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# PSYCHOLOGICAL VARIABLES AND MENTAL TRAINING INTERVENTIONS IN KICKBOXING: A SYSTEMATIC REVIEW

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## ABSTRACT

*This study aims to examine the psychological variables that determine performance in kickboxing and the effectiveness of mental training interventions through a comprehensive literature review. The findings clearly demonstrate that kickboxing is not only a physically demanding sport but also one that requires a high level of psychological skills. In particular, competitive anxiety, motivation, self-confidence and self-efficacy, psychological resilience, and attentional control emerge as key determinants of performance. The impact of competitive anxiety on performance is not direct but depends on how athletes interpret and manage it. Self-confidence and psychological resilience are identified as critical factors that help regulate anxiety and support performance. The sustainability of motivation is closely associated with maintaining intrinsic motivation, while higher levels of self-confidence and self-efficacy enable athletes to perceive competition as a challenge rather than a threat. Psychological resilience stands out as a multidimensional construct that both reduces anxiety and enhances performance. Additionally, attentional control and focus are crucial for rapid decision-making and automatic motor execution in high-intensity sports such as kickboxing. Regarding mental training interventions, techniques such as imagery, self-talk, goal setting, breathing and relaxation exercises, and mindfulness-based approaches generally show positive effects on performance, emotional regulation, and psychological skills. Integrated programs that combine multiple mental training techniques appear to produce more effective and long-lasting outcomes compared to single-method interventions. However, the literature reveals significant gaps. Research directly examining psychological variables in kickboxing remains limited, with much of the existing knowledge adapted from other combat sports. There is also a lack of controlled experimental studies specifically designed for kickboxing contexts. Furthermore, the scarcity of sport-specific validated measurement tools represents an important methodological limitation. In conclusion, success in kickboxing cannot be explained solely by physical capacity; psychological skills are equally critical determinants of performance. Future research should focus on developing kickboxing-specific psychological models, testing intervention programs, and producing applied strategies that can contribute both to scientific knowledge and practical performance enhancement.*

**KEYWORDS:** Kickboxing, Sport Psychology, Competitive Anxiety, Motivation, Self-Confidence, Self-Efficacy, Psychological Resilience, Attentional Control, Mental Training, Imagery, Self-Talk, Goal Setting, Relaxation Techniques, Breathing Exercises, Mindfulness, Performance, Emotional Regulation.

## 1. INTRODUCTION

### 1.1. Nature Of Kickboxing and Psychological Requirements

Kickboxing is a full-contact combat sport that combines punching and kicking techniques. Slimani et al. (2017) define kickboxing as a dynamic discipline that integrates tactical skills with high-intensity performance, while Rydzik et al. (2021) emphasize that the sport requires athletes to demonstrate real-time self-regulation, body awareness, rapid reaction time, and spatial orientation under unpredictable competitive conditions.

Psychological variables such as anxiety management, self-confidence, motivation, and psychological resilience are among the key factors shaping elite sports performance (Issurin, 2017). The ability to maintain focus under intense pressure, regulate emotional responses, and sustain high levels of self-efficacy distinguishes elite athletes from others (Chen & Cheesman, 2013; Devonport, 2006; Slimani, Miarka et al., 2016).

These demands are even more pronounced in combat sports, where the constant risk of physical injury intensifies experiences of anxiety and fear (Vaccaro et al., 2011). In this context, kickboxing creates a unique psychological environment: a single mistake can determine the outcome of a match (Jensen et al., 2013), the risk of physical harm is an inherent component of the sport (Krupalija et al., 2010), and moment-to-moment self-regulation strategies directly shape success (Belem et al., 2016; Massey et al., 2013). In a qualitative study of elite kickboxers, Devonport (2006) identified seven core mental skills associated with success and conceptualized the ability to endure and cope with physical impact as a sport-specific psychological competence in kickboxing.

### 1.2. Research Gap, Rationale, And Methodological Framework

Most research on kickboxing has focused on injury epidemiology, physiology, and technical-tactical analysis, while the psychological dimension remains limited both in quantity and scope (Podrigalo et al., 2022). This gap becomes particularly evident when compared to similar combat sports. For instance, Cooper and Lochbaum (2022) conducted a systematic review of 16 studies in mixed martial arts (MMA), and comprehensive reviews addressing psychological variables have also been published in judo, karate, and boxing. However, kickboxing has not yet benefited from such a systematic perspective.

Slimani et al. (2017) explicitly criticize this gap,

emphasizing that psychological skills are among the most important determinants of performance, yet remain under-researched in kickboxing. Recent findings further highlight the significance of this issue: Morrone et al. (2024) demonstrated that psychological variables predict elite kickboxing performance, while Bilgoe et al. (2025) reported that 57% of active elite kickboxers experience psychological distress and 63% exhibit disordered eating behaviors.

## 2. METHODOLOGICAL FRAMEWORK AND LITERATURE REVIEW

This study aims to examine the psychological variables specific to kickboxing and the effectiveness of mental training interventions through a narrative review approach. Furley and Goldschmied (2021) argue that, due to methodological heterogeneity and small sample sizes in sport psychology research, narrative synthesis represents the most appropriate approach for studies of this nature. Accordingly, this review addresses three primary research questions: (1) What are the main psychological variables that predict kickboxing performance? (2) To what extent are mental training interventions effective for kickboxing athletes? (3) What methodological gaps and limitations exist within the current literature?

