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Original Article

Coping pain strategies, aggression and anxiety in professional martial arts athletes

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Abstract:
Introduction: Martial arts are associated with the ability to control one's emotions, to deal with opponents and the challenges of pain. They are often associated with physical contact with an opponent and various challenges as a result. Martial arts athletes can experience anxiety, pain and aggression in the terms of their sport their performance and in the context of the discipline. Problem Statement and Approach: The following research aims to examine the relationship between aggression, pain coping strategies and anxiety in athletes training in martial arts. Furthermore, the factors were tested in comparison with non-training individuals. Material and Methods: In the study a sample consisted of martial arts athletes (N=50) and non-training academic students (N=50). To measure the studied concept several questionnaires were used: the Pain Coping Strategies Questionnaire (CSQ); the Buss–Perry Aggression Questionnaire (BPQA); the State–Trait Anxiety Inventory (STAI). Results: The results showed that athletes present higher results in pain management skills than the group of students. In the case of the self-assessment of the trait and state relating to anxiety, the athletes' results were lower than in the student group. The results presented in the group of athletes a strong correlation in the anger and physical aggression relationship. In the group of students, the strongest correlation relationship was also shown for the anger and physical aggression relationship. Conclusions: Our results showed the relationship between psychological anxiety, pain management and aggression in martial arts athletes compared to non-training individuals. Athletes have lower levels of anxiety and also aggression compared to students. In both the athlete and control group, control of one's own arousal is positively related to distraction strategies. Knowing how athletes psychologically cope with difficult factors such as pain and anxiety can be valuable feedback for researchers and practitioners.
Key Words: **coping strategies, aggression, anxiety, martial arts**

Introduction

Martial arts are multifaceted disciplines that intertwine physical exertion with significant psychological and emotional components. Engagement in these practices necessitates not only the mastery of physical techniques but also the development of advanced emotional regulation, pain tolerance and adaptability to high-pressure situations (Zvi & Lavi, 2025). Participation in martial arts often requires individuals to manage emotions such as anger, frustration and fear. Research indicates that traditional martial arts, which incorporate philosophical and meditative elements, can effectively reduce levels of anger and aggression, particularly among adults and youths with behavioural issues (Lafuente et al., 2021).

Physical contact and the experience of pain are inherent aspects of this kind of sport discipline. Athletes learn to cope with discomfort and develop resilience, which can translate to improved stress management in other areas of life. The ability to remain composed under physical pressure can be developed through consistent training (Tingxiu et al., 2025). Competitive martial arts environments can induce significant anxiety due to the inherent risks and pressures to perform. Studies have found that mental toughness, often developed through martial arts training, is associated with lower levels of cognitive and somatic anxiety, and higher self-confidence among athletes. This psychological resilience is crucial for optimal performance and overall well-being (Mojtahedi et al., 2023).

Pain in people who train indicates the limits of the body's capacity, especially in the area that is subjected to the highest stress in each discipline and is consequently most vulnerable to damage or injury (Leźnicka et al., 2017). In the sociology of sport literature, much attention has been paid to the experience of pain management in martial arts (Focht et al., 2000). Pain is an intrinsic part of professional sport, especially sports and martial arts. The ability to cope with it is a desirable skill in athletes at a high level of training (Lafuente et al., 2021). The physical contact in this kind of sport can be connected to pain and also aggression

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(Kostorz & Sas-Nowosielski, 2021). And it is through the sport that aggressiveness becomes embedded in the image of young athletes (Przepióra et al., 2017). The level of aggressiveness is also related to the professional level of an athlete (Purba & Situmeang, 2018). Not only the actual training itself, but also the training experience has a positive effect on the reduction of aggressiveness (Przepióra et al., 2017).

An explicit definition of aggression is difficult to formulate. A general definition of aggression characterizes it as any form of behaviour aimed at hurting or causing harm to another person who is motivated to avoid it (Kowalczuk et al., 2011). The classic definition of aggression was proposed by Buss (Buss & Perry, 1992), who characterized it as a reaction that provides harmful stimuli to another person. However, the topic of aggression has been studied many times before by various researchers.

