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PRACA ORYGINALNA
ORIGINAL PAPER

# Life satisfaction and the severity of symptoms of depression and anxiety among people who practice Brazilian jiu-jitsu (BJJ) and mixed martial arts (MMA)

## Ocena porównawcza poziomu satysfakcji z życia oraz występowania objawów depresyjnych i lękowych u osób trenujących brazylijskie jiu-jitsu (BJJ) oraz mieszane sztuki walki (MMA)

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## ABSTRACT

**INTRODUCTION:** Brazilian jiu-jitsu (BJJ) and mixed martial arts (MMA) can provide the appropriate amount of movement to prevent mental disorders. The aim of the study was to compare individuals training in BJJ, MMA, and both of these disciplines in terms of the occurrence of depressive and anxiety symptoms and level of life satisfaction.

**MATERIAL AND METHODS:** The study involved 229 people (147 men – 64.2%, and 82 women – 35.8%) aged 14 to 47 years, with an average age of 29 ± 7.897. Out of all respondents, 62.4% trained in BJJ, 16.2% in MMA, and 21.4% in both sports. To assess the subjects' parameters, the following scales were used: the Satisfaction With Life Scale (SWLS), the Hospital Anxiety and Depression Scale (HADS), and the author's original scale of sociodemographic data.

**RESULTS:** The results from the SWLS showed a significant difference in life satisfaction between groups practicing different sport disciplines. People practicing BJJ scored 24 ± 5.952 points, those practicing MMA scored 21 ± 6.727 points, and people practicing both disciplines scored 25 ± 6.704 points. The results were statistically significant ($p = 0.029$). In the HADS-A subscale, women achieved statistically significantly higher results than men ($p = 0.000$). Moreover, the age of the respondents and the length of training in years showed statistically significant positive correlations with the results of the HADS-A scale.

**CONCLUSIONS:** People practicing only MMA rated their life satisfaction lower than those training both disciplines or only BJJ. A longer period of training and older age were associated with less severe anxiety symptoms. Women scored higher on the anxiety scale than men.

KEYWORDS

depression, anxiety, life satisfaction, sports, mental health

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## STRESZCZENIE

**WSTĘP:** Brazylijskie jiu-jitsu (BJJ) oraz mieszane sztuki walki (*mixed martial arts* – MMA) mogą zapewnić odpowiednią ilość ruchu, zapobiegając zaburzeniom psychicznym. Celem pracy było porównanie osób trenujących BJJ, MMA lub obie te dyscypliny pod względem występowania objawów depresji, lęku oraz poziomu satysfakcji z życia.

**MATERIAŁ I METODY:** W badaniu wzięło udział 229 osób (147 mężczyzn – 64,2%, i 82 kobiety – 35,8%) w wieku od 14 do 47 lat; średnia wieku wynosiła 29 ± 7,897 roku. BJJ trenowało 62,4% ankietowanych, MMA 16,2%, oba sporty 21,4%. Do oceny parametrów badanych użyto *Skali satysfakcji z życia* (Satisfaction With Life Scale – SWLS), *Szpitalnej skali lęku i depresji* (Hospital Anxiety and Depression Scale – HADS) oraz danych socjodemograficznych.

**WYNIKI:** Wyniki uzyskane w kwestionariuszu SWLS wykazały istotną różnicę w zakresie satysfakcji z życia pomiędzy grupami uprawiającymi różne dyscypliny sportowe. Osoby uprawiające BJJ uzyskały 24 ± 5,952 pkt, trenujące MMA 21 ± 6,727 pkt, uprawiające obie dyscypliny 25 ± 6,704 pkt. Uzyskane wyniki są znaczące statystycznie ($p = 0,029$). W podskali HADS-A kobiety osiągały znamiennie statystycznie wyższe wyniki niż mężczyźni ($p = 0,000$). Ponadto wiek badanych oraz czas trenowania w latach wykazały istotne statystycznie dodatnie korelacje z wynikami uzyskanymi w skali HADS-A.

**WNIOSKI:** Osoby trenujące wyłącznie MMA oceniły swoją satysfakcję z życia niżej niż osoby trenujące obie dyscypliny lub wyłącznie BJJ. Dłuższy okres uprawiania dyscypliny i starszy wiek ankietowanych były związane z mniejszym nasileniem objawów lękowych. Kobiety uzyskały wyższe wyniki w skali lęku niż mężczyźni.