The literature search was conducted across PubMed, Scopus, and Google Scholar databases without restrictions on publication date or language. Keywords related to kickboxing (e.g., “kickboxing,” “kickboxer,” “K-1,” “full contact,” “low kick,” “point fighting,” “striking combat sports”) were combined with psychological and performance-related terms (e.g., “mental toughness,” “psychological resilience,” “competitive anxiety,” “arousal regulation,” “self-efficacy,” “self-confidence,” “motivation,” “coping strategies,” “emotional regulation,” “attentional focus,” “imagery,” “visualization,” “self-talk,” “goal setting,” “relaxation techniques,” “mindfulness,” “psychological skills training,” “mental health”) using Boolean operators (AND/OR).

Due to the limited number of studies directly involving kickboxing samples, research from similar combat sports—such as mixed martial arts (MMA), boxing, Muay Thai, karate, and judo—was also included, provided that the findings were directly applicable to kickboxing contexts.

Additionally, the reference lists of identified systematic reviews and meta-analyses were examined using backward citation tracking to expand the literature pool.

Inclusion criteria were defined under three categories: (1) empirical studies and reviews

examining psychological variables or mental training interventions in kickboxing or similar combat sports; (2) theoretical studies providing the conceptual or psychometric foundations of relevant psychological constructs; and (3) meta-analyses in sport psychology that contribute to the broader interpretation of kickboxing-related findings. Studies focusing solely on physiological or technical-tactical aspects without addressing psychological variables were excluded.

The selected literature was organized into two main categories: (1) psychological variables predicting kickboxing performance (competitive anxiety, motivation, self-confidence and self-efficacy, psychological resilience, and attentional control), and (2) mental training interventions (mental imagery, goal setting, self-talk, breathing and relaxation techniques, and mindfulness-based approaches). Within each subsection, the theoretical framework was summarized, followed by kickboxing-specific findings and comparative discussions with the broader sport psychology literature.

### ***Psychological Variables Specific to Kickboxing***

Psychological variables in kickboxing athletes are examined under five main categories: competitive anxiety, motivation, self-confidence and self-efficacy, psychological resilience, and attentional control. In this section, each variable is discussed comparatively in light of existing evidence, and kickboxing-specific findings are interpreted in relation to the general sport psychology literature.

#### ***2.1. Competitive Anxiety***

##### ***2.1.1. Conceptual Framework***

Competitive anxiety in sport psychology is typically examined under two components: cognitive and somatic. Cognitive anxiety refers to negative thoughts and disruptions in focus, whereas somatic anxiety encompasses physiological responses such as increased heart rate and muscle tension (Craft et al., 2003).

The Multidimensional Anxiety Theory (MAT) suggests that these components exert independent effects on performance, while Catastrophe Theory proposes that performance may decline abruptly when somatic anxiety exceeds a certain threshold under conditions of high cognitive anxiety. However, craft et al. (2003), through a meta-analytic examination, demonstrated that the direct relationship between anxiety intensity and performance is statistically weak.

This finding has shifted research attention toward individual differences and the interpretation of

anxiety. According to the Individual Zones of Optimal Functioning (IZOF) model, each athlete possesses a unique optimal anxiety zone (Ruiz et al., 2017). Similarly, Hanton et al. (2008) emphasize that the key determinant is not the level of anxiety itself, but rather whether the athlete interprets it as facilitative or debilitating.

##### ***2.1.2. Findings On Anxiety in Kickboxing and Combat Sports***

One of the most comprehensive studies directly examining anxiety in combat sports was conducted by Mojtahedi et al. (2023) with a sample of 194 athletes (boxing/kickboxing, Muay Thai, MMA, and judo).

The multiple regression models established in the study demonstrated that psychological resilience and respect for the opponent (sportsmanship) together explained 16% of the variance in somatic anxiety and 13.4% of the variance in cognitive anxiety. The findings revealed that athletes with lower psychological resilience, combined with higher levels of respect toward their opponents, reported significantly higher levels of both cognitive and somatic anxiety. This suggests that psychological resilience functions as a critical buffering mechanism in anxiety regulation.

Similarly, Morrone et al. (2024), in a study involving 103 medalist kickboxers who participated in the WAKO 2021 World Championship, found that worry and attentional disruption increased the likelihood of perceiving competition as a threat, thereby exerting indirect negative effects on performance. In contrast, athletes with higher levels of self-confidence and emotional arousal control, who interpreted competition as a challenge, demonstrated enhanced performance outcomes.

Furthermore, Devonport (2006), through qualitative findings, documented that elite kickboxers consistently incorporate relaxation techniques and arousal self-regulation strategies into their pre-competition routines, highlighting the practical importance of psychological preparation in this sport.

##### ***2.1.3. Anxiety Sources Specific to Kickboxing***

In kickboxing, anxiety extends beyond fear of failure and strongly encompasses the risk of physical injury (Vaccaro et al., 2011). Mojtahedi et al. (2023) found that athletes who reported higher levels of respect toward their opponents also exhibited higher cognitive and somatic anxiety. This finding was interpreted as potentially stemming from ethical concerns about harming opponents and heightened

levels of empathy.

This evidence highlights the limitations of directly applying general sport anxiety models to combat sports. Moreover, intervention studies specifically targeting kickboxing-related anxiety sources and arousal regulation remain extremely limited in the literature, representing a significant research gap that warrants further investigation.

