

PHYSIOLOGY

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Emotional intelligence and anxiety disorder probabilities in grappling and striking combat sport athletes: comparison with regression analysis

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Abstract

Background. Combat sports are separated into striking and grappling types. Both have an essential impact on the Summer Olympics medal results. Psychological analysis is a way to understand the factors explaining success in elite-level combat athletes; however, very little research has focused on emotional intelligence, verifying the prevalence of anxiety disorders. **Problem and Aim.** This study aimed to compare emotional intelligence and cognitive, motor, physiological and total anxiety between striking and grappling athletes. **Methods.** Our sample was composed of 382 athletes, 299 from grappling and 89 from striking combat. All samples were analyzed by emotional intelligence using the Trait-Meta Mood Scale and by anxiety, using Inventory of situations and anxiety responses, $p \leq 0.05$. **Results.** The main results indicated that grappling athletes showed a higher score for anxiety before the evaluation [54 (27; 79) vs. 49 (26; 73); $p=0.04$], before habitual and daily situations [7 (3; 18) vs. 6 (3; 14); $p=0.04$], emotional perception [23 (18; 28) vs. 22 (18; 27); ($p=0.03$)] and a lower score for emotional regulation [29 (24; 33) vs. 30 (25; 33); $p=0.01$]. The regression performed showed a significant effect ($p=0.014$) for anxiety and emotional intelligence comparing grappling versus striking, with higher ODD for the Inventory of situations and anxiety responses (Exp B – 1.029).

Conclusions. Our results showed that grapplers presented higher interpersonal, cognitive and motor anxieties, and lower levels of emotional comprehension than striking athletes. Furthermore, the regression model demonstrated ~30% probability of increasing interpersonal anxiety in grappling athletes rather than strikers.

Introduction

Combat sports are divided into striking (i.e. boxing, *karate*, *taekwondo*) and grappling types (i.e. *judo*, Brazilian *jiu-jitsu*, wrestling) [Brito *et al.* 2017; Faro *et al.* 2020; Slimani *et al.* 2017; Tabben *et al.* 2018]. Striking as grappling combats have an essential impact on medal results in the Summer Olympics, representing about 1/4 of all disputed podiums, with professional modalities such as mixed martial arts and boxing [Chaabene *et al.* 2014; Ghouli *et al.* 2017; Miarka *et al.* 2017]. However, Psychological analysis is a way to understand the factors explaining success in elite-level athlete's combats [Brandt *et al.* 2018; Coswig *et al.* 2018]. Although mental skills, meditative movement or mindful physical exercise are often taught through combat sports [Caldwell *et al.* 2011; Slimani *et al.* 2016], very little research has focused on increasing emotional intelligence, and verifying correlations with the prevalence of anxiety disorders.

Over the years striking and grappling combats have required to manage physical fitness associated with technical-tactical actions in a stressful situation of hard training and competitive pressure [Brito *et al.* 2018; Miarka *et al.* 2018] trying to increase their physical fitness and mental skills [Slimani *et al.* 2017], managing technical-tactical aspects [Tabben *et al.* 2018] or/and physiological factors [Chaabene *et al.* 2014; Ghouli *et al.* 2017]. It is a consensus among experts that a negative mood state, increasing fatigue and anxiety [Czajkowski, 2010], can affect the performance of the combat athlete [Brandt *et al.* 2018]; however, until now, it is not known the effects of striking and grappling combats on the emotional intelligence and anxiety variables in their athletes. Moreover, anxiety effects were an imminent concern in the grappling championship performance of judo [Brandt *et al.* 2019; Renden *et al.* 2015], jiu-jitsu [Brandt *et al.* 2019; Renden *et al.* 2015] and wrestling [Rutkowska, Gierczuk, 2020], as on the striking championship performance of karate [Terry, Slade 1995] and taekwondo [Capranica *et al.* 2017].

In the context of leisure-time striking and grappling combats, people require high levels of motivation to continue participation and most forms of combat sports involve some level of interpersonal interaction [Faro *et al.* 2019]. In each case, behavior might be governed, at least in part, by emotional intelligence [Rutkowska, Gierczuk 2020].

