

Mood profile of regular combat sports practitioners: a cross-sectional study

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Abstract:

Introduction: One of the major public health concerns worldwide is the growing rate of psychopathological diseases such as anxiety and depression. We know that physical exercise plays an important role as an adjuvant in the prevention and treatment of these psychopathologies. **Objective:** To compare the mood of regular jiu-jitsu, kickboxing and non-sports practitioners. **Methods:** Twenty-six jiu-jitsu practitioners, twenty-four kickboxing practitioners, and twenty-five non-practitioners of sports participated in this study (all adult males). As instruments, the Brunel Mood Scale (BRUMS) questionnaire was used to assess mood (this questionnaire analyzes six mood variables, i.e., tension–anxiety, depression–melancholy, hostility–anger, fatigue–inertia, vigor–activity and confusion–disorientation) and the International Physical Activity Questionnaire (IPAQ) was used to analyze the level of physical activity. Mood dimensions were assessed using the Kolmogorov–Smirnov test, and the unpaired t-test was used to compare the mean values of the groups. To test the hypotheses in relation to the multiple variables, the Pillai, Roy, Wilks and Hotelling–Lawley tests were used. The significance level adopted was $p < 0.05$. **Results:** For the jiu-jitsu and kickboxing groups, there was no difference between the averages ($p > 0.05$) with both being in an excellent mood. When comparing the group of practitioners of sports with the group of non-practitioners, all negative variables (tension–anxiety, depression–dejection, hostility–anger, fatigue–inertia, and confusion–perplexity) obtained higher scores in the non-practitioners of sports group ($p < 0.05$). **Conclusion:** People who regularly practice combat sports had better mental health compared to non-practitioners. We recommend the indication of these sports by psychiatrists, psychologists, and general practitioners to combat and prevent anxiety and depression.

Key Words: Sport psychology, Martial arts, Jiu-jitsu, Kickboxing, Mental health, Psychiatry

Introduction

Humor is considered a set of feelings that vary in intensity and duration, and can be pleasant or unpleasant for the subject (Lane & Terry, 2000). In this sense, anxiety is considered the second most common mood disorder, affecting millions of people worldwide, and can lead to depression, which tops the list with 300 million people worldwide (Zsófia et al., 2019). These psychopathologies are a public health problem worldwide (Huang et al., 2016) and are associated with decreased well-being and quality of life. (Zilcha-Mano et al., 2014). Its treatment is carried out with antidepressant drugs, psychotherapy and physical exercise may be used as adjuvants (Kvam et al., 2016; Ribeiro et al., 2018).

The most common mood-regulating drugs (antidepressants) are focused on the monoamine serotonin (5-HT) and act to increase synaptic 5-HT concentrations (Taciak et al., 2018). These medications are also used to treat anxiety, obsessive-compulsive disorder, panic disorders, alcoholism, obesity, migraines, and chronic pain (Fitzgerald & Bronstein, 2013). On the other hand, the physiological mechanism induced by physical exercise, increases serum 5-HT levels (Zimmer et al., 2016), potentiating the drug's effect, thus helping to treat and even prevent anxiety and depression.

Among the most varied physical exercises indicated as therapeutic support, combat sports have been the target of great demand by people, especially those who have some psychopathology. Combat sports are manifestations of physical exercise (Waşık & Wójcik, 2017) and among its modalities there are judo, taekwondo, wrestling, boxing, jiu-jitsu, kickboxing, mixed martial arts (MMA), karate, among others (Drury et

al., 2017; Reale et al., 2017) . These sports can be practiced for both competitive and health purposes (Da Silva Duarte et al., 2021b).

In this way, Among the various combat modalities, in recent years there has been an increase in demand for the practice of jiu-jitsu and kickboxing, which are known worldwide and are widely practiced (Da Silva Duarte et al., 2021a). This demand has increased, probably, due to the dissemination of combat sports and the philosophy of martial arts applied during training that help to change the individual's behavior. The philosophy of martial arts is linked to traditional modalities of eastern origins that seek ethical development, determining the lifestyle of practitioners (Cynarski, 2013).

In Brazil, jiu-jitsu was the 14th most practiced sport among respondents (Brasil, 2013) and is a ground combat, based on takedown, strangulation and joint pressure techniques. (Branco et al., 2016). Kickboxing is a mix of combat sports based on kicking barefoot like karate and punching with the fists like boxing (Salci, 2015) and an estimated two hundred thousand individuals practice kickboxing. (Cbkb, 2021). In 2018 kickboxing was recognized by the International Olympic Committee (Dugonjić et al., 2019), becoming an Olympic sport in 2021. (Da Silva Duarte et al., 2021b).