Aggressive behaviour is strongly associated with biased behaviour and intention to inflict pain (Krishnaveni & Shahin, 2014), as well as specific actions to cause harm to others. There is also a link between aggression and impulsivity (Al Assaad, 2020). The concept of aggression in young karate athletes was studied by Dewi Putri Susanti, Samsul Bahri, Giri Prayogo (2023). Their study proves that karate kumite practitioners have average levels of aggression. Assad Al Assad (2020) reported that those male mixed martial arts athletes who are more aggressive suffer more injuries. Krzysztof Sas-Nowosielski and Karolina Kostorz (2021) examined the dimension of aggression among athletes training in sports and martial arts. Their measurements proved that people training in combat sports have lower levels of hostility.

When analysing anxiety and its impact on human activity, its intensity is considered first (Afifah et al., 2021). In this dimension, the beneficial effect of anxiety is assumed to be at a moderate level. In this conception, the optimal level of anxiety is adaptive and has a positive impact on the athlete's functioning. Excessive anxiety disorganizes the athlete's performance, while reduced anxiety causes demotivation and discouragement (Humara, 1999).

The specificity of anxiety occurring in sports competition is described taking into account the already classic division into anxiety as a trait and anxiety as a state (Spielberger et al., 1983). Anxiety is among the most frequently studied emotions specific to sporting competition and occurs both before and during competition (Strahler et al., 2010). It is present in the everyday sporting life of every athlete and can be related to other factors such as mental toughness (Budnik-Przybylska et al., 2018).

Martial arts athletes in particular experience cognitive, somatic and emotional anxiety in relation to sports performance (Kusuma et al., 2020). As already mentioned, pain, aggression and anxiety are associated with martial arts, and it is therefore reasonable to compare these concepts in a group of athletes and non-trainees. The topic is important in the context of sport, personality and self-regulation (Yu & Mantuhac, 2024). After in-depth analysis several research questions were formulated:

1. Is there a relationship between levels of aggression and pain coping strategies in people who train martial arts?
2. Is there a relationship between anxiety and levels of aggression in martial arts athletes?
3. Is there a correlation between anxiety and perceived pain in the martial arts athletes?
4. Is there a difference in pain coping strategies, aggression and anxiety between combat sports athletes and non-athletes?

The primary objective of the present study is to explore and analyse the relationship between levels of aggression, preferred pain coping strategies and the intensity of anxiety experienced by athletes who actively train in various forms of martial arts. The research seeks to determine whether engagement in martial arts – disciplines that often emphasize both physical confrontation and mental discipline – has a significant impact on these psychological variables.

Moreover, in order to account for the unique characteristics and psychological demands associated with martial arts practice, the study includes a comparative analysis involving a control group consisting of individuals who are physically active but do not engage in any form of professional or structured martial arts training.

This comparison is intended to provide a clearer understanding of whether the observed psychological traits are specifically associated with martial arts training or are instead reflective of general physical activity.

Material and Methods

Participants

This study involved male adult training martial arts – Judo (N=26), Karate (N=20), Kickboxing (N=4) – in sports clubs in Poland at international and national level, aged between 22 and 40 (M=28.36, SD=5.03). To distinguish the control group, the study invited physical education university male students (N=50) who declared that they undertake regular recreational physical activity – i.e. not as participation in a sports club or training professionally. Students were aged from 22 to 37 years old (M= 23.9, SD=3.17).

Procedure

Respondents completed questionnaires without a time limit. They were informed of the purpose of the research, its anonymity and its voluntary nature. After this, they voluntarily agreed to participate in the study and were aware that they could withdraw from participation at any time. The research was compliant with the Declaration of Helsinki and was approved by the *removed for the review* (protocol number 2017/11/09).

Research Tools

The Coping Strategies

In the present study, the Pain Coping Strategies Questionnaire (CSQ) (Swartzman et al., 1994) was used to assess the coping strategies used and their effectiveness in managing and reducing pain. It consists of 42 statements describing different ways of coping with pain and two questions about assessing one's own ability to use different strategies to cope and reduce pain.