SŁOWA KLUCZOWE

depresja, lęk, satysfakcja z życia, sport, zdrowie psychiczne


## INTRODUCTION

Brazilian jiu-jitsu (BJJ) is a grappling sport that involves taking one's opponent to the ground and performing a finishing technique, such as various types of joint locks or strangleholds. This sport is diverse in terms of techniques and forms of training (with and without kimonos) and types of tournaments (for points and until submission) [1]. Mixed martial arts (MMA) differ from BJJ in that there are strikes and kicks and more attention is paid to training in the standing position. MMA uses techniques from BJJ as well as other martial arts, such as karate, boxing, and kickboxing, in which striking the opponent is allowed [2]. The cradle of both sports is Brazil, where the Brazilian version of jiu-jitsu developed thanks to the Gracie family. The Brazilian vale tudo (a form of fighting without rules) initiated the Ultimate Fighting Championship formula in the United States [3].

Data from the systematic analysis of the Global Burden of Disease Study 2019, covering the years 1990–2019, indicate an increasing trend in the global prevalence of anxiety and depressive disorders [4]. With today's fast-paced lifestyle and omnipresent stress increasing the risk of developing lifestyle diseases, an increasing role is being attached to physical activity in the prevention of various diseases, including mental disorders. In order to maintain good psychophysical condition, the World Health Organization (WHO) guidelines from 2021 recommend 75–150 minutes of high-intensity aerobic physical activity and at least 2 days a week of muscle strengthening exercises of moderate or high intensity [5]. A study by Imboden et al. [6] indicates that regular physical activity may reduce the risk of depression. A lack of physical activity may contribute to the development of both anxiety and depressive disorders, whereas excessively intense daily exercise may coincide with depressive symptoms [7]. Regardless of age, an adequate amount of physical activity was associated with higher life satisfaction, as reported in the study by An et al. [8]. Another study revealed that life satisfaction related to habitual physical activity varied across age groups [9]. The strongest association between physical activity and satisfaction was observed among middle-aged adults (36–68 years), while the correlation was weaker among young adults and individuals over the age of 68. Moreover, life satisfaction was greater on days when the participants engaged in more physical activity than usual. Martial arts can be one way to ensure the right amount and intensity of movement. Many scientific studies indicate that practicing sports is beneficial in preventing anxiety and depressive disorders – comparable to the effects of behavioral therapy [10,11,12]. An example of the impact of practicing BJJ on health is the work of Willing et al. [13], who studied soldiers and war veterans of the United States Army. The participants in their study showed significant clinical improvement in symptoms of post-traumatic stress disorder, as well as less severe major depression, generalized anxiety, and alcohol consumption among people who practiced BJJ. The two disciplines, although seemingly similar, may comprise groups of people with different predispositions. In a study by Blomqvist Mickelsson [14], people who practiced MMA showed a significantly higher initial level of aggression than people practicing BJJ.

The aim of the study was to compare the life satisfaction scores and the occurrence of depressive and anxiety symptoms among people practicing BJJ, MMA, and both disciplines.

## MATERIAL AND METHODS

The study was conducted online using Microsoft Forms between March 15 and April 30, 2023. All respondents agreed to the study. Minors obtained the consent of their legal guardians to participate in the study. The survey was addressed to people practicing BJJ and MMA in Polish sports clubs throughout the country. A total of 229 responses were obtained from these respondents.

### Characteristics of the study group

The study group included 147 men (64.2%) and 82 women (35.8%). The average age in the study group was 29 ± 7.897, ranging in age from 14 to 47 years. The average age among the men was 29.456 ± 5.657, ranging from 14 to 47 years; among women, it was 35 ± 1.414, ranging from 16 to 46 years.

### Research tools

The following were used for the work:

1. A questionnaire on sociodemographic data: age, sex, type of martial art training (BJJ, MMA, or both), and duration of training in years
2. The Satisfaction With Life Scale (SWLS), which assesses one's life satisfaction. The more points obtained on the SWLS, the higher one's satisfaction with life. A minimum of 5 points can be obtained and the maximum is 35. Based on the results, the respondents were divided into three categories: low life satisfaction (5–17 points), average life satisfaction (18–23), and high life satisfaction (24––35) [15].
3. The Hospital Anxiety and Depression Scale (HADS), which assesses anxiety and depressive symptoms. The scale consists of two subscales, one of which refers to depression (HADS-D) and the other to anxiety (HADS-A). The more points obtained, the greater the intensity of symptoms. A score of up to 7 points in each subscale is normal; between 8 and 10 points is borderline and indicates moderate anxiety/depression symptoms; and a score of 11 or higher indicates a pathological level of anxiety/depression [16].

