

APPLICATION OF SPORT PSYCHOLOGY TO MIXED MARTIAL ARTS: A SYSTEMATIC REVIEW

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Review

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Abstract:

This study, through a systematic review, analyzed scientific production concerning sport psychology in mixed martial arts. The review was conducted in accordance with the PRISMA statement, and the search was performed using the SciELO, *ScienceDirect*, PsycInfo, and Web of Science databases. Of the 79 studies screened, eight satisfied the eligibility criteria, with explicit addressing of the topics of fear, aggression, emotional control, confidence, mental toughness, motivation, arousal, coping, rational emotive behavioral therapy for MMA athletes, fighting experience and MMA competition. Consequently, the scarce scientific production was found to evidence the need for further research in this modality. It is suggested that studies that investigate other variables of sport psychology such as mood, anxiety, and burnout.

Key words: *combat sports, martial arts, athletes, self-regulation, fear*

Introduction

Mixed martial arts (MMA) is a new and popular fighting style in which fighters use a variety of techniques sourced from other martial arts to knock out their opponents or force them to submit. It has already become a favorite combat sport among young adults, surpassing the popularity of boxing and wrestling (Nancy, 2009).

In sports, for an athlete to be successful, high levels of physical fitness are required, which relates to the development of various capacities such as strength, power, agility, and flexibility (Costa, Medeiros, & Fukuda, 2011; Schick, et al., 2010); however, along with improving the body's capabilities, sporting success also requires the strengthening of mental and psychological aspects (Andrade, Bevilacqua, Coimbra, Pereira, & Brandt, 2016; Brandt, Bevilacqua, & Andrade, 2017; Brandt, et al., 2014; Cunningham & Turner, 2016; Massey, Meyer, & Naylor, 2013; Palmi & Sole, 2016).

Mental skills training helps athletes to control anxiety (Mamassis & Doganis, 2004), increase confidence (Myers, Payment, & Feltz, 2004), and control emotions (Lazarus, 2000). In combat sports and martial arts, mental training exercises are used to calm athletes before competitions, reinforce self-mastery and self-knowledge, and to help them overcome challenges, thereby mentally conditioning a fighter through the reduction of his/her anxious reactions and leading to an increase in the athlete's sporting performance (Devonport, 2006).

Although the importance of mental abilities in combat sports has been proven, little investigation has been conducted into this topic. For example, Brazil is considered a sporting power, being relatively prominent in diverse modalities of fighting and combat sports, particularly judo and MMA but, nevertheless, Correia and Franchini (2010) found only 75 articles on fighting and combat sports in their search of 11 of the most important Brazilian and Latin American journals, and none of these concerned sport psychology or MMA athletes.

Considering the recent increase in the number of international publications on combat sports, the significant market involved in combat sports, and the growing number of practitioners and increasing worldwide popularity of these sports, particularly in regard to MMA (Zembura & Zysko, 2015), analyzing of the published studies on the psychological aspects of MMA practitioners and athletes will allow us to obtain valuable publication-related data, such as the journals that have published such articles, publication years, research methods applied, and main issues investigated. Thus, the aim of the present study was to analyze, through a systematic review, scientific production concerning the application of sport psychology and its sub-areas to MMA.

Methods

To appropriately conduct the systematic review of the relevant literature, the criteria recommended

by the PRISMA Statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) were adopted and adhered to (Moher, et al., 2016).

Search strategy

To begin this investigation, first a search was conducted among journals indexed in the electronic databases of SciELO, ScienceDirect, PsycInfo – PsycARTICLES, and Web of Science – Core Collection for scientific production concerning the application of sport psychology to MMA.

To search for relevant articles, the following terms related to MMA were used as primary descriptors: “Mixed Martial Arts OR Ultimate Fighting.” These were combined, using the Boolean operator “AND,” with the following terms related to sport psychology: “Psychology OR Sport Psychology OR Exercise Psychology OR Mood OR Mood States OR Anxiety OR Stress OR Motivation OR Mental Training OR Mental Toughness OR Coping OR Burnout OR Emotions OR Aggressiveness” (Table 1).

The search for articles was conducted until June 2, 2017. No time limit was set on the publication of the articles searched; we wanted to include all production on the topic. The databases searched were selected due to their well-known international coverage and representativeness, as they index most of the main scientific journals related to sport.