The health benefits of practicing combat sports can happen to adults and the elderly, regardless of the age at which they start (Origua Rios et al., 2018). These types of sports improve cognitive function, body balance, skeletal, cardiovascular, metabolic, neurological and psychological status (Calderón, 2015; Origua Rios et al., 2018).

In the context of psychological health, regular practitioners of kung fu and tai chi qigong for self-defense aged between forty and sixty-five had lower depressive symptoms and greater life satisfaction (Walther et al., 2018). In a recent study analyzing and comparing the anxiety of men and women practicing jiu-jitsu, judo, karate, kendo, taekwondo and wrestling at low, medium and high levels of physical activity, their findings showed that women are more anxious and, the higher the levels of physical activity, the lower the levels of anxiety (Fernández et al., 2020). A week of karate deprivation in advanced individuals (brown and black belts) generated severe mood disturbances (Szabo & Parkin, 2001).

According to the literature review carried out, no studies were found that analyzed and compared the profile of the mood state between jiu-jitsu, kickboxing and non-practitioners of male sports. The scarcity of this type of analysis corroborates with Gomes et al (2019), where they state that there are gaps in the literature on the psychological effect of practicing combat sports. Therefore, the objective of the present study is to analyze and compare the mood state in regular practitioners of jiu-jitsu, kickboxing and non-practitioners of sports.

Material & methods

Study type and location

This is a quantitative cross-sectional study that was developed with practitioners of jiu-jitsu and kickboxing combat sports and non-practitioners of sports. The present study was approved by the Ethics Committee of the Federal University of Mato Grosso (UFMT - nº 3.102.414) and conducted by the Research Center of the Metabolic, Sports and Health Research Team of this institution (NP-TIMES UFMT).

Subjects

The sample was determined by convenience and consisted of seventy-five male participants aged between eighteen and fifty-four years. The sample distribution consisted of twenty-six regular jiu-jitsu practitioners, twenty-four regular kickboxing practitioners and twenty-five non-practitioners of sports.

As an eligibility criterion for sports practitioners, a minimum period of two months of continuous practice with 75% attendance in classes in the last month was adopted. For non-practitioners, those who declared not practicing any type of sport or physical activity in the last two months, not taking anxiolytics and being classified as sedentary or insufficiently active through the IPAQ questionnaire were included (Matsudo et al., 2001).

Instruments

The instrument used to analyze the mood state profile was the Brunel Mood Scale (BRUMS) (Rohlf's et al., 2005) which was validated for use with the Brazilian public. (Rohlf's et al., 2008). This is a shortened version of the Profile of Mood Status (POMS) questionnaire (McNair et al., 1971). The main difference between these instruments is that in the original version there are sixty-five questions and in the reduced version twenty-four, which must be scored according to the Likert scale graduated in 5 points, where 0 is "nothing" and 4 is "very much". Both questionnaires contain the same analyzed variables: tension-anxiety, depression-melancholy, hostility-anger, vigor-activity, fatigue-inertia and confusion- disorientation. Faro Viana et al (2001) defines these variables as:

- Tension - Anxiety = Increased tension, worry, anxious and impatient.
- Depression - melancholy = Sadness, unhappiness, depressed, alone and downcast.
- Hostility – anger = Grumpy, irritated, annoyed and nervous.
- Fatigue – inertia = State of tiredness, exhausted and without energy.
- Vigor – activity = Lively, active, cheerful, cheerful and energetic.
- Confusion - disorientation = Low lucidity and confusion.

Procedures

After authorization from the owners and teachers of the combat sports academies and the coordinator of the Fighting extension program at NP-TIMES-UFMT in the city of Cuiabá/MT, combat sports practitioners were invited to participate in the study. Non-practicing participants were contacted within the Federal University of Mato Grosso (UFMT), via email and Whatsapp ®. After clarifying the procedures and objective of the present study, the Free and Informed Consent Term was signed and then the questionnaires were sent electronically (Google Forms Platform). The data collection interval was between October and November 2019.

Statistical analysis

For statistical analysis, the Kolmogorov-Smirnov test was used to verify data distribution. After that, in order to analyze the comparison of means between the study groups, the unpaired t test was used.

Participants' multivariate data were obtained by Step One Software 2.2.2 (Applied Biosystems) and R 3.4.2 software, being exported from this to the Excel program (Microsoft). In order to understand the different types of approaches in the area of multivariate analysis, they have allowed a joint approach to the analysis of variables in sports and physical activity. The multivariate analysis of variance (MANOVA) results in the comparison of medians of several independent variables in relation to groups of treatments or measures, allowing the testing of study hypotheses that differ from each other in relation to the multiple variables evaluated in the multivariate tests of Pillai, Roy , Wilks and Hotelling-Lawley (Roy et al., 2009) . Therefore, Canonical Discriminant Analysis (CDA) is a statistical technique that has the function of identifying the allocation of variables that have confluence in Euclidean distance between analysis groups (Stewart et al., 2013).