### Statistical analysis

Standard statistical procedures were used in the analysis. The Kolmogorov–Smirnov test was used to determine the normality of the distribution. The Mann––Whitney U test and Kruskal–Wallis test were used to assess the significance of differences between groups. Correlations in the nonparametric test were determined using Spearman's rank correlation coefficient. A value of $\alpha < 0.05$ was considered statistically significant. Calculations were performed in Statistica version 13.3.

## RESULTS

### Description of the study group

Out of all respondents, 62.4% practiced BJJ, 16.2% practiced MMA, and 21.4% trained in both sports. The shortest duration of martial arts training was less than a year (4 people) and the longest was 25 years; the average was 6.08 years.

### Assessment of life satisfaction in the study groups

The results from the SWLS indicated a significant difference in the level of life satisfaction between the groups practicing different sport disciplines: those practicing BJJ obtained 24 ± 5.952 points, those practicing MMA scored 21 ± 6.727 points, and those practicing both disciplines obtained 25 ± 6.704 points. These results turned out to be statistically significant ($p = 0.033$). There was also a significant difference concerning the life satisfaction of people practicing BJJ and both sports versus those practicing only MMA (Table I, Figure 1).

**Table I.** Results from the Satisfaction With Life Scale (SWLS), by sport discipline

| Variable | Mean | SD | Median | Min | Max |
|---|---|---|---|---|---|
| Whole study group | 27 | 6.309 | 24 | 5 | 35 |
| BJJ | 24 | 5.952 | 24 | 5 | 35 |
| MMA | 21 | 6.727 | 21 | 5 | 35 |
| Both | 25 | 6.704 | 25 | 5 | 34 |