Emotional intelligence is particularly associated with self-control, reducing anxiety and increasing an optimal performance [Lee-Barron, 2012; Johnson, 2016; Rutkowska, Gierczuk, 2020]. This feeling has been an essential concept for sports psychology and has requested intensive research in combat sports because of its effects on the championship performance of *karate* [Terry, Slade, 1995], *judo* [Matsumoto *et al.* 2000], *kendo* [Dionne, 2017], Brazilian *jiu-jitsu* [Faro *et al.* 2020], *taekwondo* [Capranica *et al.* 2017] and wrestling [Rutkowska, Gierczuk, 2020]. [Laborde *et al.* 2016]. The use of psychological skills and

emotional intelligence as mediating and regulating factors and organizers can improve the athletic performance [Kajbafnezhad *et al.* 2012]. Perhaps, the attractiveness of emotional intelligence emerged from the consolidation that construct was more significant than intelligence quotient for performance [Moran, Weiss, 2006]. Since that, emotion studies are a distinguished part of successful high sport performance and for physical activity practices, particularly to regulate athletes' emotions [Brandt *et al.* 2018; Rutkowska, Gierczuk 2020].

Despite such an eminent concern, combat sports practices that initially bring philosophical aspects were supposed to assist practitioners and high-level athletes in self-control, an aspect of inhibitory control, as the ability to regulate one's emotions, thoughts, and behavior in the face of mood states [Brandt *et al.* 2018; Coswig *et al.* 2018; Cassell *et al.* 2018], anxieties and impulses [Castro-Sanchez *et al.* 2018]. However, no research has observed how emotional intelligence contributes to the reduction of anxiety disorders in striking and grappling combats. A critical understanding of emotional intelligence constructs' operationalization in striking and grappling contexts is particularly important to practicing which aims to control the anxiety, targeting the implementation of evidence-based interventions that enhance performance and adherence in combat sports.

The first hypothesis indicates those striking and grappling athletes demonstrate differences, with higher emotional intelligence and lower levels of anxiety of striking combats than in grappling combats. Therefore, the aim of this study was to compare emotional intelligence and cognitive, motor, physiological and total anxiety between striking and grappling combat sports athletes, verifying the performance probabilities associated with emotional intelligence and anxiety factors.

Method

Study design

This is a transversal descriptive study in which emotional intelligence and anxiety factors were measured according to combat sport type, comparing striking (i.e. boxing, karate, and taekwondo) and grappling type (i.e. judo, Brazilian jiu-jitsu, wrestling). To achieve the aims the following dependent variables were used: emotional intelligence and anxiety factors, as independent: type of combat. The measures were carried out in two situations: a) competitions when the athletes were in procedures of accreditation and weighing (24-h before the competition) and; (b) during national trainings. All measurements were made by a single researcher, first was applied ISRA followed by TMMS-24. The participants were informed about the aims and risks and signed the Informed Consent Term. This protocol was approved by the Research Ethics Committee of the University in which it was performed.

Sample

The following inclusion criteria were applied: a) to be ≥ 15 yrs. of age, b) to practice and compete in jiu-jitsu, judo, karate, taekwondo, boxing or wrestling (≥ 5 yrs.). To carry out the study, 1,400 questionnaires were applied, of which 922 were returned, 476 were rejected because they presented incomplete information therefore, the final sample was composed of 382 athletes, 299 from grappling (Jiu-jitsu=142, judo=137 and wrestling free style=20) versus 89 from striking combats (karate=57, taekwondo=25 and boxing=7). Athletes were competing in 2016, 2017 and 2018 high-level championships. Therefore, athletes had previous experience with official events, rules and procedures of their respective combat sport. This comparative and descriptive applied research study, using survey questionnaire analysis, allowed us to determine specific psychological demands of emotional intelligence (TMMS-24) and anxiety, using the Inventory of situations and anxiety responses (ISRA).

Measurements

For mood measurement, we applied the Emotional Intelligence Scale translated into Spanish [Fernandez-Berrocal *et al.* 2004]. This inventory consists of 24 items that are subdivided into three subscales or dimensions: a) emotional perception; b) emotional comprehension; and c) emotional regulation. The score for each of these subscales is classified into three ranges. For the emotional perceived subscale, the middle score range (22-32 in men; 25-35 in women) indicates adequate emotional perception, and scores in the high (>33 in men; >36 in women) or low (<21 in men; <24 in women) range indicate that emotional perception should be improved. In contrast, for the comprehension subscale, scores in the low range indicate a need for improvement (<25 in men, <23 in women), those in the middle range (26-35 in men; 24-34 in women) indicate adequate comprehension, and those in the high range (>36 in men; >35 in women) indicate excellent emotional comprehension. Likewise, in the emotional regulation subscale, low scores (<23 in men and women) indicate the need for improvement, scores in the middle range (24-35 in men, and 24-34 in women) indicate adequate regulation, and high scores (>36 in men, >35 in women) indicate excellent emotional regulation. In the questionnaire, individuals must rate each of their responses on a Likert scale from one to five points to indicate their level of agreement. The total score is obtained by adding the responses from each sub-scale, each of which ranges from eight to 40 points.