Eligibility criteria

The inclusion criterium for articles were: studies that address topics related to sport psychology (e.g., mood, anxiety, stress, motivation, mental training, coping, burnout, emotions, and aggressiveness) in

MMA athletes or practitioners. By applying this criterium, we excluded studies that did not investigate MMA athletes or practitioners. Also, conference abstracts, book chapters, and articles not available in full-text were excluded.

Selecting and extracting data

The selection of studies was performed independently by three reviewers. It commenced with the analysis of the titles of the articles by applying the aforementioned search strategy, followed by the analysis of selected abstracts, and, after this, by the analysis of the selected full-text articles. Any disagreements that arose among reviewers were resolved by consensus.

To facilitate analysis and discussion, the following data were extracted from the publications: study identification, year of publication, authors, countries in which authors’ institutions were located, language of publication, keywords, journal impact factor (IF), participants, study design, topic, and results/conclusions of the studies.

Results

The search returned 79 articles. After excluding duplicates ($n = 46$) and those found to be unsuitable ($n = 19$) upon reading their titles, 14 articles were advanced to the abstract-reading phase. At this stage, five more studies were excluded, leaving nine for the full-text reading phase. Finally, eight studies were used for the final review (Figure 1).

The selected studies are presented in Table 2, with the author(s) and year of publication, study title, journal, and IF included.

Table 1. Search results according to the terms used in SciELO, Science Direct, Web of Science (WoS) and PsycInfo databases

Search terms		SciELO	Science Direct	WoS	PsycInfo
“mixed martial arts” AND	psychology	0	1	5	17
“mixed martial arts” AND	“sports psychology”	0	1	0	0
“mixed martial arts” AND	“exercise psychology”	0	0	0	1
“mixed martial arts” AND	mood	0	0	1	0
“mixed martial arts” AND	“mood states”	0	0	0	0
“mixed martial arts” AND	anxiety	0	1	2	2
“mixed martial arts” AND	stress	1	2	14	1
“mixed martial arts” AND	motivation	0	1	4	2
“mixed martial arts” AND	“mental training”	0	0	0	0
“mixed martial arts” AND”	“mental toughness”	0	0	1	1
“mixed martial arts” AND	coping	1	0	1	0
“mixed martial arts” AND	burnout	1	0	1	0
“mixed martial arts” AND	emotions	0	0	7	2
“mixed martial arts” AND	aggressiveness	0	0	5	4
Total		3	6	41	29

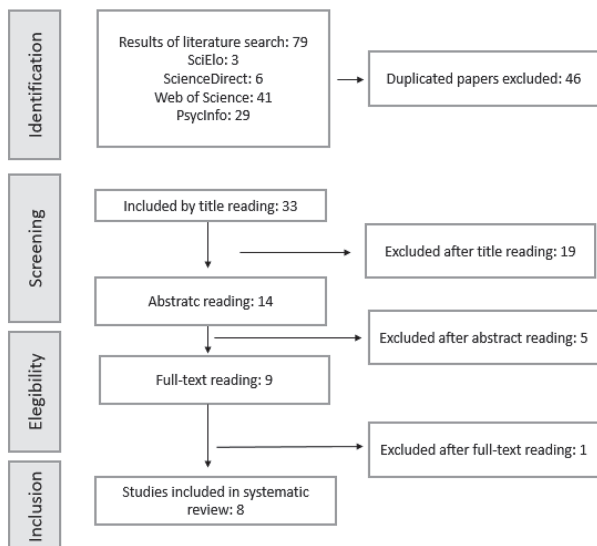


Figure 1. Flowchart of the selection of studies on sports psychology related to mixed martial arts included in Scielo, ScienceDirect, Web of Science and PsycInfo databases.

The first study relating to sport psychology in MMA was published in 2011, while the year with the highest number of publications was 2013, with three studies. The studies analyzed were published in English (n = 7) and Portuguese (n = 1).

In regard to study participants, the number of athletes investigated ranged from three to 136; most were males aged between 20 and 30 years and characterized as professional athletes (Table 3).

The following topics were addressed in the studies: coping strategies for fighters; fighters' experiences during fights; the use of behavioral therapy to enhance self-belief and self-acceptance; the difference in mental toughness between fighters of different standards; fighters' emotions; the factors and psychological techniques used by fighters in training and competition; and the aggressiveness, self-esteem, stress, and mental health of fighters (Table 3).

