mood, and anger, for example, stamping one's feet, hitting one's fists on the table, or throwing objects, as well as reactions indirectly aimed at a specific person, for example gossiping or mean jokes.

Scale III – irritability – involves reactions caused by a tendency towards tantrums at slight provocation, such as impulsivity, irascibility, grumpiness, or abusiveness.

Scale IV – negativism – involves reactions of oppositional behavior against authority and power, which can progress from passive protest to active struggle against the law of accepted conventions.

Scale V – resentment – involves attitudes of criticism, jealousy and hate, stemming from disillusionment and a general anger at the world due to real or perceived slights.

Scale VI – suspicion – involves attitudes of mistrust and reserve, intensifying into a belief that others are hurting, or at least attempting to hurt, the individual; this scale is expressed in projecting hostility on one's surrounding.

Scale VII – verbal aggression – involves all verbal reactions towards specific persons; it is defined in terms of form (shouting, arguing), as well as content (threats or curses).

Scale VIII – guilt – measures emotional reactions involving a conflict of feelings arising from a real or perceived violation of moral or social norms in deed or thought; this scale expresses the individual's possible belief that they are a bad person, including the attendant feelings of remorse.

The internal consistency (Cronbach's alpha) reliability coefficient for the total scale was 0.82, and the reliability coefficients for the subscales ranged from 0.69 to 0.85.

Results

The hypothesis that the longer one participates in a sport, the lower their aggression levels was tested using correlation analysis (Pearson's correlation coefficient). The results are presented in Table 2.

Table 2 shows that statistically significant correlations have occurred chiefly in the group of participants training in martial arts. The correlations were negative and of a medium size (assault: r = -0.33; irritability: r = -0.37; negativism: r = -0.31; suspicion: r = -0.37; and verbal aggression: r = -0.56).

The first hypothesis was partially confirmed, as mainly participants training in marital arts were characterized by lower levels of aggression.

Three interesting results can be seen in Table 2. First, in participants playing basketball, the correlation between the duration of training and negativism was negative, r = -0.30.

A statistically significant correlation between duration of training and guilt was observed only in the group participating in individual sports, r = -0.30, which means that the longer an individual participates in an individual sport, the more guilt they feel.

Third, the correlations for the assault scale were negative in the junior league soccer group, r = -0.36, positive in the 5th-4th league soccer group, r = 0.34, and not statistically significant in the major league soccer group.

To attempt to explain why these three groups achieved such diverse results, a one-way analysis of variance was carried out. It tested Hypothesis 2: aggression levels increase with the level of competition. Using

Table 2. Correlations Between Duration of Sports Training and Aggression

	Martial arts	Individual sports	Hockey	Basketball	Volleyball	Soccer – major league	Soccer – 5th and 4th league	Soccer – junior league
Assault	-0.33*	0.03	0.04	0.14	0.13	0.14	0.34*	-0.36**
Indirect aggression	-0.02	-0.25	-0.11	0.17	-0.10	-0.08	0.17	0.11
Irritability	-0.37*	-0.13	-0.02	0.09	0.06	-0.01	-0.02	0.2
Negativism	-0.31*	-0.16	-0.09	-0.30*	-0.08	-0.23	0.01	-0.0749
Resentment	-0.11	-0.06	0.03	0.01	0.17	0.22	0.06	0.22
Suspicion	-0.37*	-0.04	-0.2	0.11	-0.07	-0.02	-0.08	-0.08
Verbal aggression	-0.56***	0.04	-0.14	-0.10	-0.08	-0.2	-0.04	-0.16
Guilt	-0.09	0.30*	-0.08	-0.19	-0.22	0.02	-0.16	-0.01

Table 3. Analysis of Variance of Aggression Levels in Groups Playing Soccer

Variable		Junior league	5th-4th league	Major league	*F*	*p*	Intergroup differences
		1	2	3			
Assault	*M*	15.39	14.60	15.02	3.246	*	1:2
	SD	1.42	1.87	1.55			
Indirect aggression	*M*	13.48	13.67	13.38	0.338	ns.	ns.
	SD	1.89	1.71	1.78			
Irritability	*M*	16.05	16.31	15.64	1.950	ns.	ns.
	SD	1.71	1.81	1.54			
Negativism	*M*	7.96	7.85	7.64	1.203	ns.	ns.
	SD	1.08	1.06	1.07			
Resentment	*M*	11.82	11.77	11.45	0.964	ns.	ns.
	SD	1.39	1.29	1.68			
Suspicion	*M*	14.96	14.79	14.02	3.665	*	2:3
	SD	1.57	1.82	2.15			
Verbal aggression	*M*	18.91	19.12	19.04	0.098	ns.	ns.
	SD	2.94	2.24	1.92			
Guilt	*M*	7.41	13.96	13.45			
	SD	1.09	1.74	1.68	311.119	***	1:2; 1:3; 2:3