ISRA: The Inventory of situations and anxiety responses provides an independent evaluation for the three response systems: cognitive, motor, and physiological, as well as a total. It also includes four factors of analysis: anxiety before the evaluation (FI), interpersonal (F-II), phobic (F-III) and before habitual and daily situations (FIV). This enabled us to develop a profile of

individual reactivity and measurements following the preceding protocol [Tobal, Cano-Vindel, 2002]. The athlete had to indicate the frequency with which each one of the anxiety responses appears in the proposed situation according to a Likert scale of 5 points. The original version of the ISRA was used consisting of 224 items in an open situation. These items are composed of an interaction of 22 situations and 24 responses. We obtained direct scores and subsequently calculated a percentile that offers a scale for each subject in each of the measures.

The objective of passing this inventory was to see how the anxiety of the subjects was distributed in terms of the triple response system (motor, physiological and cognitive) and to observe their general anxiety. Regarding the factors that it offers us, we consider the FI to be important since it measures anxiety before the evaluation. In any case, the others were analyzed to see if there were any other differences. In the case of athletes, one of the factors that is indicated as causing anxiety is precisely the fear of being evaluated or doing it badly and failing (factor I of the ISRA measures the anxiety before the evaluation).

Statistical analysis

Descriptive data is presented as median [25th percentile; 75th percentile] values and Mann-Whitney (U) test was conducted to compare anxiety frequencies between groups. The effect size was calculated using hedges (g), and interpreted as follows: small ($r=0.10$), medium ($r=0.30$) or large ($r=0.50$). Furthermore, logistic regression analysis was used to confirm the effects of emotional intelligence and anxiety on the dichotomous variable performance (grappling vs striking). The significance level of $p \leq .05$ was used. All analyses were conducted using SPSS 20.0 for Windows.

Results

Descriptive analysis of multidimensional anxiety and emotional intelligence are shown in Table 1 separated by grappling and striking athletes.

The regression model showed a significant effect ($p < 0.001$) for anxiety levels and emotional intelligence comparing grappling versus striking, with higher ODD for the Inventory of situations and anxiety responses (Exp B = 1.029). Table 2 shows a regression analysis performed to determine the interaction between emotional intelligence, multidimensional anxiety and grappling versus striking combats.

Discussion

Sports sciences recognize that emotional intelligence is a determinant of performance because pleasant emotions are directly associated with optimal performance and

Table 1. Analysis of years-old, training years, hours, multidimensional anxiety, and emotional intelligence by grappling and striking athletes.

Factors	Grappling	Striking	Inferences			
	μ (25 th ; 75 th)	μ (25 th ; 75 th)	U	Z _{score}	P	ES
ISRA C	56 (32; 82)	50 (29; 71)	10908.50	-1.69	.09	0.09
ISRA M	27 (12; 55)	21 (11; 40)	10588.00	-2.05	.04	0.10
ISRA F	29 (13; 51)	22 (10; 44)	11116.00	-1.45	.15	0.07
ISRA T	121 (60; 178)	88 (48; 158)	10619.50	-2.01	.04	0.10
IF1	54 (27; 79)	49 (26; 73) ^a	11651.00	-.85	.39	0.04
IF2	11 (5; 22)	8 (4; 20)	10839.00	-1.76	.08	0.09
I3	17 (5; 37)	13 (3; 30)	11098.50	-1.47	.14	0.08
IF4	7 (3; 18)	6 (3; 14) ^a	11608.50	-.90	.37	0.05
IE1	23 (18; 28)	22 (18; 27) ^a	11830.50	-.65	.52	0.03
IE2	27 (22; 32)	30 (24; 32)	10533.00	-2.11	.03	0.11
IE3	29 (24; 33)	30 (25; 33) ^a	12243.50	-.19	.85	0.01

Note: ISRA C = Cognitive anxiety, ISRA M = Motor anxiety, ISRA P = Physiological anxiety, ISRA T = Total anxiety; IF1 = Anxiety before the evaluation, IF2 = Interpersonal anxiety, IF3 = Phobic anxiety, IF4 = Anxiety before habitual and daily situation; IE1 = Emotional perception, IE2 = Emotional Comprehension and IE3 = Emotional regulation. μ = median, 25th = 1st quartile, 75th = 3rd quartile. U = Mann-Whitney; Sig. = P calculated; ES = effect size. ^a $p \leq 0.05$ versus Grappling.