The CDA was analyzed and applied in the results of analysis in main components of the mood state of the participants of the study that had the objective of discriminating the different mood states with the level of physical activity with the multivariate analysis of variance (MANOVA) using the square test of variances of the participants' mood states.

The construction of the biplotted graph in two perspectives of canonical variables (Can1 and Can2), whose intention is to perform a discriminant of the variables that stand out among the canonical characteristics, showing their vectors of the variables in order to show the multivariate differences, whose @=5 %, in the interpretation of the results, the screeplot analogy and the Kaiser criterion were used (R Core Team, 2017).

Results

The sample is characterized by male individuals, with an average of similar ages, being thirty-one years old for the jiu-jitsu group (n=26), twenty-nine years old for the kickboxing group (n=24) and twenty-five for the non-practitioner group (n=25). The jiu-jitsu and kickboxing groups were classified as very active by the IPAQ and the non-sports group were classified as inactive.

When comparing the jiu-jitsu and kickboxing groups, there was no significant difference for the mood variables ($p > 0.05$). However, when comparing the jiu-jitsu group with the non-practitioners group, there was a significant difference in all variables: tension-anxiety, depression-dismay, hostility-anger, vigor-activity, fatigue-inertia and confusion-perplexity ($p < 0.05$). For the kickboxing group when compared to non-practitioners, only the fatigue-inertia variable had no significant difference ($p > 0.05$). The groups that practice combat sports had the score of the positive mood variable “vigor” with greater expressiveness. On the other hand, the group of non-practitioners of sports had high scores for the variables considered negative: tense-anxiety, depression-dismay, hostility-anger, fatigue-inertia and confusion-perplexity (Table 1).

Table 1. Comparison of means of mood state of jiu-jitsu, kickboxing and non-practitioners of sports.

Variables	Jiu-Jitsu / Kickboxing practitioners			Jiu-jitsu / Non-practitioners			Kickboxing / Non-practitioners		
	Mean±SD	Mean±SD	P	Mean±SD	Mean±SD	p	Mean±SD	Mean±SD	p
Tension - anxiety	1.43±0.66	1.44±0.97	0.99	1.43±0.66	2.21±0.75	0.03 ^c	1.44±0.97	2.21±0.75	0.03 ^c
Depression - Despondency	0.78±0.84	0.7±0.68	0.72	0.78±0.84	2.02±0.96	0.01 ^e	0.7±0.68	2.02±0.96	0.01 ^e
Hostility - Anger	0.95±0.68	0.91±0.8	0.83	0.95±0.68	1.75±0.79	0.04 ^d	0.91±0.8	1.75±0.79	0.05 ^a
Vigor - Activity	2.71±0.81	2.78±0.64	0.71	2.71±0.81	1.93±0.88	0.02 ^b	2.78±0.64	1.93±0.88	0.03 ^c
Fatigue - Inertia	1.46±0.9	1.38±0.98	0.76	1.46±0.9	2.36±0.9	0.01 ^e	1.38±0.98	2.36±0.9	0.07
Confusion - Bewilderment	1.04±0.71	1.12±0.65	0.67	1.04±0.71	1.93±0.79	0.01 ^e	1.12±0.65	1.93±0.79	0.03 ^c

Note: Data expressed as mean and standard deviation; SD = Standard Deviation; a = $p \leq 0.05$; b = $p \leq 0.04$; c = $p \leq 0.03$; d = $p \leq 0.02$; e = $p \leq 0.01$

Mood state variables showed statistically significant differences among themselves, where the most accentuated change was depression . Age was the only variable that had no difference between the group analyzes (Table 2).

Table 2. Analysis of variance (ANOVA) of practitioners of sport combat and non-practitioners of sports in the behavior of mood states among the three categories of the sample that comprise people with different levels of physical activity.