The ways of coping with pain reflect six cognitive and one behavioural strategy, which in turn fall under 3 factors: cognitive coping; distraction and vicarious coping; and catastrophizing and hope-seeking. The higher the gained score, the higher the level of pain management.

Aggression

The Buss–Perry Aggression Questionnaire (BPQA) (Buss & Perry, 1992) was used to measure aggression. The BPAQ contains 29 questions, designed to measure aggressive tendencies (both physical and verbal aggression), as well as anger and hostility. The respondent's task in completing the questionnaire is to rank the answers to each question on a scale from 1 to 5. Four factors were identified in the factor analysis: Physical Aggression (PA) – nine items, Verbal Aggression (VA) – five items; Anger (A) – seven items; and Hostility (H) – eight items. The aggression items almost exclusively cover direct aggression. The testing time with this questionnaire is approximately 10 minutes.

Anxiety

To measure anxiety the Polish adaptation of the State–Trait Anxiety Inventory (STAI) 15 (Wrześniewski et al., 2012) was used. This tool allows the measurement of anxiety as fear as a state which is a reaction to environmental factors (X-1) and as a characteristic intrinsic to the individual (X-2). The questionnaire consists of 20 statements which require a response on a scale from 1 to 4.

Data Collection and Analysis / Statistical Analysis

In the research conducted, the analysis was based on two statistical methods:

1) The first was the T-student test for independent samples. This is a parametric test in which the number of groups studied should be kept in the first place; it is a test that allows comparing the mean values from two independent groups (athletes and students) in terms of a quantitative variable, which in this research concerned age, catastrophizing, anger or physical aggression.
The method allows the determination of whether two groups studied in relation to each other are statistically significant.

2) The second method was based on Pearson's correlation, which is one of the most reliable in statistical research. This is a method based on checking whether two quantitative variables are related to each other in a specific linear relationship. The result obtained can range from a value of -1 to a value of 1, which, in the case of such extreme values, indicates a strong correlation between the variables under study; in the case of a value of 0, there is no correlation.

For statistical calculations, the tool used was IBM SPSS v 29.0

Results

The results were presented using basic descriptive characteristics (mean value, standard deviation). With the applicability conditions provided for parametric tests, the analysis used the T-test for independent samples and Pearson's r-Pearson correlation.

The significance level was p=0.05, and the analysis was performed using the IBM SPSS 29.0 package.

Tests conducted allowed statistical analysis of the results obtained using the T-test for independent samples. The $p<0.05$ values obtained are statistically significant.

The analysis showed that CSQ1, catastrophizing, STAI X-1, STAI X-2, physical aggression, anger and hostility scores were statistically significantly different, depending on the type of group studied.

Table 1. Results of T-test of Physical Aggression, Verbal Aggression, Anger, and Hostility in athletes and students.

Group Statistics						Test t equality of means						
						t	df	p	The difference in averages	Standard error of the difference	95% confidence interval for the difference in means	
GROUP		N	Mean	SD	SSD						Lower limit	Upper limit
Age	Athletes	50	**28,36**	5,03	0,71	5,31	82,67	0,000**	4,46	0,84	2,79	6,13
	Students	50	**23,90**	3,17	0,45							
CSQ1 (0-6)	Athletes	50	**4,46**	1,01	0,14	3,81	98,00	0,000**	0,74	0,19	0,35	1,13
	Students	50	**3,72**	0,93	0,13							
catastrophising (0-36)	Athletes	50	**4,10**	4,11	0,58	-4,61	74,04	0,000**	-5,78	1,25	-8,28	-3,28
	Students	50	**9,88**	7,84	1,11							
STAI X-1 (0-100)	Athletes	50	**22,73**	13,23	1,87	-2,53	98,00	0,013*	-7,67	3,03	-13,67	-1,66
	Students	50	**30,40**	16,82	2,38							
STAI X-2 (0-100)	Athletes	50	**27,13**	11,83	1,67	-13,79	98,00	0,000**	-38,13	2,77	-43,62	-32,64
	Students	50	**65,27**	15,57	2,20							
Physical Aggression (PA) (9-45)	Athletes	50	**19,72**	5,77	0,82	-2,00	98,00	0,048*	-2,32	1,16	-4,62	-0,02
	Students	50	**22,04**	5,81	0,82							
Anger (A) (7-35)	Athletes	50	**20,92**	5,02	0,71	-2,33	98,00	0,022*	-2,62	1,13	-4,86	-0,38
	Students	50	**23,54**	6,18	0,87							
Hostility (H) (8-40)	Athletes	50	**19,44**	5,60	0,79	-2,93	98,00	0,004*	-3,26	1,11	-5,47	-1,05
	Students	50	**22,70**	5,54	0,78							