Table 4. Analysis of Variance of Aggression Levels Between Sports Disciplines

Variable		Major league soccer	Hockey	Basketball	Volleyball	Martial arts	Individual sports	Control group	5th-4th league soccer	Junior league soccer	*F*	*p*	Intergroup differences
		1	2	3	4	5	6	7	8	9			
Assault	*M*	15.02	14.64	14.40	14.64	14.00	14.65	14.45	14.60	15.39	3.00	**	5:9***; 7:9***
	SD	1.55	1.71	1.54	1.69	1.55	1.54	1.48	1.87	1.42			
Indirect aggresion	*M*	13.38	13.50	13.32	13.15	12.73	13.30	13.41	13.67	13.48	1.13	ns.	ns.
	SD	1.78	1.62	1.81	1.52	1.75	1.55	1.59	1.71	1.89			
Irritability	*M*	15.64	16.59	16.53	16.79	15.39	15.88	15.80	16.31	16.05	3.17	**	4:5*
	SD	1.54	2.04	1.90	1.71	2.31	2.07	1.80	1.81	1.71			
Negativism	*M*	7.64	7.30	7.49	7.66	7.32	7.56	7.54	7.85	7.96	2.15	*	2:9*
	SD	1.07	1.11	1.16	1.18	1.01	1.22	1.05	1.06	1.08			
Resentment	*M*	11.45	11.52	11.91	12.02	10.63	11.44	11.13	11.77	11.82	4.18	***	3:5***; 4:5***; 5:8*; 5:9***
	SD	1.68	1.47	1.52	1.22	1.51	1.40	1.62	1.29	1.39			
Suspicion	*M*	14.02	15.03	14.53	14.91	13.24	13.58	14.18	14.79	14.96	5.41	***	2:5***; 2:6*; 4:5**; 4:6*; 5:8**; 5:9**; 6:9*
	SD	2.15	1.60	2.01	1.80	2.12	2.01	2.10	1.82	1.57			
Verbal aggression	*M*	19.04	19.02	19.17	18.94	18.24	18.88	18.95	19.12	18.91	0.65	ns.	ns.
	SD	1.92	1.92	2.23	2.05	2.00	2.48	1.93	2.24	2.94			
Guilt	*M*	13.45	13.36	13.04	13.38	13.41	13.65	13.77	13.96	7.41	109.89	***	(1, 2, 3, 4, 5, 6, 7, 8):9***
	SD	1.68	1.29	1.27	1.50	1.30	1.69	1.52	1.74	1.09			

the Statistica 13.1 software, Tukey's test for unequal sample sizes was applied. The results are presented in Table 3.

As Table 3 shows, the second hypothesis was not confirmed. However, it was revealed that junior league soccer players exhibited low levels of guilt (Sten 2), while for 5th-4th league and major league players, it was moderate (Sten 6).

Among the entire sample, the correlation between age and guilt was $r = 0.43$, $p < .001$ and between age and duration of training, it was $r = 0.24$, $p < .001$,

It is commonly known that younger males exhibit higher testosterone levels, and thus, higher aggression levels [Vetulani 2013].

Next, Hypothesis 3 was tested, which states that the longer young persons train in a given sport type,

the higher their aggression levels. Statistically significant differences with regards to age were noted between the groups of junior league soccer players and all other groups, as well as between basketball players and all other groups ($F = 30.21$; $p < .001$).

Knowing that soccer players were the youngest group, a one-way analysis of variance was carried out to compare aggression levels in this group with those of the other groups. Results are presented in Table 4. Significant differences were revealed on the suspicion scale between junior league soccer players and participants training in martial arts.

Table 4 additionally shows that the lowest levels of aggression (though not guilt) were reported in the group training in martial arts. Irritability was the greatest in hockey players, and resentment – in basketball players. Also, the highest levels of aggression were noted in adolescents playing soccer.

Table 4 allows for resolving the hypothesis that people participating in sports show lower aggression levels than do physically non-active people. The hypothesis was not confirmed.