## **2.2. Motivation**

### **2.2.1. Theoretical Framework: Self-Determination Theory**

Motivation is defined as the internal and external forces that initiate, direct, and sustain behavior (Vallerand, 2007). The Self-Determination Theory (SDT), developed by Deci and Ryan (2000), conceptualizes motivation along a continuum. Intrinsic motivation is driven by the inherent enjoyment and satisfaction derived from the activity itself, whereas extrinsic motivation is influenced by external factors such as rewards or avoidance of punishment.

According to SDT, the key determinant of long-term sustainability in sport is intrinsic motivation, which can only be effectively supported when the basic psychological needs of autonomy, competence, and relatedness are fulfilled (Deci & Ryan, 2000).

### **2.2.2. Motivation In the Kickboxing Literature**

Slimani et al. (2017) emphasize that one of the primary psychological challenges faced by kickboxers is maintaining motivation throughout intense training cycles, and that complex emotional processes directly influence this motivation. Similarly, Devonport (2006) found that all elite kickboxers identified high motivation as an essential psychological attribute for success and demonstrated that the integration of motivation with physical training directly determines both preparation and competition performance.

Slimani et al. (2017) further reported that successful kickboxers are more likely to adopt performance-approach goals and less likely to adopt performance-avoidance goals compared to their less successful counterparts, a finding consistent with the broader goal orientation literature.

In one of the few studies directly examining the effects of mental interventions on motivation, Slimani and Chéour (2016) demonstrated that cognitive training strategies consisting of motivational self-talk and imagery significantly increased motivation levels among combat sport athletes. Moreover, the authors found that this increase in motivation directly mediated

improvements in muscular strength, thereby illustrating a strong link between psychological interventions and physical performance outcomes.

Despite these findings, studies that directly and comprehensively examine motivation within kickboxing-specific samples remain extremely limited, with most existing knowledge derived from general combat sports contexts. Notably, there is a lack of research integrating Self-Determination Theory (SDT) with the unique dynamics of kickboxing. Key areas such as sustaining training motivation, reducing dropout risk, and developing interventions aimed at enhancing intrinsic motivation represent critical gaps that warrant further investigation within applied sport psychology.

## **2.3. Self-Confidence And Self-Efficacy**

### **2.3.1. Conceptual Distinction**

Self-efficacy refers to an individual's context-specific belief in their ability to execute the behaviors required to successfully perform a particular task, whereas self-confidence reflects a broader and more general perception of one's overall abilities. Self-efficacy is shaped through multiple sources, including past performance accomplishments, vicarious experiences, verbal persuasion, and physiological and emotional states. Among these, past performance achievements are considered the most enduring and influential source, a finding also supported by qualitative studies conducted with kickboxers (Bandura, 1977, 1982; Devonport, 2006).

Furthermore, athletes with higher levels of self-efficacy tend to demonstrate greater effort under competitive stress and achieve higher levels of performance, a relationship strongly supported by recent meta-analytic evidence (Lochbaum et al., 2022).

### **2.3.2. Self-Confidence As a Predictor of Performance**

Within the kickboxing and combat sports literature, self-confidence consistently emerges as one of the variables most strongly associated with competition performance. Slimani, Miarka et al. (2016) found that athletes who win competitions exhibit significantly higher levels of self-confidence and psychological resilience compared to those who lose.

Similarly, Morrone et al. (2024), in a study conducted within the framework of the Multidimensional Theory of Challenge and Threat States (MuSt), demonstrated that higher self-confidence enables athletes to perceive competition

as a challenge rather than a threat. Through this cognitive appraisal mechanism, self-confidence exerts a strong indirect influence on performance.

In line with these findings, Kuan and Roy (2007) reported that the key factor distinguishing successful combat sport athletes (i.e., medalists) from others is not merely their goal orientation, but rather their higher levels of self-confidence and their ability to regulate negative emotions such as fear, anger, and frustration.

### **2.3.3. Self-Confidence As a Developable Competency**

Self-confidence is not merely an innate or fixed trait; rather, it is a dynamic competency that can be enhanced through structured psychological interventions. Slimani *et al.* (2014a), in a study conducted with 120 professional kickboxers, found that sophrology-based training—which combines relaxation and imagery techniques—significantly increased self-confidence compared to self-talk interventions alone.

In another study conducted by the same research group with amateur kickboxers (Slimani *et al.*, 2014b), it was demonstrated that a combined mental skills training program incorporating both self-talk and imagery produced superior outcomes in terms of self-confidence and positive affect compared to self-talk used in isolation. The key implication of these findings is that the simultaneous application of multiple mental strategies creates a complementary and additive effect, whereby different techniques reinforce one another.

Accordingly, combined intervention approaches consistently yield stronger and more enduring improvements in self-confidence than single-technique interventions (Slimani & Chéour, 2016).

## **2.4. Psychological Resilience**

### **2.4.1. Definition And Theoretical Models**

Psychological resilience (mental toughness) remains one of the most frequently studied yet conceptually debated constructs in sport psychology. According to the widely accepted perspective, it is defined as a protective resource that enables individuals to cope with the negative effects of stress, overcome challenges, and achieve their goals (Perry *et al.*, 2021).

Derived from the concept of hardiness, the 4C model conceptualizes resilience as a multidimensional personality construct consisting of four components: challenge, commitment, control, and confidence. Based on this model, the Mental Toughness Questionnaire (MTQ48) has become one

of the most widely used instruments in international research contexts.