Behavior of the sample's mood states					
Categories	Mood states	MS (Aj)	SS (Aj)	F	p
Jiu-jitsu, kickboxing and non-practitioners of sports.	Tension	4.94	9,887	7.69	0.0009
	Depression	13.66	27,327	19.28	0.0001
	Hostility	5.61	11,238	9.7	0.0001
	Vigor	5.52	11.053	8.92	0.0003
	Fatigue	7.33	14,667	8.41	0.0005
	Confusion	6.03	12,062	11,446	0.0001
	Age	0.71328	241	1.3113	0.2758

Note: MS = Mean square; Aj =adjusted; SS = Sum of Squares; F = value of F; p = P value; $P \leq 0.05$

The correlation of canonical discriminant functions was stronger in the athletes group (0.41632), showing a more stable mood state in this group (Table 3). The discriminant function has an explanatory potential of 96.2% of mood states and physical activity when compared to fighters and non-practitioners of sports participating in the study in question (Table 3). The canonical correlation (Can1) resulted in an explanation of 96.2% of the mood state construct factors and the second canonical correlation function (Can2) was able to explain in 3.8% of the total variation. Added to the functions, 100% of the factors explained that mood states imply the level of physical activity, this can be seen in the canonical discriminant by the dispersion of scores via canonical biplot in the correlation axes.

Table 3. Canonical discriminant for data analysis of the categories of fights and people who do not practice sports related to mood.

Discriminant functions canonical	DF	Eigen value	Percent (%)	Accumulated (%)	p-value
Fighters 0.41632	14	0.71328	96.2067	96.207	0.0003
No practitioners 0.02735	6	0.02812	3.7933	100	0.9275

Note: DF = Degrees of freedoo; $p < 0.05$

Figure 1 represents the " boxplot " graph, which demonstrates high levels of vigor and below the mood states of tension, depression, hostility, fatigue and confusion in fighters, being explained by the practice of physical exercise, especially combat sports, the which improves mood states, unlike non-practitioners of sports in which mood states can be increasing, especially depressive.

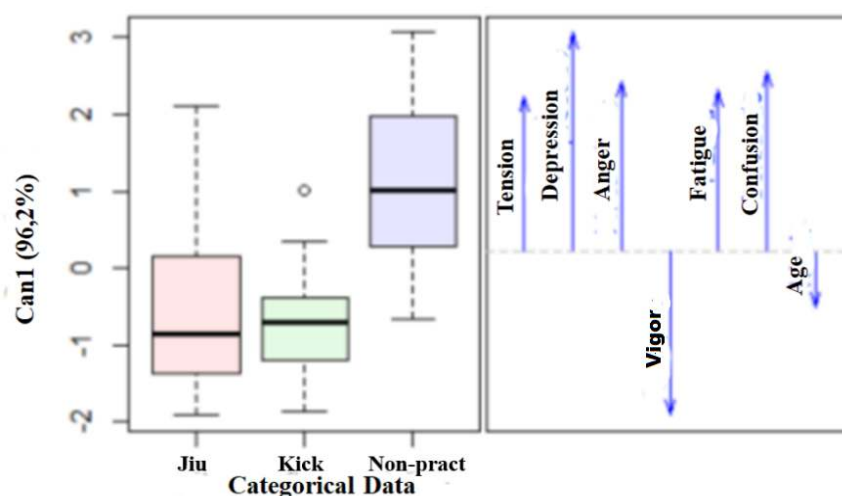


Figure 1. Analysis of the canonical discriminants of the behaviors of the physical activity levels of athletes and non-athletes in the mood state and age of three groups of participants

Figure 2 presents the biplot of the mood state in practitioners of fights, which have a positive response, evidenced by vigor. On the other hand, non-practitioners of sports have the possibility of obtaining negative mood control factors.

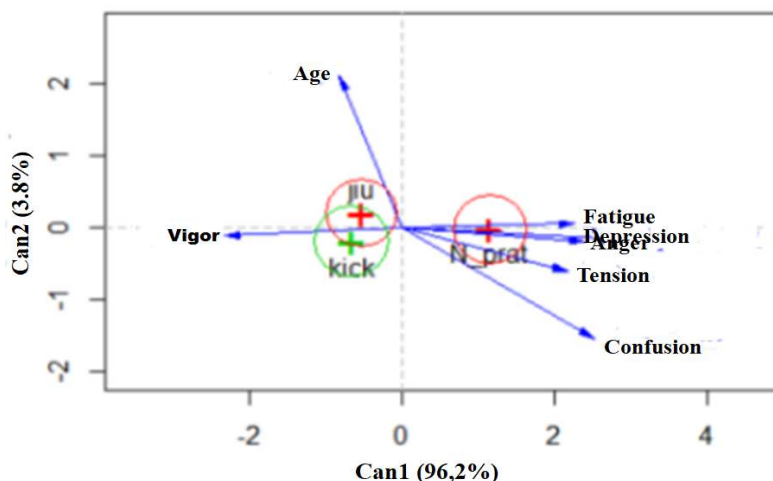


Figure 2. Graph of the mood states of the study groups - Biplot of canonical discriminant of the characteristics of combat sports athletes (Kickboxing and jiu-jitsu) and non-athletes with different mood constructs that determine the vectors for Can1 and Can2.