Table 2. Logistic regression between emotional intelligence, multidimensional anxiety of striking and grappling fighters.

Variables in the model	B	S.E.	Wald	df	Sig	Exp (B)	95% C.I. for EXP(B)	
							Lower	Upper
ISRA C	-.005	.018	.089	1	.765	.995	.960	1.030
ISRA M	-.025	.020	1.568	1	.210	.976	.939	1.014
ISRA F	-.009	.020	.191	1	.662	.991	.952	1.032
ISRA T	-.006	.016	.123	1	.726	.994	.963	1.026
IF1 ^a	.029	.012	6.025	1	.014	1.029	1.006	1.053
IF2	.013	.021	.360	1	.548	1.013	.971	1.056
IF3	.009	.011	.698	1	.403	1.010	.987	1.032
IF4	-.001	.020	.002	1	.967	.999	.962	1.038
IE1	-.022	.022	1.014	1	.314	.978	.937	1.021
IE2	.045	.024	3.465	1	.063	1.046	.998	1.096
IE3	-.013	.024	.293	1	.588	.987	.941	1.035
Constant	-1.535	.898	2.923	1	.087	.216		

Note: ISRA C = Cognitive anxiety, ISRA M = Motor anxiety, ISRA P = Physiological anxiety, ISRA T = Total anxiety; F1 = Anxiety before the evaluation, F2 = Interpersonal anxiety, F3 = Phobic anxiety, F4 = Anxiety before habitual and daily situation; IE1 = Emotional perception, IE2 = Emotional Comprehension and IE3 = Emotional regulation. μ = median, 25th = 1st quartile, 75th = 3rd quartile. U = Mann-Whitney; Sig. = P calculated; ES = effect size. B = regression coefficient; S.E. = standard error; DF = degrees of freedom; Sig = p value, EXP (B) = Exponentiation of B; C.I. = confidence interval. ^a significant regression ($p \leq 0.05$).

unpleasant emotions affect the competition [Laborde *et al.* 2016]. Despite the importance of the degree of influence of emotional intelligence on sport performance, few studies related the determinant factors of emotional

intelligence in combat sport athletes [Laborde *et al.* 2016; Rutkowska, Gierczuk 2020]. To the best of our authors' knowledge, it is the first study which examined the associations between emotional intelligence and anxiety levels comparing striking and grappling sports in the field of sports psychology. The main results demonstrated significant differences between groups, grapplers demonstrated higher interpersonal, cognitive, and motor anxieties, as lower levels of emotional comprehension than striking athletes. This result demonstrated that emotional intelligence and performance are associated with striking combat sports, as the anxiety reduction, especially cognitive anxiety, which is associated with negative thoughts, poor concentration, fear, and loss of confidence.

Our findings agree with previous authors, who demonstrated a randomized controlled trial effects of karate versus a mindfulness-based stress reduction intervention on well-being and cognitive functioning in older adults, both methods showed only small training effects concerning the assessed emotional and cognitive parameters [Jansen *et al.* 2017].

In our regression, the Wald's criterion and p -value showed that interpersonal anxiety as the best variable to explain differences between grappling and striking combats. TMMS-24 of grappling group demonstrated ~30% higher interpersonal anxiety than the striking group. Preceding authors showed that gripping seems to be one essential characteristic determining expertise in grappling matches, since research with beginners and experts in judo, supports the notion that beginners spend more gripping time before realizing attacks [Barreto *et al.* 2010]. First, this time could be used by grappling athletes to analyze the opponent, attempting to perform interactions administered by gripping the *judogi*, that well-developed effort to establish the gripping is pointed to be of the key factors of the combat result [Miarka *et al.* 2017] and it could be associated with present results, increasing interpersonal anxiety. This statement can be supported by the fact that grapplers, at the most part of the combat time, try to grip and defend against the attempts of his/her opponent, as it is used to control space and to attain control of the opponent for a sequential attack of judo [Barreto *et al.* 2019; Miarka *et al.* 2017], wrestling [Lopez-Gonzalez, Miarka 2013] and karate [Tabben *et al.* 2018].