### **2.4.1. Definition And Theoretical Models (Continued)**

The MTQ48, developed based on this model, is widely used in international research and its factor validity has been supported by large sample studies (Perry *et al.*, 2013, 2021). In contrast, the Sport Mental Toughness Questionnaire (SMTQ), specifically designed for sport contexts, presents a 14-item structure consisting of three factors: confidence, constancy, and control (Sheard *et al.*, 2009).

Kickboxing research has predominantly relied on the SMTQ as a measurement tool.

### **2.4.2. Findings On Psychological Resilience in Kickboxing**

Slimani, Miarka *et al.* (2016), in a study conducted with 32 elite kickboxers, found that winners scored significantly higher than losers across all sub-dimensions of the SMTQ (confidence, constancy, and control). The authors emphasized that the primary determinant of competition outcomes was not physical capacity, but rather psychological variables.

Similarly, Mojtahedi *et al.* (2023), in a large sample of combat sport athletes, demonstrated that as psychological resilience increased, both cognitive and somatic anxiety decreased, while self-confidence increased. These findings suggest that resilience is not merely a predictor of competition outcomes but also a multifunctional psychological resource that buffers anxiety and enhances self-confidence.

Qualitative findings further support this perspective. Devonport (2006) identified resilience as one of the three core psychological attributes associated with success in elite kickboxers. Additionally, Slimani *et al.* (2017) emphasized that resilience operates within a complex, mutually reinforcing interaction with other variables such as self-confidence, motivation, and optimism.

### **2.4.3. Limitations Of Measurement Tools**

Ongoing psychometric debates suggest that the MTQ48 does not sufficiently differentiate itself from the concept of hardiness and that its factor structure is not consistently replicated across all samples (Perry *et al.*, 2021). While the validity evidence for the SMTQ appears relatively more promising, follow-up studies remain limited (Sheard *et al.*, 2009).

Moreover, for both instruments, validity and reliability studies specific to kickboxing populations have not yet been conducted. This limitation makes it difficult to interpret existing measurement results

with a high degree of certainty.

## **2.5. Attentional Focus and Control**

### **2.5.1. Conceptual Framework**

Nideffer (1976) conceptualized attentional focus along two dimensions: width (broad–narrow) and direction (internal–external). The ability of athletes to flexibly shift between these attentional modes in response to environmental demands is considered a critical competency for high-level performance.

The Constrained Action Hypothesis, originally proposed by Wulf et al. (2001a, 2001b) and later supported by extensive empirical evidence (Wulf, 2013), further elaborates this framework. According to this hypothesis, an internal focus—directed toward one’s own body movements—constrains the motor system and disrupts movement automaticity. In contrast, an external focus—directed toward the outcome of the movement or the external environment—facilitates more automatic and reflexive motor control, thereby enhancing performance.

Joan N. Vickers and Robert M. Nideffer conceptualized attentional focus in sport through dimensions of width (broad–narrow) and direction (internal–external). The ability of athletes to flexibly shift between these attentional modes in response to environmental demands is regarded as a critical determinant of high-level performance. The Constrained Action Hypothesis, proposed by Gabriele Wulf, Niels McNevin, and Charles H. Shea (2001a, 2001b), and later supported by extensive empirical evidence (Wulf, 2013), further expands this framework. According to the hypothesis, an internal focus of attention directed toward one’s own body movements constrains the motor system and interferes with movement automaticity. In contrast, an external focus directed toward movement outcomes or environmental effects promotes more automatic and reflexive motor control, thereby enhancing performance. This distinction has direct practical implications for kickboxing, a sport that requires explosive speed, rapid decision-making, and high levels of motor automaticity.

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### **2.5.2. Findings On Attentional Control in Kickboxing and Combat Sports**

Halperin et al. (2017) examined intermediate and expert-level boxers/kickboxers by providing internal and external focus instructions and found that an external focus significantly improved both punching

speed and force. This finding demonstrates that the attentional focus emphasized in coaching instructions can produce clear and measurable differences in performance.

Similarly, Rydzik, Kopańska et al. (2024), in quantitative electroencephalography (QEEG) studies, reported that brainwave activity—particularly beta-2 and sensorimotor rhythm (SMR) frequencies—was significantly higher under real K-1 competition conditions compared to simulated training scenarios such as heavy bag practice. This neural pattern was interpreted as reflecting increased demands for rapid decision-making, motor coordination, and stress regulation.

Systematic reviews investigating perceptual-cognitive skills in combat sports consistently show that expert fighters significantly outperform novices in anticipating opponents’ actions and maintaining resistance to distracting stimuli (Russo & Ottoboni, 2019). Supporting this, qualitative findings indicate that elite kickboxers regard attentional focus as a fundamental component of success and develop specific pre-competition routines to optimize it (Devonport, 2006).

### **2.5.3. Attentional Control Training**

Slimani et al. (2017) highlight that successful kickboxers utilize attentional control strategies more frequently and tend to develop internally referenced concentration patterns during competition. Furthermore, Andreato et al. (2022), in their recent systematic review of combat sports, report that mindfulness-based approaches are highly effective in reducing competitive stress and anxiety while simultaneously enhancing attentional focus.

Nevertheless, controlled studies specifically examining attentional control interventions within kickboxing populations remain extremely limited. This gap represents a critical area for future research in applied sport psychology.