Dicussion

As far as we know, this is the first study that compares the mood state between practitioners of jiu-jitsu, kickboxing and non-practitioners of sports. Our findings indicate that men who regularly practice jiu-jitsu and kickboxing have a better mood when compared to individuals who do not practice sports. In relation to non-practitioners of sports, the variables considered negative are high. On the other hand, regular combat sports practitioners have a better mood state compared to inactive ones, in line with the study's hypothesis.

Corroborating our results, the study by Yang et al (2018) showed that the mood state of children who practice taekwondo was better when compared to children who do not practice sports. In another study, just one dynamic taekwondo session was enough to improve the mood of twenty university students (10 men and 10 women) with no previous experience with the modality (Toskovic, 2001). In this sense, the practice of combat sports modifies the personality of its practitioners, increases courage and helps to eliminate negative thoughts, directly impacting the quality of life (Kotarska et al., 2019).

In the study by De Oliveira et al (2019), the group of elderly people who did not practice physical exercise had high anxiety and depression scores when compared to those who practiced. Similar to our findings, the non-sports group had increased tension-anxiety and depression-dejection when compared to the groups that play sports. Also corroborating these results, another study showed that thirty minutes of walking is enough to improve mood in the elderly. (Geraldes et al, 2019), which reinforces that physical exercise positively influences the emotional state of the individual.

In this sense, studies show a positive effect of physical exercise on the fatigue variable (Adnan et al., 2019; Bray & Born, 2004; Monteiro-Junior et al., 2017) and this is corroborated by our data from the group of jiu-jitsu practitioners who presented a lower fatigue-inertia level than ours. sports practitioners. However, this was not confirmed in the kickboxing group , requiring further investigations with a greater number of participants.

The confusion-perplexity variable was significantly higher in the non-sports group when compared to kickboxing and jiu-jitsu practitioners. This may be because individuals with depressive-anxiety disorder tend to have the symptom of mental confusion (Gliatto, 2000). About the depression variable, Lane & Terry (2000) state that it is one of the most important mood variables, as it can influence other variables considered negative, increasing perception and intensity. What might have influenced the mood state in the group of non-practitioners of sports in the present study.

In our study, groups that played combat sports had significantly lower levels of hostility-anger. In this sense, combat sports supervised by a coach who works on the educational aspects and compliance with the rules can become an effective method of reducing anger and aggression (Basiaga-Pasternak et al, 2020).

The jiu-jitsu and kickboxing groups demonstrated a state of mood considered to be great due to the high vigor (Morgan et al., 1987). In the context of sports performance, it is considered the best mood to reach maximum performance (Morgan, 1980). On the other hand, the group of non-practitioners of sports obtained a bad mood profile, which are the negative variables tension-anxiety, depression-dejection, hostility-anger, fatigue-inertia and confusion-perplexity that, according to Terry et al (2020), is associated with a higher risk of mental health problems.

Studies have shown that those who play combat sports (taekwondo , boxing, and judo) produce Brain-Derived Neurotrophic Factor (BDNF) (Oztasyonar, 2017; Schor et al., 2019) even more than those who practice street running (Oztasyonar, 2017). It is speculated that this positive difference in the mood of combat sports practitioners in the current study can be explained by the increase in BDNF levels resulting from regular physical exercise. This neurotrophin has been the subject of study in the field of psychology because its low level in the central nervous system is related to depressive behaviors (Han et al., 2020). However, future studies need to be developed in order to analyze the production of BDNF and mood-modulating neurotransmitters in jiu-jitsu and kickboxing practitioners.

As limitations of the present study , we had a relatively small sample universe, which makes it impossible to generalize the results. On the other hand, the relevance of the study is that the participants are regular practitioners of jiu-jitsu and kickboxing , and the non-practitioners of fights reported not practicing exercises for more than two months, which provides the reliability of the data. In this way, at least in part, it reflects the profile of the practitioners of these two fighting modalities.

Conclusions

Practitioners were shown to have better mental health when compared to non-sports practitioners. Individuals classified as very active had high levels of the vigor variable, while inactive individuals had high levels of depression, hostility, tension, fatigue and confusion. There is a need for a definitive change in the lifestyle of individuals with mood disorders such as anxiety and depression and, in addition, a joint action by psychiatrists and psychologists to guide the practice of combat sports as an alternative option for the treatment and prevention of these disorders. Other important aspect are the implementation of public health policies to offer these sports to needy communities that cannot afford to pay.

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