BJJ – Brazilian jiu-jitsu; MMA – mixed martial arts; SD – standard deviation

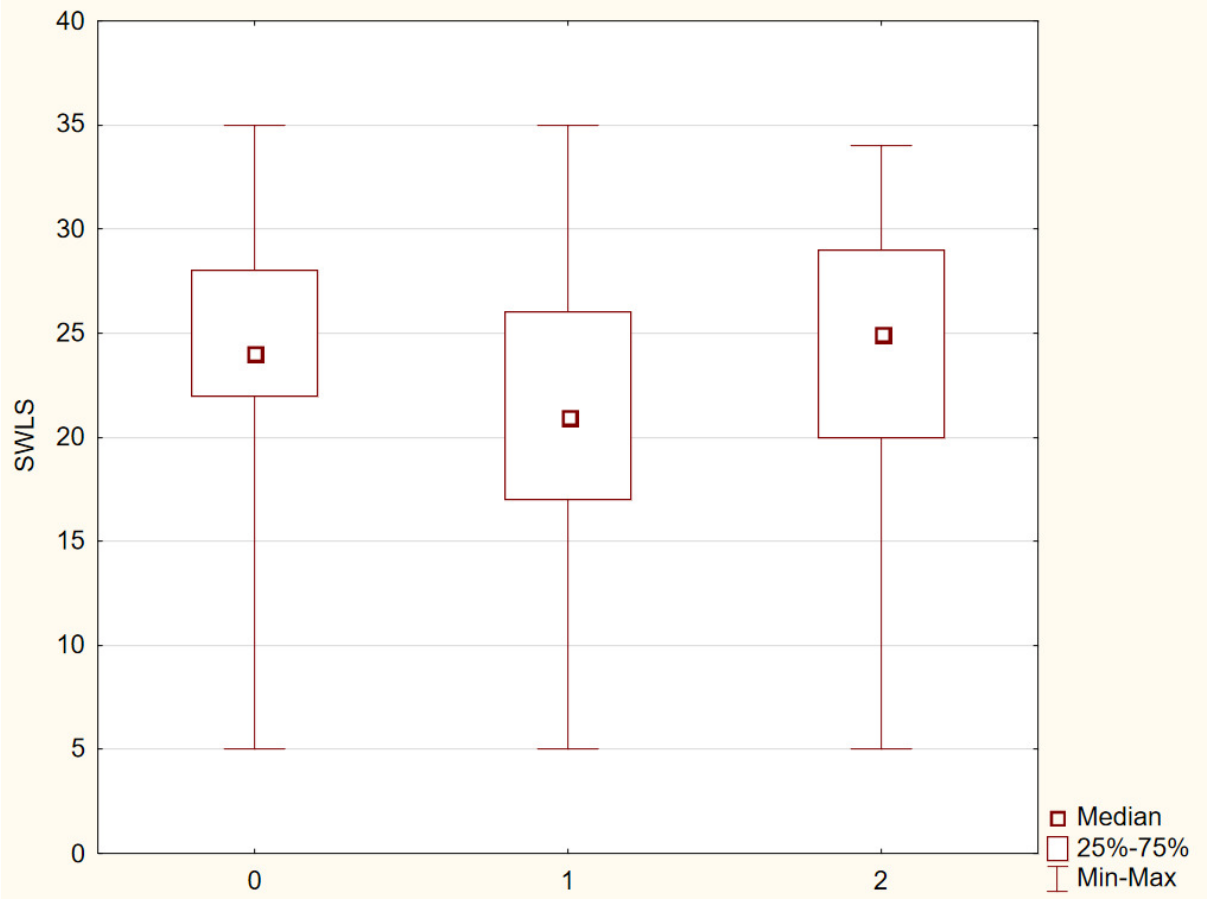


**Fig. 1.** Assessment of life satisfaction among people practicing Brazilian jiu-jitsu (BJJ) and mixed martial arts (MMA). SWLS – Satisfaction With Life Scale; 0 – people training BJJ; 1 – people training MMA; 2 – people training both sports

### Assessment of depressive and anxiety symptoms

In the assessment of depressive symptoms on the HADS-D scale, an average of 7.19 ± 3.982 points was obtained among people practicing BJJ, while people practicing MMA achieved 7.973 ± 3.884 points and respondents practicing both disciplines 7.265 ± 4.276 points (Table II). These results did not differ statistically. In the assessment of anxiety symptoms (HADS-A), people practicing BJJ achieved an average of 7.014 ± 3.982 points, MMA 7.973 ± 3.884 points, and those practicing both disciplines 7.266 ± 4.276 points. The groups did not differ statistically ($p = 0.202$; Table III). Taking into account the gender of the respondents, the men scored an average of 4.395 ± ± 3.153 points in the assessment of depressive symptoms on the HADS-D scale, while the women obtained 4.720 ± 3.629 points. No statistically significant differences were noted ($p = 0.201$; Table IV). The results from the anxiety subscale (HADS-A) were significantly statistically different between men and women ($p = 0.000$). The women scored higher in terms of anxiety than the men (Table V, Figure 2).

**Table II.** Results from the Hospital Anxiety and Depressive Scale, depression subscale (HADS-D), by sport discipline

| Variable | Mean | SD | Median | Min | Max |
|---|---|---|---|---|---|
| BJJ | 4.189 | 3.097 | 3 | 0 | 15 |
| MMA | 5.324 | 3.697 | 4 | 0 | 17 |
| Both | 4.837 | 3.608 | 4 | 0 | 15 |

BJJ – Brazilian jiu-jitsu; MMA – mixed martial arts; SD – standard deviation

**Table III.** Results from the Hospital Anxiety and Depressive Scale, anxiety subscale (HADS-A), by sport discipline

| Variable | Mean | SD | Median | Min | Max |
|---|---|---|---|---|---|
| BJJ | 7.014 | 3.982 | 6 | 0 | 17 |
| MMA | 7.973 | 3.884 | 7 | 1 | 18 |
| Both | 7.265 | 4.276 | 6 | 2 | 18 |

BJJ – Brazilian jiu-jitsu; MMA – mixed martial arts; SD – standard deviation

**Table IV.** Results from the Hospital Anxiety and Depressive Scale, depression subscale (HADS-D), by gender

| Variable | Mean | SD | Median | Min | Max |
|---|---|---|---|---|---|
| Women | 4.720 | 3.629 | 4 | 0 | 17 |
| Men | 4.395 | 3.153 | 4 | 0 | 15 |

SD – standard deviation

**Table V.** Results from the Hospital Anxiety and Depressive Scale, anxiety subscale (HADS-A), by gender

| Variable | Mean | SD | Median | Min | Max |
|---|---|---|---|---|---|
| Women | 8.659 | 4.606 | 8 | 0 | 18 |
| Men | 6.422 | 3.430 | 6 | 1 | 18 |