## **3. MENTAL TRAINING INTERVENTIONS AND THEIR EFFECTIVENESS**

Mental training interventions refer to systematic practices aimed at improving athletes’ performance, emotional regulation, and psychological well-being. In a systematic review of 21 studies in combat sports, Andreato et al. (2022) found that techniques such as imagery, self-talk, relaxation, goal setting, and mindfulness generally yield positive effects on anxiety, mood, self-confidence, and overall performance.

In this section, these five intervention types are discussed with particular emphasis on findings

specific to kickboxing.

### 3.1. Mental Imagery

#### 3.1.1. Definition And Theoretical Framework

Mental imagery refers to the athlete's ability to create a multisensory mental experience in the absence of external stimuli. Within the literature, imagery is typically examined under two primary categories: cognitive functions (the mental rehearsal of motor skills and strategies) and motivational functions (the visualization of goal attainment, arousal regulation, and self-confidence) (Slimani, Chamari, et al., 2016).

The PETTLEP model, developed by Holmes and Collins (2001), provides one of the most comprehensive applied frameworks for enhancing the effectiveness of imagery interventions. Meta-analytic evidence consistently demonstrates that imagery produces a moderate yet statistically significant improvement in performance, and when combined with physical training, yields substantially greater gains compared to physical training alone (Simonsmeier et al., 2021; Slimani, Tod et al., 2016).

#### 3.1.2. Imagery In the Kickboxing Literature

Devonport (2006) found that elite kickboxers systematically integrate imagery into their pre-competition routines for the purposes of strategy development, technical rehearsal, and emotional preparation. These findings indicate that imagery in kickboxing serves both cognitive and motivational functions and aligns closely with the principles of the PETTLEP model.

Similarly, Andreato et al. (2022) emphasize that combined approaches incorporating imagery and self-talk produce superior outcomes compared to isolated techniques. In line with this, Slimani et al. (2014a) demonstrated that sophrology training—integrating imagery and relaxation—produced significantly stronger effects on self-confidence and emotional regulation than self-talk alone.

Furthermore, Slimani and Chéour (2016), in their study with combat sport athletes, showed that combined mental training interventions involving imagery and motivational self-talk resulted in significantly greater improvements in muscular strength and self-efficacy compared to groups using imagery in isolation. These findings reinforce the effectiveness of integrative mental training approaches in enhancing both psychological and physical performance outcomes.

However, controlled studies directly examining imagery interventions within kickboxing remain крайне limited. In most existing research, imagery is

not treated as an independent variable but rather as a component of broader, multi-skill mental training programs. Critical variables such as the optimal duration, perspective, and content of imagery, as well as the moderating role of individual imagery ability, represent important research gaps that need to be addressed within applied sport psychology.

### 3.2. Goal Setting

#### 3.2.1. Theoretical Framework and Types of Goals

The Goal-Setting Theory, developed by Locke and Latham (1985), posits that specific and challenging goals lead to significantly greater performance improvements compared to general or vague goals. In sport psychology, goals are typically categorized into three types: process goals (technical and tactical behaviors), performance goals (personal standards), and outcome goals (competitive results such as winning).

Recent meta-analytic evidence indicates that process goals produce the strongest effects on performance, whereas outcome goals demonstrate relatively weak effects (Williamson et al., 2024). Furthermore, the same meta-analysis shows that process goals are also the most effective in enhancing athletes' self-efficacy (Williamson et al., 2024).

#### 3.2.2. Goal Setting in Kickboxing and Combat Sports

Devonport (2006) found that elite kickboxers use goal setting as a critical psychological skill to sustain motivation and structure competition periods. Similarly, Slimani et al. (2017) reported that successful kickboxers are more likely to adopt performance-approach goals and less likely to adopt performance-avoidance goals.

Kickboxing presents unique dynamics in terms of goal setting. The demands of weight-cutting processes and dense competition schedules necessitate the coordinated planning of both short-term and long-term goals. At the same time, because competition outcomes are directly influenced by the opponent's actions, the functional value of pure outcome goals is inherently limited.

For this reason, process goals—such as technical accuracy, tactical adaptation, and energy management, all of which are fully within the athlete's control—play a decisive role in supporting performance in kickboxing. Nevertheless, controlled studies that directly and independently examine goal-setting interventions within kickboxing samples remain absent in the literature (Andreato et al., 2022).

### 3.3. Self-Talk

#### 3.3.1. Types And Mechanisms of Effect

Self-talk refers to the internal or external verbalizations directed toward oneself by the athlete. In the literature, two primary categories are identified: instructional self-talk, which directs attention toward technical aspects of performance, and motivational self-talk, which aims to enhance self-confidence, increase effort, and regulate anxiety.

Hatzigeorgiadis et al. (2011), in a meta-analysis of 32 studies, found that self-talk interventions produce a moderate and statistically significant improvement in overall performance. Furthermore, within the framework of the matching hypothesis, instructional self-talk appears to be more effective in fine motor tasks, whereas motivational self-talk shows a positive trend toward greater effectiveness in gross motor tasks requiring strength and endurance.

#### 3.3.2. Self-Talk Interventions in Kickboxing

Slimani et al. (2014a), in a randomized controlled trial involving 120 professional kickboxers, demonstrated that motivational self-talk significantly improved self-confidence and emotional regulation compared to a control group. However, sophrology training – combining imagery and relaxation – was found to produce substantially stronger effects than self-talk alone.

Similarly, Slimani et al. (2014b), in a study with 45 amateur kickboxers, showed that a combined intervention integrating self-talk and imagery yielded superior outcomes in both self-confidence and positive affect compared to self-talk in isolation.