Discussion

Studies by [Daniels, Thornton 1990] and by [Nosanchuk 1981] have shown a negative relationship between hostility and duration of sports training, as well as between aggression and level of expertise in a given sport. Thus, the first hypothesis verified in the current study concerned the relationship between training duration and aggression levels. Statistically significant correlations occurred mainly in the group of participants training in martial arts. The Pearson's correlation coefficients were negative and of moderate size for such variables as assault, irritability, negativism, suspicion, and verbal aggression.

Why is it that mainly martial arts contribute to lowering aggression levels? [Cynarski *et al*. 2015]. This effect can be explained by reference to the drive or instinct theories. Their chief authors are [Freud 1994] and [Lorentz 1972]. According to these theories, an inborn aggressive drive exists in humans, because an internal arousal is constantly generated in the body, which requires expression. Lorentz noted that aggressive behavior should be directed towards "acceptable" vicarious objects and that it should be expressed in socially accepted ways. Proponents of the drive/instinct theory of aggression claim that participation in sports lowers the tendency towards aggression. Ebil-Eibesfeld [1976] stated that sport can serve a cathartic function, lowering energy levels and thus preventing aggression attacks. Research by Starosta and Botwina [2002] have shown that wrestling allows for externalizing aggression in a competitive context and lowers the buildup of aggression.

The current study concludes that individuals training in martial arts display lower levels of aggression than individuals participating in other sports.

A negative correlation between duration of sport training and negativism was observed among participants playing basketball. A negative correlation coefficient for negativism means that individuals training in martial arts and basketball accept existing laws, rules, and conventions. Such people rarely question the decisions of judges or coaches.

A positive correlation between duration of sport training and guilt was observed among participants practicing individual sports. This means that the longer an individual trains an individual sport, the more they are dissatisfied with themselves. This might imply a perfectionist motivation and a belief that insufficient time and effort has been invested in this goal. On the other hand, participating in individual sports involves training and entering competitions by oneself. There are no teammates who could share the responsibility for an unsatisfying result. This could cause resentment and a belief that one is an unsuccessful sportsperson. However, this result should be interpreted with caution because the studied group was not uniform (cyclists – 7 participants; swimmers – 6 participants; sailors – 9 participants; weightlifters – 5 participants; athletes – 16 participants). Thus, it would be pertinent to replicate the current study on a larger sample divided into subgroups based on the practiced individual sport.

Similarly to martial arts, in the group of junior league soccer players, the Pearson's correlation coefficient for the variable of assault was negative, $r = -0.36$. It was positive for 5^{th}-4^{th} league players, $r = 0.34$, and it was not statistically significant for major league players.

How to explain these contradictory results? The youngest soccer players ($M_{age} = 15.91$) are the most focused on achieving sport success. The period of adolescence is characterized by hormonal instability, uncertainty with regards to future career prospects, goals, and plans. Young sportspeople in sports club realize that physical aggression towards other players, which violates sports rules, might prevent them from advancing their careers. The coach's authority is also a factor.

According to the second Yerkes-Dodson law, overly strong motivation, and a resulting high level of arousal, ambition, and responsibility first affects the so-called technique-oriented athletes, lowering their performance and sports results. However, the same motivation level might be optimal for the so-called warriors, with simple movement habits and primitive tactics.

The majority of the so-called warriors are individuals with strong nervous systems, while those with weaker ones are more common among the so-called technique-oriented athletes. Difficult situations, threats, and competition mobilize the strong types and improve the effectiveness of their performance

According to the social learning theory [Bandura 1983], aggression is a learned, acquired psychological trait. According to this theory, the sportsperson will learn appropriate behaviors by imitation or modeling. Young soccer players' idols are European or international major league players. These successful players do not have to rely on physical aggression to achieve their goals. Thus, in this group of sportsmen, no statistically significant correlations were observed between the duration of training and the assault scale. This was not the case in 5th-4th league players, however, for whom this correlation was positive (r = 0.34). This result can be explained by [Dollard, Miller's 1939] frustration-aggression theory. 5th-4th league players were not able to enter the major league, despite being of a similar age as other major league players ($M_{5\text{-}4\ league}$ = 24.77; $M_{major\ league}$ = 25.09). Frustrating goal achievement in the form of denying an advance causes frustration, which, in turn, leads to aggression. In which it was confirmed that in tournaments, all participants want to win, but only one (or one team) actually can. Those who lose experience frustration due not meeting their own expectations. Their reaction to such a situation involves a heightened readiness to engage in aggressive behavior.