SD – standard deviation

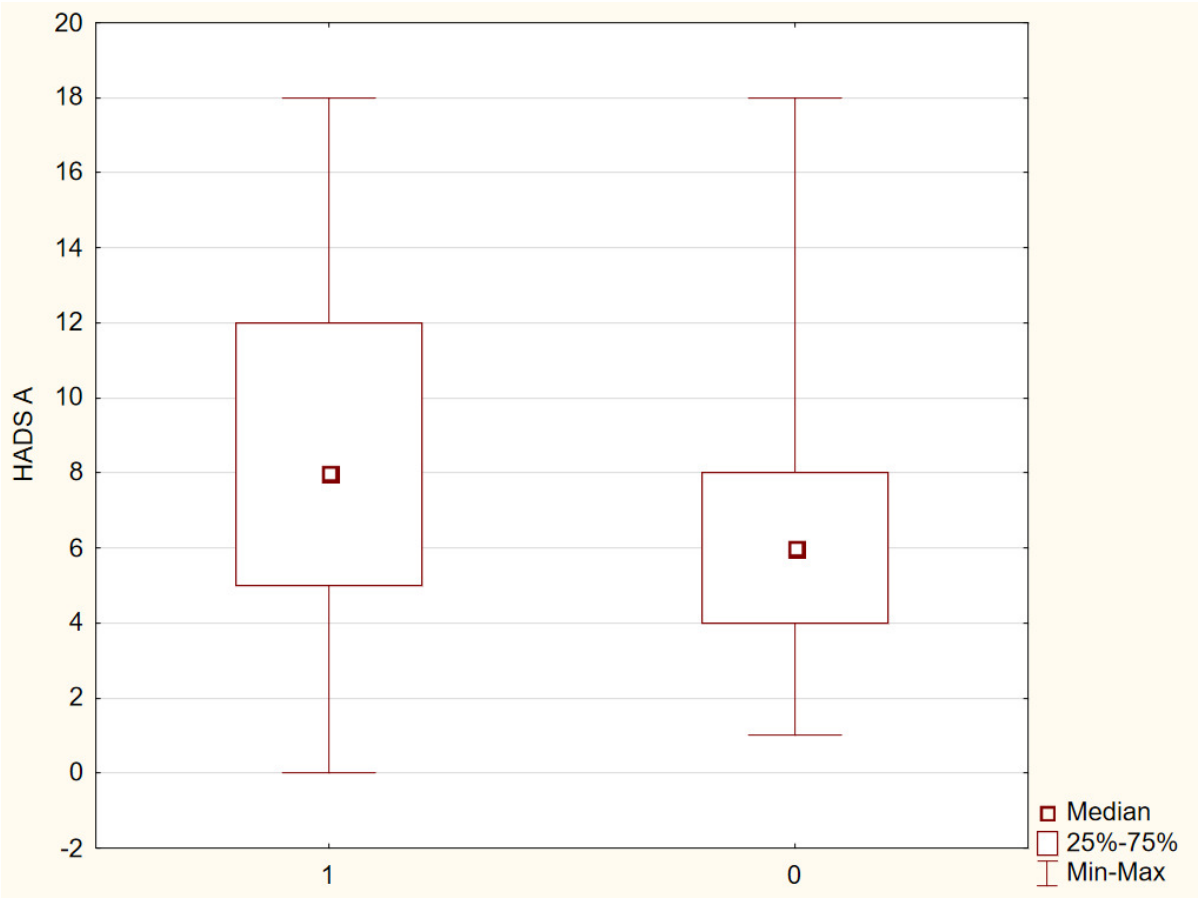


**Fig. 2.** Difference in the severity of anxiety symptoms between women and men training martial arts. HADS-A – Hospital Anxiety and Depressive Scale, anxiety subscale; 0 – men; 1 – women

### Assessment of the relationship between the parameters

An assessment of the relationship between the study parameters was conducted for the entire study group. Statistically significant negative correlations were found between the results from the life satisfaction scale and those from the HADS-A and HADS-D subscales. In addition, there were statistically significant positive correlations between both the age of the respondents and the length of training and the results from the HADS-A subscale (Table VI).

**Table VI.** Spearman's rank-order correlation between the study parameters

| Variable | Age | Training duration, in years | HADS-A | HADS-D |
|---|---|---|---|---|
| Age | 1.000 | **0.251*** | **-0.132*** | -0.058 |
| Training duration, in years | **0.251*** | 1.000 | **-0.168*** | -0.072 |
| SWLS score | 0.027 | 0.064 | **-0.462*** | **-0.512*** |

HADS-A – Hospital Anxiety and Depressive Scale, anxiety subscale; HADS-D – Hospital Anxiety and Depressive Scale, depression subscale;
* statistically significant value ($p < 0.05$)

## DISCUSSION

The study assessed the life satisfaction, the intensity of anxiety and depressive symptoms, and the relationship between them in a group of people practicing BJJ and MMA. Both the entire study group and subgroups based on sports disciplines were assessed. The women presented a higher level of anxiety than the men, which has also been confirmed by other studies [17]. Among other parameters of the study, age and length of practicing the sport discipline correlated negatively with the results from the HADS--A scale. The younger the respondents, the higher their results on the anxiety scale. The longer the respondents had practiced their sport, the lower their level of anxiety.