Qualitative findings further support these results. Devonport (2006) documented that elite kickboxers actively employ self-talk both before and during competition, particularly in challenging moments such as receiving strikes or losing points, in order to re-establish focus and maintain performance.

Taken together, these findings suggest that self-talk produces significantly stronger and complementary effects when combined with other mental techniques, particularly imagery. Indeed, Slimani and Chéour (2016) demonstrated that combined mental training interventions incorporating both self-talk and imagery not only enhance psychological skills but also lead to significant improvements in muscular strength and explosive power in combat sport athletes.

Therefore, designing multi-component mental training programs, rather than relying on a single technique, emerges as a strong practical recommendation within applied sport psychology

(Andreato et al., 2022).

### 3.4. Breathing And Relaxation Techniques

#### 3.4.1. Physiological And Psychological Foundations

Breathing and relaxation techniques are among the most established intervention tools in sport psychology. The Relaxation Response, conceptualized by Benson (1975), along with Progressive Muscle Relaxation (PMR), constitute foundational approaches in this domain.

Recent reviews indicate that PMR significantly reduces stress and anxiety, and its effectiveness is further enhanced when combined with other techniques (Khir et al., 2024). In addition, Pagaduan et al. (2020) demonstrated that Heart Rate Variability (HRV) biofeedback protocols represent a highly effective intervention, producing large effect sizes in improving fundamental sport skills such as passing, shooting, and visual accuracy.

#### 3.4.2. Findings In the Kickboxing Literature

Slimani et al. (2014a) found that sophrology training, which combines imagery and physical relaxation, produces substantially stronger effects than self-talk alone. This finding aligns closely with theoretical expectations suggesting that holistic mind-body approaches may yield superior outcomes compared to purely cognitive techniques.

Qualitative evidence further supports this perspective. Devonport (2006) identified relaxation techniques as one of the core psychological skills associated with success among elite kickboxers and documented that athletes actively use breathing control to optimize physiological arousal and manage pre-competition anxiety.

These findings gain further significance when considered alongside the results reported by Ryzdik, Obmiński et al. (2024), who observed that both cortisol levels and neural activation significantly increase under real K-1 competition conditions. Given this heightened physiological stress response, breathing techniques that activate the parasympathetic nervous system emerge as critical tools for effective arousal regulation.

Recent systematic reviews examining mental interventions in combat sports also highlight the direct effects of relaxation and breathing techniques in accelerating recovery and reducing anxiety (Andreato et al., 2022).

Despite these benefits, kickboxing presents unique challenges in this domain. During competition, breathing control is influenced not only by psychological regulation but also by intense

physical exertion, the restrictive effects of mouthguards, and the impact of strikes. In this context, the development of kickboxing-specific breathing protocols designed to facilitate rapid physiological recovery during short inter-round rest periods (e.g., 60 seconds) represents a significant priority for both scientific research and applied practice.

### **3.5. Mindfulness-Based Interventions**

#### **3.5.1. Conceptual Framework and Evidence Base**

Mindfulness-based interventions (MBIs) aim to develop non-judgmental, present-moment awareness through practices such as focused breathing, meditation, and body scan exercises (Kabat-Zinn, 2003). A recent umbrella review covering fifteen systematic reviews reported that MBIs generally demonstrate positive effects on athletic performance, mindfulness-related outcomes, and mental health, although methodological inconsistencies limit the strength of definitive conclusions (Xie et al., 2025).

When compared to traditional Psychological Skills Training (PST), MBIs appear to yield superior outcomes particularly in the domain of emotional regulation (Gross et al., 2018). While both approaches produce improvements in attentional control and emotion regulation, they operate through fundamentally different mechanisms. MBIs focus on altering the individual's relationship with thoughts and bodily experiences through acceptance, whereas PST aims to directly modify and control these experiences (Röthlin et al., 2020).

Neuroscientific evidence further supports the effectiveness of MBIs, indicating that they induce structural and functional changes in brain regions associated with attention and self-awareness, such as the anterior cingulate cortex and insula, thereby enhancing self-regulation (Hölzel et al., 2011).

#### **3.5.2. Mindfulness-Based Interventions in Combat Sports**

Direct evidence on MBIs within combat sports remains limited, with most studies conducted in disciplines such as karate, wushu, and taekwondo (Andreato et al., 2022). In a systematic review of 72 studies, Ciaccioni et al. (2024) reported that combat sports contribute positively to task-oriented coping and emotional regulation (emotional competence), although findings regarding internalizing symptoms such as anxiety and depression remain inconsistent.

Notably, no studies have directly examined MBIs within kickboxing populations. Given the sport-specific demands of kickboxing—such as coping

with physical impact, making rapid decisions under pressure, and maintaining focus under high arousal conditions—the development of tailored MBI programs represents a priority area for both theoretical advancement and applied practice.

#### **3.5.3. Integrated Application of Pst and Mbi**

The sophrology intervention applied by Slimani et al. (2014b) provides a concrete example of how the boundaries between PST and MBI can become blurred. By integrating breathing control, bodily awareness/relaxation, and mental preparation, sophrology can be conceptualized as a hybrid intervention encompassing elements of both traditional PST (e.g., imagery) and MBI (e.g., mindfulness and acceptance).

The finding that such integrated approaches produce stronger effects than self-talk alone offers an important practical implication: future research in kickboxing should focus on designing multi-component intervention programs that combine PST and MBI techniques.