Table 2. Author and year, title, journal and journal's impact factor of the selected studies

Author (year)	Title	Journal	Impact factor
Belem et al. (2016)	Stress in MMA: Can coping strategies improve the performance of fighters?	Brazilian Journal of Sports Medicine	0.294
Cunnigham et al. (2016)	Using Rational Emotive Behavior Therapy (REBT) with mixed martial arts (MMA) athletes to reduce irrational beliefs and increase unconditional self-acceptance	Journal of Rational Emotive & Cognitive-Behavior Therapy	0.696
Massey et al. (2015)	Self-Regulation strategies in mixed martial arts	Journal of Sport Behaviour	-
Rosario et al. (2014)	The experience of aggression among mixed martial arts athletes interpreted through reversal theory	International Journal of Sport Psychology	0.610
Jensen et al. (2013)	In the cage: MMA fighters' experience of competition	Sport Psychologist	1.330
Chen et al. (2013)	Mental toughness of mixed martial arts athletes at different levels of competition	Perceptual and Motor Skills	0.626
Massey et al. (2013)	Toward a grounded theory of self-regulation in mixed martial arts	Psychology of Sport and Exercise	3.196
Vaccaro et al. (2011)	Managing emotional manhood: Fighting and fostering fear in mixed martial arts	Social Psychology Quarterly	2.748

Table 3. Topic and sample of the selected studies

Author (year)	Topic	Sample			
		n	Sex	Age	Level
Belem et al. (2016)	Coping and stress	50	M	25	Professionals
Cunnigham et al. (2016)	Beliefs and self-acceptance	3	M	26.6	Semi-professionals
Massey et al. (2015)	Self-regulation	9	8 M and 1 F	-	Professionals
Rosario et al. (2014)	Aggressiveness	6	-	23-30	Professionals
Jensen et al. (2013)	Fight experience	7	M	24-36	Amateurs and professionals
Chen et al. (2013)	Mental toughness	136	M	27.1	Amateurs, semi-professionals, and professionals
Massey et al. (2013)	Self-regulation	9	8 M and 1 F	-	Professionals
Vaccaro et al. (2011)	Fear	88 fighters and 15 coaches			Professionals

Note. n: sample size

Table 4. References and results/conclusions of the selected studies

Reference	Results/Conclusions
Belem et al., 2016	Fighters whose main source of money is MMA has high levels of stress. MMA fighters with a higher training volume use a variety of coping strategies aimed at setting goals and have a greater coping skills confrontation with adversity.
Cunnigham et al., 2016	Significant reduction in total irrationality and self-depreciation and an increase in the United States of America, which was maintained during six months post-Rational Emotive Behavior Therapy for two out of three athletes. Social validation data revealed positive changes in emotion management and performance in all athletes. The mechanisms by which REBT promoted changes in self-depreciation and USA are discussed as are recommendations regarding the future implementation of REBT with athletes.
Rosario et al, 2014	Athletes have reported that aggressiveness is important when used correctly. When aggressiveness is manifested, it is allowed because of the MMA rules. Aggressiveness in the athletes does not exceed the limits of the academy.
Jensen et al., 2013	For fighters, the fighting experience is characterized by a chaotic and intense situation with opponents they respect and by fears that represent a significant departure from everyday life. The competition represents the opportunity to evaluate not only the ability to fight, but also the mental toughness. Fighters face similar challenges from other sports, but there are unique aspects to MMA.
Chen et al., 2013	Professional athletes obtained higher scores on mental strength compared to semi-professionals and amateurs. Amateurs presented higher scores than the semi-professionals. The convergent validity data showed mixed results and were not favorable for the validation of PPI-A.
Massey, et al., 2013	Motivation and ongoing evaluation have only helped fighters in internal and external self-regulation in training and competition. The external factors associated with self-regulation consisted of maintaining an ascetic routine through environmental regulation, social support and structured amnesty.
Massey et al., 2015	The use of stages of behavior change, developing embodied emotions, and the use of psychological strategies facilitated the self-regulation and the fighters' performance.
Vaccaro, et al., 2012	Athletes fear being injured and losing fights and they need to demonstrate masculinity to counter this fear.

Regarding the results of the studies, it was reported that for the fighters whose main money source was MMA fighting, high levels of stress were common, and they used a variety of coping strategies to alleviate this tension. Motivation and constant evaluation were found to be particularly useful for helping them regulate internal and external factors. It was also identified that chaotic situations experienced in the ring was the most important aspect of fighting; it was also found that athletes' greatest fear was the fear of losing and being injured. Additionally, professional athletes were found to have higher scores on mental toughness than semi-professional and amateur athletes (Table 4).