Anxiety disorders often begin in childhood or early adulthood, reaching a peak in middle age, and then their occurrence decreases with age [18]. In a study by Fernández et al. [19], which compared different martial arts disciplines in terms of emotional intelligence and anxiety levels, it was shown that anxiety was higher in less advanced individuals than in those with more experience and at a higher level in their discipline, but it did not depend on the age of the subjects. Similar results were presented by Smith [20]: lower anxiety levels were observed in outstanding athletes compared to reserve players. Our work did not show any correlation between the length of training and the results on the HADS-D subscale. We also did not find any significant differences between the BJJ and MMA groups in terms of anxiety level or the occurrence of depressive symptoms. It might be more interesting to compare these variables in people who generally practice martial arts with people who practice more popular sports, such as running or swimming, as well as people who do not engage in any physical activity.

Imboden et al. [21] compared the effectiveness of aerobic exercise with stretching exercises. Aerobic exercise was associated with greatly reduced symptoms of depression compared to stretching. Many studies have shown a positive effect of physical exercise on depressive disorders. In their meta-analysis, Kvam et al. [22] proved that physical exercise is effective in supporting the treatment of depression and can be very beneficial in combination with antidepressants. The results of a cross-sectional study on a large population by Chekroud et al. [23] revealed a positive relationship between physical activity and better well-being. The best results were noted in people practicing team sports, cycling, and aerobic exercise.

Moreover, in our work we found a relationship between practicing a given sports discipline and the level of life satisfaction. People practicing MMA rated their life satisfaction lower than people practicing BJJ or both disciplines. Many other factors may be related to the perceived life satisfaction: physical activity as well as socioeconomic status, which was indicated in the studies by Wypych-Ślusarska et al. [24] and Eime et al. [25]. Potoczny's et al. [26] work examining the relationship between practicing Taekwondo and the assessment of life satisfaction, among other things, did not find a direct relationship between them, but showed that this sport has a positive effect on the well-being of those practicing it. Kotarska et al. [27] showed positive correlations between practicing sports and martial arts and higher self-assessment of quality of life. Taking into account the variety of sports practiced, the relationship between the type of sport practiced and the perceived satisfaction with life may also be a point of consideration. In a study by Hunzinger et al. [28], people practicing contact sports (which also include BJJ and MMA) reported higher quality of life than people who did not practice sports, but comparable to those engaging in other types of physical activity. Sports activity can help reduce anxiety and depression symptoms and can have a positive impact on life satisfaction [29,30,31]. Another important factor may be the amount of energy needed to practice a given discipline, which was proven in a study by Dunn et al. [32]. BJJ and MMA may require more energy than

other sports. Training in close contact with another person, in a larger group, gives a sense of belonging and support; it influences the hormonal system by increasing the secretion of oxytocin, which may have a preventive effect on anxiety and depressive disorders as well as a more positive perception of reality, and thus a feeling of satisfaction with life [33,34].

### Limitations of the work

This study, as with any survey study, had certain limitations. The data were collected mainly in the form of open-ended questions. We had no influence on how the respondents would answer. The overall small sample size and the disproportion between the BJJ and MMA subgroups could have influenced the results.

## CONCLUSIONS

1. People who practiced MMA alone rated their life satisfaction lower than those who only practiced BJJ or both disciplines.
2. The women scored higher in the anxiety subscale than the men.
3. The age of the respondents and the length of time practicing a given discipline correlated negatively with anxiety symptoms.

### Conflict of interest

The authors declare that there is no conflict of interest with respect to the research, authorship, and/or publication of this article.

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**Authors' contribution**

Study design – K. Badura-Brzoza, K. Folga-Cytrycka
Data collection – K. Folga-Cytrycka
Data interpretation – P. Główczyński, P. Dębski
Statistical analysis – P. Dębski
Manuscript preparation – K. Folga-Cytrycka, P. Główczyński, K. Badura-Brzoza
Literature research – K. Folga-Cytrycka

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