Recently, research has shown a positive association between religious beliefs with competitive anxiety judo athletes [Moghadam *et al.* 2015]. Although such settings have greater external validity, the variables of interest are more difficult to control and measure than in a laboratory environment. Our study ensured that participants were of the same age range, they did not show significant differences but when observing the regression analysis model, interpersonal anxiety was associated with grappling combats; even so, it is important to point out a limitation for non-comparisons between combat outcomes during championships. Preceding research

indicated that better performance during judo championship was associated with significantly lower levels of cognitive anxiety or higher levels of confidence [Filaire *et al.* 2001]. The present findings revealed important and original differences between striking and grappling combats, which showed that grappling athletes were not able to maintain lower levels of cognitive and motor anxieties, while the striking group demonstrated better emotional comprehension.

Conclusion

This study proposed a unique approach to characterizing anxiety and emotional intelligence considering striking and grappling combat sports. Results showed that grapplers showed higher interpersonal, cognitive, and motor anxieties, as lower levels of emotional comprehension than striking athletes. The present regression model demonstrated ~30% of probability of increasing interpersonal anxiety in grappling practice than striking combats. Therefore, psychologists can create strategies to reduce the fear of combat situations (i.e. worries about opponent attacks, injuries, referees, social judgement or their own combat outcomes). These findings can be arranged with massive knowledge of sports physiology as a means of supporting psychological preparation for combat sports, considering particularities of emotional intelligence dimensions and the multidimensional anxiety.

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Inteligencja emocjonalna a prawdopodobieństwo zaburzeń lękowych u zawodników sportów walki opartych na chwytach (*grappling*) i uderzeniach (*striking*): porównanie za pomocą analizy regresji

Słowa kluczowe: psychologia sportu, sztuki walki, lęk, przystosowanie emocjonalne, kompetencje psychiczne

Streszczenie

Tło. Sporty walki dzielą się na typy: oparty na uderzeniach (*striking*) i chwytach (*grappling*), oba mają zasadniczy wpływ na wyniki medalowe Letnich Igrzysk Olimpijskich. Analiza psychologiczna jest sposobem na zrozumienie czynników wyjaśniających sukces u zawodników sportów walki na elitarnym poziomie, jednak bardzo niewiele badań koncentruje się na inteligencji emocjonalnej, weryfikując rozpowszechnienie zaburzeń lękowych. Problem i cel. Niniejsze badanie miało na celu porównanie inteligencji emocjonalnej oraz lęku poznawczego, motorycznego, fizjologicznego i całkowitego pomiędzy zawodnikami uprawiającymi *striking* i *grappling*.

Metody. Grupa badanych składała się z 382 sportowców, 299 z walk *grappling*owych i 89 z walk *striking*owych. Cała grupa badanych była analizowana pod kątem inteligencji emocjonalnej przy użyciu *Trait-Meta Mood Scale* oraz lęku, przy użyciu Inwentarza sytuacji i reakcji lękowych, $p \leq 0,05$.

Wyniki. Główne rezultaty wskazują, że zawodnicy stosujący chwyt wykazali wyższy poziom lęku przed ewaluacją [54 (27; 79) vs. 49 (26; 73); $p=0,04$], przed sytuacją zwyczajową i codzienną [7 (3; 18) vs. 6 (3; 14); $p=0,04$], percepcją emocjonalną [23 (18; 28) vs. 22 (18; 27); ($p=0,03$)] oraz niższy wynik regulacji emocjonalnej [29 (24; 33) vs. 30 (25; 33); $p=0,01$]. Przeprowadzona regresja wykazała istotny statystycznie rezultat ($p=0,014$) dla lęku i inteligencji emocjonalnej porównując *grappling* i *striking*, z wyższym ODD w Inwentarzu sytuacji i reakcji lękowych (Exp B - 1,029).

Wnioski. Nasze wyniki wykazały, że zawodnicy stosujący chwyt prezentowali wyższy poziom lęku interpersonalnego, poznawczego i motorycznego, jak również niższy poziom inteligencji emocjonalnej niż zawodnicy stosujący uderzenia. Ponadto, model regresji wykazał ~30% prawdopodobieństwo wzrostu lęku interpersonalnego u zawodników *grapplingu* niż u zawodników *strikingu*.