**p<0.05. **p<0.01*

The results of the statistical analysis presented in Table 1 show that the group of athletes surveyed exhibit greater pain management skills than the group of students (CSQ1). This is also confirmed by the value of the trait related to catastrophizing, which is more than twice as high for the student group as for the group of tested athletes. Similarly, the self-assessment of the trait and state relating to anxiety (STAI X-1 and STAI X-2, respectively), is at least twice as high in the student group as in the group of athletes tested. . The other values of the traits tested, which were CSQ1, distraction, ignoring sensations, praying/hoping, declaring pain management, increased behavioural activity or verbal aggression, were all statistically insignificant traits in the T-test.

Table 2. Results of r-Pearson correlation for athletes' group

Athletes	Physical Aggression (PA)	Distraction	Catastrophising
Anger	**,824****	**-,024**	**,121**
Increased behavioural activity	**-,289***	**,608****	**,061**
Ignoring sensations	**-,152**	**,076**	**,562****

**p<0.05. **p<0.01*

In the studied group of athletes (Table 2), a strong correlation with the statistical test Pearson's r was shown in the anger–physical aggression (PA) relationship. In line with the assumptions of the CSQ there is a correlation shown in the statistical study between distraction and increased behavioural activity, with a coefficient of 0.608. Also noteworthy is the strong positive correlation shown in the ignoring sensations–catastrophizing relationship, with a positive coefficient of 0.562, assuming a significance level of 0.01. A strong correlation was also observed in STAI X-2. In other cases, no statistically significant correlation was observed, i.e. re-evaluation of sensations or verbal aggression.

Table 3. Results of r-Pearson correlation of students group

Students	Physical Aggression	Distraction	STAI X1
Anger	**,905****	**,236**	**,364****
Increased behavioural activity	**-,289***	**,753****	**-,018**
Ignoring sensations	**,225**	**,349***	**,562****
Anxiety (STAI X2)	**-,325***	**-,199**	**-,872****

**p<0.05. **p<0.01*

In the study group of students (Table 3), the strongest correlation relationship was also shown for the Anger (A) – Physical Aggression (PA) relationship with a coefficient of 0.905**, i.e. an almost perfect positive correlation with a clear strength of association at a significance level of 0.01. The study also showed a significant negative correlation between the STAI X1 and Spielberg's STAI X2 questionnaires, for which the correlation coefficient was -0.0872**, used to determine the measurement of trait–anxiety and state–anxiety. The correlation between hostility (H) and feelings of anxiety as a state was also statistically significant, with a correlation coefficient of 0.654**. Also noteworthy is the correlation between increased behavioural activity and distraction, with a correlation coefficient of 0.753** in the studies conducted. The same was true for the re-evaluation of pain sensations relative to distraction, whose correlation at the 0.01 significance level returned a correlation coefficient value of 0.589**. The correlations between physical aggression and catastrophizing, hopefulness, distraction, ignoring sensations or increasing behavioural activity were not statistically significant. Also, age did not significantly affect statistical significance.

Dicussion

Anxiety, aggression and emotions are the kinds of topics which are commonly studied in the context of martial arts (Andrade et al., 2020). Our first finding confirmed that anger is significantly related to physical aggression at a stronger level, which can be interpreted as meaning that the level of physical aggression increases This can be justified in this kind of sport discipline because emotional agitation caused by anger is often translated into uncontrolled physical actions (Laufente et al., 2021). As previous research showed, some martial arts athletes have poor psychological qualities such as fear of different factors (Cheng, 2022). This kind of observation can be related to our finding on the basic part of anger and anxiety.