### **3.5. Mindfulness-Based Interventions**

#### **3.5.1. Conceptual Framework and Evidence Base**

Mindfulness-based interventions (MBIs) aim to cultivate non-judgmental, present-moment awareness through practices such as focused breathing, meditation, and body scan exercises (Kabat-Zinn, 2003). A recent umbrella review encompassing fifteen systematic reviews reported that MBIs generally demonstrate positive effects on athletic performance, mindfulness-related outcomes, and mental health; however, methodological inconsistencies limit the strength of definitive conclusions (Xie et al., 2025).

Compared to traditional Psychological Skills Training (PST), MBIs appear to produce superior outcomes particularly in the domain of emotional regulation (Gross et al., 2018). Although both approaches yield improvements in attentional control and emotion regulation, they operate through distinct mechanisms. MBIs emphasize acceptance and a shift in the individual's relationship with thoughts and bodily experiences, whereas PST focuses on directly modifying and controlling these internal states (Röthlin et al., 2020).

Neuroscientific evidence further supports the efficacy of MBIs, indicating that they promote structural and functional changes in brain regions associated with attention and self-awareness, such as the anterior cingulate cortex and insula, thereby enhancing self-regulatory capacities (Hölzel et al., 2011).

### 3.5.2. *Mindfulness-Based Interventions in Combat Sports*

Direct empirical evidence on MBIs in combat sports remains limited, with the majority of studies conducted in disciplines such as karate, wushu, and taekwondo (Andreato et al., 2022). In a systematic review of 72 studies, Ciaccioni et al. (2024) reported that combat sports contribute positively to task-oriented coping and emotional regulation (emotional competence), although findings regarding internalizing symptoms such as anxiety and depression remain inconsistent.

Notably, no studies have directly examined MBIs within kickboxing populations. Given the sport-specific demands of kickboxing—such as coping with physical impact, making rapid decisions under pressure, and maintaining attentional focus under high arousal conditions—the development of tailored MBI programs represents a key priority for both theoretical advancement and applied practice.

### 3.5.3. *Integrated Application of Pst and Mbi*

The sophrology intervention applied by Slimani et al. (2014a) provides a clear example of how the boundaries between PST and MBI can become blurred in practice. By integrating breathing control, bodily awareness/relaxation, and mental preparation, sophrology can be conceptualized as a hybrid intervention encompassing elements of both traditional PST (e.g., imagery) and MBI (e.g., mindfulness and acceptance).

The finding that such integrated approaches produce stronger effects than self-talk alone offers an important practical implication: future research in kickboxing should prioritize the development of multi-component intervention programs that combine PST and MBI techniques.

## 4. DISCUSSION

This review aimed to provide a comprehensive and integrative examination of psychological variables specific to kickboxing and the effectiveness of mental training interventions. In this section, the key findings are discussed, methodological limitations and research gaps are evaluated, and practical implications for practitioners are presented.

### 4.1. *Key Findings: Consistencies And Contradictory Evidence*

#### 4.1.1. *Consistent Findings*

One of the most consistently supported findings in the kickboxing literature is that self-confidence is among the strongest psychological predictors of

performance. Despite employing different methodologies, Devonport (2006), Slimani et al. (2017), and Morrone et al. (2024) converge on this conclusion.

A second consistent finding is that psychological resilience predicts both competitive performance and positive psychological states, including lower anxiety and higher self-confidence. This relationship has been independently confirmed across different populations, measurement tools, and geographical contexts by Slimani, Miarka et al. (2016) and Mojtahedi et al. (2023).

A third robust finding is that multi-component mental training interventions produce stronger effects than single-component approaches. Slimani et al. (2014a, 2014b) demonstrated through two separate randomized controlled trials that sophrology was more effective than self-talk alone, and that a combined intervention of self-talk and imagery produced superior outcomes compared to isolated self-talk. These findings are strongly supported by contemporary systematic reviews in combat sports (Andreato et al., 2022) and empirical studies comparing isolated and combined techniques (Slimani & Chéour, 2016).

#### 4.1.2. *Contradictory And Inconclusive Findings*

One of the most prominent issues in the literature concerns inconsistencies in the measurement of psychological resilience. While Slimani, Miarka et al. (2016) employed the SMTQ, Mojtahedi et al. (2023) used the MTQ-10; however, these instruments are based on fundamentally different factor structures (the SMTQ being three-dimensional and the MTQ-10 unidimensional). This discrepancy complicates direct comparisons across studies.

Furthermore, Stamatis et al. (2020) reported that 75% of intervention studies on psychological resilience exhibit a high risk of bias, a finding that also serves as an important caution for the kickboxing literature.

A similar uncertainty is observed in the measurement of anxiety. Mojtahedi et al. (2023) relied on retrospective self-report measures, whereas Rydzik, Obmiński et al. (2024) employed indirect and real-time assessments using cortisol levels and QEEG. Morrone et al. (2024), on the other hand, utilized the IPPS-24, a relatively less validated instrument. This methodological heterogeneity significantly limits the development of a unified and standardized understanding of anxiety in kickboxing athletes.

### 4.2. *Methodological Limitations and Research Gaps*

#### 4.2.1. *Sample Limitations*

The majority of existing studies have been conducted with relatively small sample sizes ranging between 20 and 120 participants, which leads to insufficient statistical power, particularly in multivariate analyses (Lochbaum *et al.*, 2022). With the exception of Mojtahedi *et al.* (2023), Ozturk and Oz (2022), and Bilgoe *et al.* (2025), nearly all kickboxing studies have focused exclusively on male athletes, thereby limiting the generalizability of findings to female populations.