Discussion and conclusions

Sport psychology is a relatively new area of research (Gouveia, 2001) and this may explain why only a few studies on sports psychology and MMA were found. Thus, as stated by Devonport (2006), sport psychology professionals have a wide field in which to make interventions in terms of psychological training. This problem contrasts with two important aspects: the growth of MMA practice and demands of athletes and coaches in the sport, and the evident needs in terms of the mental preparation of MMA athletes for undergoing the toughness of training and competition.

Furthermore, it is self-defeating that researchers are not publishing studies concerning sport psychology in MMA—if researchers are not interested and do not research and publish, the sport will not come to recognize the importance of sport psychology.

To conduct further analysis, the following categories were adopted for the investigation: bibliometric analysis of publications; fear, aggression, and emotional control in MMA participants; confidence and mental toughness in MMA participants; fighting experience and competition in MMA; and motivation and arousal in MMA athletes.

Bibliometric analysis of publications concerning the application of sport psychology to MMA

Out of the selected articles for this phase of research, six were published by US researchers, one by the United Kingdom and one by the Brazilian researchers. Similar results were also found in relation to journals, with five from the United-States-based journals, two from Europe, and one from Brazil. Only one journal did not present an IF provided by the Journal Citation Reports (JCR).

In terms of research participants, the most investigated category in the studies were professional athletes ($n = 6$), which was followed by

amateur athletes ($n = 3$) and one study investigated coaches. Further, the number of participants in the studies showed a high amplitude, with a minimum of three and a maximum of 136.

Regarding methodological characteristics, during analysis of the data it was verified that five studies had adopted a qualitative approach. Many researchers in sport psychology have used qualitative research as an alternative to traditional methods; this is because the qualitative approach allows researchers to study the statements and actions of individuals, thus reflecting a new paradigm in research (Culver, Gilbert, & Trudel, 2003).

It should be noted that despite the small number of publications on sport psychology and MMA athletes, and the fact that it is a recently developed sport, researchers have shown interest in evaluating the psychological aspects of these athletes, especially in 2013, when three articles on this topic were published.

Fear, aggression, and emotional control in MMA

The pioneering study on psychological aspects relating to MMA, which was conducted by Vaccaro, Schrock, and McCabe (2011), involved 121 interviews with fighters and coaches in an attempt to investigate their emotional control. Although they were given the label of “braves”, during the interviews the fighters reported experiencing fear; specifically, in interviews conducted at training academies and before fights, they reported being “nervous”, “worried”, and having “pre-fight tension” and “butterflies in their stomachs” (Vaccaro, et al., 2011).

One of the most reported fears was the “fear of injury and losing the fight”. The fear of injury is based on the inactivity and recovery time these athletes must undergo following a serious injury in a training or competition. These injuries occur as a result of the very characteristic of the sport: causing physical damage to the opponent (Vaccaro, et al., 2011). It should be noted that athletes fear being injured both in preparation for a fight and during the competition itself. When there is a climate of fear and worry, physical reactions such as muscle twisting or straining, as well as limitations in athlete concentration, can result. Further, in MMA, the risk of injury is especially high, as during training and competition athletes are subjected to head trauma, twisting, spraining, or luxation of joints, and muscle and bone injuries (Buse, 2006; Sheldon & Aimar, 2001).

The fear of losing arises when athletes think of the shame of “losing at home”, “being knocked out early in the fight”, and “losing in front of friends and family”. As a result of the culture of masculinity that the sport promotes these athletes cannot openly demonstrate this type of fear, since they would be

branded as “chickens”, “cowards”, “pussies”, etc. (Vaccaro, et al., 2011). Fear of losing causes feelings of shame in an individual, which is based on the fear of ridicule or suffering an embarrassing situation. These feelings arise the moment they are observed and judged by their peers or by themselves (Ribeiro, Oliveira, & Silva, 2013).

Nevertheless, fighters can apply methods of controlling their fear. These athletes use certain strategies: planning the fight and other events beforehand; treating the fight as another day at the gym or as a part of their job; considering themselves to be much better fighters than the opponent, or by setting his/her opponent to be inferior; and provoking fear in their adversaries, whether at the time of weigh-in or during casual encounters before the fight (Vaccaro, et al., 2011).

MMA has as a characteristic of being a sport involving intense physical contact and demanding a certain level of aggressiveness from its practitioners; hence, aggression can be considered to constitute an important positive aspect of training and competition. However, excessive aggression can be detrimental to athletes. As such, it is necessary that athletes know how to use their aggressiveness in their favor, using an appropriate amount for particular moments and taking care that, when training, such aggressiveness does not exceed the limits of the training environment (Rosario, Kerr, & Rhodius, 2014).