Do people participating in sports have lower aggression levels than physically non-active people? In order to test this hypothesis, a one-way analysis of variance was carried out, comparing aggression levels of physically non-active people not interested in sports with all other groups in the current study. A statistically significant difference between non-sportsmen and junior league sports players was observed in the case of the assault scale. All other results were not statistically significant. Other aggression-related results were not lower (and were not lowest in the overall sample) for the physically non-active participants than for participants training in sports. The hypothesis stating that participating in sports lowers aggression levels was not confirmed – it was true only for specific sports disciplines.

The research carried out on Slovak sportsmen using the Buss-Durkee Hostility Inventory are not comprehensive because this questionnaire is not designed specifically to measure sportspersons. It would be worthwhile to replicate the current study using the Questionnaire of Aggression in Sports [Makarowski 2013]. It distinguishes three factors related to aggressive behaviors: **1. go-getting** (sustained effort towards goal achievement despite emerging obstacles), **2. foul play** (little scruples in goal achievement and a belief that "anything goes"), and **3. assertiveness** (courage in action and in voicing one's opinion despite potentially negative consequences).

Single-cause explanations of aggressive behavior in sports are being replaced with more complex accounts. They acknowledge the undisputable biological basis of aggression, but also pay attention to the significant social and situational role in facilitating aggressive behaviors [Bartlett, Abrams 2019; Gracz, Sankowski 2007: 504].

Conclusions

— In the group of participants training in martial arts, the correlation between the duration of sports training and the level of variables measuring aggression, such as hostility, irritation, negativism, suspicion, and verbal aggression was negative and moderate in size.
— Training in martial arts lowers aggression levels.
— In the group of participants playing basketball, a negative correlation between the duration of training and negativism was observed, which means that basketball players do not violate the commonly accepted rules and laws.
— In the group of people training in individual sports, a positive correlation between the duration of training and guilt was observed.
— In the group of junior league soccer players, the Pearson correlation coefficient for the variable of assault was negative; it was positive for 5th-4th league players, and it was not statistically significant for major league players.
— The hypothesis stating that participating in sports lowers aggression levels was not confirmed. This hypothesis is only true for specific sports disciplines.

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Agresja wśród słowackich zawodników trenujących sztuki walki na tle innych dyscyplin sportowych

Słowa kluczowe: sporty walki, agresywne zachowania, piłka nożna, koszykówka, sporty indywidualne

Streszczenie

Wstęp. Badania wskazują, że uprawianie sportu umożliwia redukcję zachowań agresywnych, ale również wpływ poszczególnych dyscyplin sportowych może powodować nasilenie zachowań agresywnych. Wyniki badań wpływu sportu na poziom agresji są niespójne. Stosunkowo rzadko do wyjaśnienia tych różnic korzysta się z dobrze ugruntowanych teorii agresji.
Materiał i metody. W badaniach uczestniczyło 480 mężczyzn uprawiających hokej, koszykówkę, siatkówkę, sporty walki, sporty indywidualne, piłkę nożną (juniorzy, 5 – 4 liga, ekstraliga). Grupą porównawczą było 83 mężczyzn nie uprawiających sportu. Badania przeprowadzono na Słowacji.
W badaniach wykorzystano Inwentarz Agresji Bussa-Durkee.
Wyniki**.** Weryfikowano cztery hipotezy dotyczące zależności pomiędzy poziomem agresji a stażem zawodniczym, wiekiem i grupą zaawansowania sportowego.
Wnioski. 1. W grupie osób uprawiających sporty walki korelacja pomiędzy okresem uprawiana sportu a poziomem zmiennych badających poziom agresji takich jak *Atak*, *Irytacja*, *Negatywizm, Podejrzliwość* i *Agresja słowna* była ujemna i na przeciętnym poziomie. 2. Uprawianie sportów walki obniża poziom agresji. 3. W grupie osób trenujących koszykówkę zanotowano ujemny współczynnik wyniku korelacji pomiędzy stażem, a *Negatywizmem*, co oznacza, że zawodnicy koszykówki nie działają wbrew przyjętym regułom i prawu. 4. U osób uprawiających sporty indywidualne zauważono dodatni współczynnik korelacji pomiędzy okresem uprawiana sportu, a *Poczuciem winy*. 5. W grupie juniorów uprawiających piłkę nożną dla zmiennej *Atak* współczynnik korelacji Pearsona był ujemny, dla osób z 5-4 ligi współczynnik był dodatni, a dla piłkarzy z ekstra ligi współczynnik nie był istotny statystycznie. 6. Hipoteza mówiąca, że uprawianie sportu obniża poziom agresji nie potwierdziła się. Ta hipoteza jest prawdziwa tylko dla wybranych dyscyplin sportowych.