Additionally, a considerable proportion of the existing research—particularly in the domain of mental training—originates from Tunisia. This raises concerns regarding the potential moderating effects of cultural context and training traditions, which remain insufficiently explored.

#### 4.2.2. *Limitations Of Measurement Instruments*

Measurement tools such as the SMTQ, MTQ-48, and IPPS-24 were developed within general sport contexts, and their construct validity has not yet been fully established in kickboxing-specific samples. While self-report instruments are susceptible to social desirability bias, neurobiological and physiological approaches—such as those employed by Rydzik, Obmiński *et al.* (2024)—also present methodological challenges.

For instance, cortisol levels are easily influenced by non-psychological factors such as sleep, nutrition, and physical fatigue. Similarly, QEEG analyses are associated with significant standardization issues, which complicate the interpretation and comparability of findings.

#### 4.2.3. *Research Design Limitations*

Approximately 97% of studies in combat sports and kickboxing psychology employ cross-sectional designs (Ciaccioni *et al.*, 2024), which limits the ability to establish causal relationships between variables. Although randomized controlled trials conducted by Slimani and colleagues (*e.g.*, Slimani *et al.*, 2014a, 2014b; Slimani & Chéour, 2016) represent important exceptions, these interventions are typically restricted to short-term programs lasting 10–12 weeks.

The absence of longitudinal research leaves the developmental trajectory of psychological variables across an athlete's career largely unexplored and weakens the theoretical foundation for long-term intervention strategies.

#### 4.2.4. *Priority Research Gaps*

Based on the present literature review, four key

research gaps have been identified.

First, the construct of coping with being hit, conceptualized by Devonport (2006), has not been systematically or empirically measured for nearly two decades. The development of psychometric tools and its integration into intervention programs represent a critical need.

Second, there is a substantial lack of research focusing on elite female kickboxers, a population that remains largely underrepresented in the literature.

Third, there are currently no controlled studies examining mindfulness-based interventions specifically within kickboxing, highlighting a major gap in both theoretical and applied research.

Finally, although rapid weight loss (weight cutting) has been extensively studied from a physiological perspective, its psychological effects—particularly on cognitive functioning, anxiety, and self-confidence—have not been adequately examined in kickboxing-specific contexts.

## 5. CONCLUSION

### 5.1. *Key Outcomes of the Review*

This review is the first to comprehensively examine kickboxing-specific psychological variables and the effectiveness of mental training interventions. The findings can be summarized under four main outcomes.

First, self-confidence emerges as the most robust and consistent psychological predictor of kickboxing performance. It is demonstrated to function both as a determinant of performance and as a target variable that can be enhanced through psychological interventions (Devonport, 2006; Morrone *et al.*, 2024; Slimani *et al.*, 2014a, 2014b).

Second, psychological resilience plays a critical role in shaping competitive outcomes beyond physical capacity and functions as a key buffering variable in anxiety regulation (Mojtahedi *et al.*, 2023; Slimani, Miarka *et al.*, 2016).

Third, multi-component mental training interventions consistently produce stronger effects than single-component approaches. In particular, the combined use of sophrology, self-talk, and imagery represents the most compelling kickboxing-specific evidence supporting this finding (Andreato *et al.*, 2022; Slimani & Chéour, 2016; Slimani *et al.*, 2014a, 2014b).

Fourth, the significant increases in cortisol levels and brain activation observed under real competition conditions demonstrate that the psychological demands of competition differ fundamentally from those experienced in training environments (Rydzik, Kopańska, *et al.*, 2024; Rydzik, Obmiński, *et al.*, 2024).

## 5.2. Contribution To the Literature

This review contributes to kickboxing sport psychology at three distinct levels.

At the integrative level, it brings together previously fragmented research on kickboxing psychology into a unified conceptual framework.

At the positioning level, kickboxing is examined comparatively within the broader sport psychology literature and alongside related combat sports, particularly in relation to the MMA review by Cooper and Lochbaum (2022), thereby highlighting its domain-specific characteristics.

At the prioritization level, four key research gaps are identified: the measurement of coping with being hit, increased research on female kickboxers, the development of mindfulness-based interventions, and the investigation of the psychological effects of rapid weight loss (weight cutting).

Podrigalo et al. (2022) noted that the majority of kickboxing research has focused on physiology and injury epidemiology; this review documents this imbalance and advocates for the expansion of psychological research. Given that kickboxing is practiced in 135 countries and achieved full recognition by the International Olympic Committee

(IOC) in 2021 (Bilgoe et al., 2025), the importance of such research is evident.

## 5.3. Closing Remarks

Kickboxing is a unique sport discipline characterized by distinct psychological demands, including rapid decision-making under pressure, exposure to physical harm, arousal regulation, and coping with being hit.

The call made years ago by Slimani et al. (2017) remains highly relevant: psychological skills are among the most important determinants of performance, yet this dimension remains insufficiently explored within kickboxing.

This review represents an initial step toward addressing this gap. It is evident that a truly transformative body of knowledge can only be developed through larger sample sizes, multi-center collaborations, gender-balanced study designs, and longitudinal research protocols.

The development of scientifically grounded intervention programs aimed at maximizing athletes' psychological capacities is an essential priority – not only for enhancing individual performance but also for promoting long-term athlete well-being.

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