Similar results have been found in ice hockey athletes, a sport also characterized by intense physical contact and high levels of aggressiveness. Studies have shown that players with high aggressiveness exhibit better technical performance in competition than less aggressive players (Gee & Leith, 2007; McCarthy & Kelly, 1978; Sheldon & Aimar, 2001).

Another concern of researchers is whether athletes with high levels of aggressiveness are overly aggressive outside academy environment; however, Rosario, Kerr, and Rhodius (2014) found that MMA athletes did not exhibit aggressiveness outside the academy.

It is not yet clear in the literature whether martial arts practice can help control aggression, or does it increase aggression. Although there is some evidence of the use of martial arts to control aggressiveness (Abrahams, 2004; Zivin, et al., 2001), certain studies have shown that martial arts practice may increase antisocial behavior (Endresen & Olweus, 2005), while others have highlighted the possibility that physical strength and martial arts violence are related to violent behavior and increased aggressiveness (Kusnierz, Cynarski, & Litwiniuk, 2014).

Nevertheless, when comparing levels of aggressiveness in a sample of boxing, capoeira, jiu-jitsu, and non-martial arts athletes, it was proven that non-

practitioners presented higher levels of aggressiveness than practitioners. This suggests that aggressiveness can be conditioned by the specificity of the training of the modality, or by the qualifications of the coaches (Kusnierz, et al., 2014).

MMA competitions are also characterized by extreme levels of physical contact and exhaustion; fighters commonly describe the physical requirements of the sport as being as challenging as the physical threat their opponent imposes. While accepting the inevitable risk of injury, fighters fear injuries that may shorten, or even terminate, their careers (Jensen, Roman, Shaft, & Wrisberg, 2013).

Lastly, in a recent study, Cunningham and Turner (2016) found that rational emotive behavior therapy (REBT) was effective in two out of three investigated athletes in reducing self-depreciation and raising self-acceptance. This finding can have important implications for athletes, but further research is required regarding the application of REBT to this sphere.

Confidence and mental toughness in MMA

Mental toughness makes an important psychological contribution to athletes' performance, and studying the levels of mental toughness of elite MMA fighters can provide valuable information concerning their psychological needs (Chen & Cheesman, 2013; Sheard, Golby, & van Wersch, 2009). Investigating this, Sheard et al. (2009) developed a model of mental toughness containing three constructs: confidence, constancy, and control; by applying this, they were able to obtain a better understanding of the psychological demands of those MMA fighters.

Chen and Chessman (2013) found significant differences in the mental toughness scores of fighters at different competitive levels. Most notably, professional fighters scored by 9.8% higher than semi-professionals, and by 9.3% higher than amateur fighters. Furthermore, there were also differences between fighters when analysis was performed using a confidence and mental-toughness determination subscale: those with a greater experience in the sport scored higher on this subscale. In this way, high levels of confidence and determination were shown to be vital attributes for athletes who want to compete at a high level (Chen & Cheesman, 2013).

Professional fighters have also been shown to have greater positive cognition than fighters of other levels. The ability to stay positive, maintain a sense of pleasure during activity, overcome adversity, and block negative thoughts are central elements for good mental toughness; thus, professional MMA athletes should have higher positive expectations of combat, which in turn generates greater confidence in their ability to cope with competition (Chen & Cheesman, 2013; Golby, et al. 2007).

In two related studies by Massey et al. (2013) and Massey, Meyer, and Naylor (2015), the psychological aspects and strategies used by fighters in their training and competition routines were verified.

In the first article, the psychological factors involved in MMA athletes' training and competition were illustrated. The researchers conducted interviews with nine MMA fighters, inquiring into their psychological demands, their strong and weak psychological points, their psychological skills, and their strategies for gaining success in MMA. After the data collection, the authors used the grounded theory technique to analyze the psychological factors involved in training and competition in MMA.

To address stressing agents encountered in training and competition, MMA athletes were found to regularly use coping strategies; further, Belem et al. (2016) verified that coping strategies relating to goal setting are more regularly used by fighters with higher training volumes. In fact, coping strategies are used by athletes of different modalities to manage internal or external demands that are evaluated as being stressors. Their use also decreases anxiety levels, providing the athlete with an improved sense of well-being, self-confidence, and motivation (Belem, et al., 2016; Jowett & Spray, 2013).