There is also a correlation between distraction and increased behavioural activity, which means, in this case that distraction caused by a reaction to pain is closely related to increased behavioural activity and taking up other activities. This topic is also connected to temperament traits, especially to endurance, sensory sensitivity and emotional reactivity (Leźnicka et al., 2017). The strong positive correlation shown in the ignoring sensations–catastrophizing relationship is also examined. The positive correlation coefficient in this case means that ignoring sensations associated with feeling pain is strongly associated with experiencing increased levels of anxiety and, therefore, stronger sympathetic nervous system arousal. Increasing tension (the higher the level of catastrophizing) makes us more explosive and hostile towards others, which is confirmed by the correlation coefficient value of 0.524 obtained in our study.

The work also shows a significant negative correlation between anxiety as a trait and state. This means that if the value of anxiety-trait increased, then the value of anxiety as a state decreased. This is valuable information in light of the recent research that showed that the intensity of anxiety might be affected by positive emotions (Yang et al., 2020). In addition, there was a relationship between hostility and feelings, which means that the higher the hostility attitude, the higher the level of anxiety in the person in terms of what to expect and what might be a surprise. Also noteworthy is the correlation between increased behavioural activity and distraction. Similarly to the athletes, the study group of students confirmed that increased behavioural activity causes distraction from intensifying the feeling and experiencing of pain.

As the next step, we hypothesized differences in pain management and anxiety between athletes and the control group. The analysis showed significant differences. This may mean that the students surveyed are less able to cope with feelings of pain than professional athletes. It is worth noting the traits of physical aggression, anger and hostility, which in the group of athletes allow for greater self-control in the display of these feelings than the surveyed group of students. Through training, also mental management techniques might help them to deal with anxiety and pain (Cofield, 2022). Interestingly, athletes can use effective anger and aggression management methods in contrast to the non-athlete group. Furthermore, they can get rid of the negative emotions associated with aggression and anger in sport through discipline (Kostorz & Sas-Nowosielski, 2021).

Our study is not free of limitations. The analysis presented here was performed on people training in martial arts and those not declaring participation in professional sports. However, it could have also been the case that people in the control group trained recreationally, which was not controlled as a confounding variable. It would be worth adding this to future studies. The study also included a diverse number of people representing various martial arts, especially kickboxing, and future studies should take care to select a larger group. An important aspect in relation to the development of the traits studied is not only anxiety and coping strategies but also general temperamental and personality traits, which were not controlled in the presented study; this is another important element in future analyses. In sports psychomotor and cognitive abilities are also important to performance in relation to personality traits (Huzarska et al., 2023; Romanenko et al., 2025). In future research, it will be worth considering these kinds of personality traits in relation to psychomotor and cognitive abilities.

Conclusions

The presented study has some significant practical implications for future research and practical work. Athletes have lower levels of anxiety and also aggression compared to students. This may be related to the acquired ability to control their emotions and arousal, which they need in sports competitions. It may also be

developed in training. This observation is consistent with the results of the study, which suggest that athletes with more experience show less aggression (Lafuente et al., 2025), which may confirm the role of training and discipline. Highlighting the fact that athletes training in martial arts can develop abilities to control arousal and emotions is a valuable indicator for coaches and psychologists. Engagement in martial arts and combat sports fosters a unique integration of physical prowess and psychological resilience. Through the cultivation of emotional regulation, pain tolerance and mental toughness, practitioners are better equipped to handle the challenges of both competitive sports and everyday life (Ciaccioni et al., 2025).

Our results show a relationship between psychological techniques used for anxiety, pain management and aggression. This study takes the form of a pilot study that can be developed on a larger number of subjects. This may be related to the specificity of the discipline. It may also be related to the matching of individuals with matching characteristics to martial arts (Budnik-Przybylska et al., 2018). Knowing how athletes cope psychologically with difficult factors such as pain and anxiety can be valuable feedback for psychologists, coaches and practitioners. A strength of the presented study is the comparison between a specific group of athletes and non-training but recreationally physically active people. This kind of research is necessary to select proper training methods for athletes and to enhance the efficiency of practical work in sport training.

Conflicts of interest - Authors have no conflicts of interest to declare.

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