Fighting experience and competition in MMA

In order to examine MMA athletes' fighting experience, Jensen et al. (2013) applied existential phenomenological analysis to qualitative interviews with seven MMA fighters. After reviewing the content of the interviews, four themes were identified in regard to the fighters' characterization of their MMA experiences: cage reality, purpose, fighting skill, and community.

In most MMA competitions, fighters compete in an area similar to a boxing ring; however, the MMA fighting space can be octagonal and surrounded by grids, and is usually called a "cage" (Jensen, et al., 2013; van Bottenburg & Heilbron, 2006). The transition experienced upon entering the cage from outside to fight has been described by fighters as unique and impossible to simulate in training.

Another aspect fighters mentioned concerning the cage is its unpredictability. The dangerous environment and the chaotic nature of the fight can trigger different situations, making events inside it a "roller coaster", where a single error can define the outcome of the fight. However, when athletes can control this environment, they enter the "flow feeling" state (Jensen, et al., 2013).

The flow feeling can be defined as an intrinsically involving mental state that occurs when the individual in question perceives a sense of balance

in regard to their capacities. When an athlete enters the flow state, there is a sense of complete immersion in the performance of the activity, often accompanied by a higher perception, which tends to encourage persons to push themselves to their limits (Gomes, Miranda, Brandão, & Bara Filho, 2012).

Motivation and arousal of MMA athletes

The analyzed literature shows that before beginning preparation for a training period, the fighter must commit to an ascetic routine. This routine should be self-regulated and designed to promote optimal performance in training and competition. Specifically, the routine should consist of regulating the environment (e.g., removing distractions), securing social support (e.g., from coaches and training partners), and scheduling structured amnesty periods (e.g., going to parties). Furthermore, once training begins, fighters experience physical pain and psychological stress, and these should be regulated to promote the best performance in training and competition (Massey, et al., 2013, 2015).

The need to remain motivated despite encountering adversity and undergoing the constant evaluation of their performance in training plays a major role in individuals' ability to self-regulate. Further, self-efficacy is enhanced when pain, fatigue, and stress are regarded as challenging, which can result in good performance. On the other hand, when pain, fatigue and stress are perceived as threats, self-efficacy decreases and performance levels fall (Massey, et al., 2013).

In the second article, Massey et al. (2015) divided the self-regulation strategies of fighters into three major themes: behavioral processes of change, embodied emotions, and psychological strategies. In the first theme, athletes reported that changes in their behaviors and attitudes were necessary while they were in the training and competition period; examples of such changes included avoiding non-prescribed foods, along with having "cheat days", and securing social support during training, such as from training partners or relatives and friends (Massey, et al., 2015).

In regard to embodied emotions, athletes report that the intensity and repetition of training as well as the emotional stress caused by such factors cause their bodies and minds to be more prepared to react in the right way, thereby increasing self-regulation capacity during competition (Massey, et al., 2015).

Several psychological strategies are used by fighters to optimize performance in the sport. To control intensity and arousal, techniques such as deep breathing, imagery, self-talk, listening to music, and meditation are used, and these also help to control pain and distress during training and competition. To increase confidence, athletes reported using fight simulation and self-talk. Finally, for strategic planning, athletes stated they used videos of previous fights, imagery, goal setting, and the creation of a fight plan (Massey, et al., 2015).

Despite the application of the mentioned techniques, there are few cases in which coaches use sport psychology with their athletes. On the rare occasions when it is used, sport psychology is often given only through the application of a small number of mental-training techniques for specific crises experienced by coaches and athletes (Coimbra, et al., 2008; Zakrajsek, Martin, & Wrisberg, 2015).

Thus, observing the results of the few published articles, it can be verified that relevant high-performance-sport topics have not been investigated in this population; for example, aspects such as mood, anxiety, and burnout were not found. This, therefore, evidences the need for further studies.

Studies involving analysis of scientific production highlight the issues commonly addressed in the area in question, as well as those that require further investigation by the researchers. The results of our systematic review show that scientific production on sport psychology related to MMA is in a formative stage, thus evidencing the urgent need for research in this modality.

Our research verified that the subjects in this field that have been investigated thus far include fear, aggressiveness, emotional control, confidence, mental toughness, motivation, coping, REBT, arousal, fighting and MMA competition experience. Further, the identified investigations contain important themes concerning the psychological aspects of MMA athletes and provide an initial description of how these athletes react in training and competition situations.

However, further research in this modality and addressing this population is required. It is suggested that studies that would investigate other variables of sport psychology, such as mood, stress, and anxiety, should be performed. In doing so, such surveys could help coaches to better prepare their athletes to engage in MMA in training and competition.

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