Mental Health Benefits of Amateur Participation in Combat Sports and the Risk of Specific Injuries: A Narrative Review

Running title:
Combat Sports, Mental Health, and Injury Risk

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Abstract

Objective:

Combat sports are increasingly practiced at the amateur and recreational level and are often associated with both psychological benefits and an elevated risk of physical injury. This narrative review aims to synthesize current evidence on the mental health benefits of amateur participation in combat sports and to compare discipline-specific injury patterns, with particular attention to injuries relevant from a psychiatric perspective.

Methods:

A narrative review of the literature was conducted using published epidemiological studies, systematic reviews, meta-analyses, and randomized controlled trials addressing mental health outcomes, personality traits, and injury patterns among amateur and recreational practitioners of combat sports, including mixed martial arts (MMA), boxing, Muay Thai, Brazilian jiu-jitsu (BJJ), judo, and Krav Maga.

Results:

Available evidence suggests that participation in combat sports is associated with improvements in psychological well-being, emotional regulation, resilience, and reductions in anxiety and depressive symptoms. Personality profiles of martial artists are characterized by higher openness, conscientiousness, extraversion, and lower neuroticism. Injury risk varies substantially by discipline. Striking-based sports such as MMA, boxing, and Muay Thai show higher rates of head, facial, and neck injuries, whereas grappling-based disciplines such as BJJ and judo are associated primarily with joint and spinal injuries. Many injuries occur during training rather than competition.

Conclusions:

Amateur participation in combat sports appears to confer meaningful mental health benefits; however, these benefits coexist with discipline-specific injury risks. Careful training supervision, injury prevention strategies, and monitoring of head trauma exposure are essential to maximize psychological benefits while minimizing physical and potential neuropsychiatric harm.

Keywords:

combat sports; mental health; injury risk; mixed martial arts; boxing

Introduction

Interest in combat sports has increased markedly at both professional and amateur levels. Beyond physical conditioning, coordination, and strength, combat sports emphasize discipline, emotional control, and self-efficacy. From a psychiatric perspective, these characteristics may contribute to reduced stress, anxiety, and depressive symptoms through mechanisms such as behavioral activation, stress inoculation, and enhanced emotional regulation [5].

Participation in combat sports may also increase perceived personal safety and confidence in managing threatening situations. However, these potential psychological benefits must be weighed against the inherent risk of injury. Even at the amateur level, combat sports are associated with musculoskeletal injuries, soft tissue trauma, and, notably, head injuries that may have long-term neuropsychiatric consequences [9 - 12].

This narrative review aims to (1) summarize the mental health benefits associated with amateur participation in combat sports, (2) describe and compare discipline-specific injury patterns, and (3) discuss the implications of these findings from a psychiatric and preventive perspective.

Methods

A narrative literature review was conducted. We searched PubMed/MEDLINE, Scopus and Google Scholar for English-language publications from January 2000 to December 2025 using combinations of keywords including "combat sports", "martial arts", "mixed martial arts", "boxing", "Muay Thai", "Brazilian jiu-jitsu", "judo", "Krav Maga", "mental health", "anxiety", "depression", "resilience", and "injury". Additional papers were identified through reference lists of included articles and relevant reviews. We prioritized studies reporting data on amateur or recreational practitioners, including epidemiological studies, randomized controlled trials, systematic reviews and meta-analyses. Studies not available in English or without sufficient methodological detail were excluded.

Results

Mental health benefits of combat sports

A systematic review and meta-analysis demonstrated that martial arts training is associated with significant improvements in psychological well-being and reductions in anxiety and depressive symptoms, while effects on aggression were minimal or non-significant [5]. These findings suggest that combat sports do not inherently promote aggressive behavior when practiced in structured settings. Previous reviews summarized injury prevalence across combat sports [4]

A 2024 cross-sectional study examining personality traits and mental health among martial artists found that practitioners exhibited higher openness, conscientiousness, extraversion, and agreeableness, alongside lower neuroticism. Additionally, lower levels of anxiety and depressive symptoms were observed compared to non-practicing populations, although causal relationships could not be established [6].

Evidence from randomized controlled trials further supports these findings. A school-based martial arts intervention significantly improved psychological resilience among adolescents aged 12–14 years compared with controls, suggesting a role for martial arts training in stress management and emotional regulation [7].

Injury patterns by discipline

Mixed Martial Arts (MMA)

Athletes training in MMA combine both striking and grappling techniques. This discipline is characterized by the fusion of techniques from various martial arts. While MMA allows considerable freedom, rules restrict the most dangerous techniques, such as eye gouging, biting, groin attacks, and certain strikes. Throws, punches, kicks, joint locks, and chokeholds are permitted. Fights are decided by knockout, submission, or judges' decision if the bout goes the full duration. In an epidemiological study involving 48 amateur MMA athletes, the risk of head, facial, and neck injuries was analyzed. Injuries were sustained by 47.9% of athletes, of which 82.6% involved the head, face, and neck [9]. These injuries were the most common, accounting for 75.75% of all injuries. The overall incidence of head, face, and neck injuries was 20.65% per round and 0.13% per second, occurring more frequently in shorter bouts. A retrospective study of 503 fights, including both amateur and professional bouts, showed that

professional fighters and those who lost their bouts had higher injury rates than amateurs and winners. Injury patterns differed depending on competition level and bout outcome. Amateur fighters experienced more contusions and hematomas, whereas professionals sustained more lacerations. Winners had a higher proportion of fractures, while losers experienced more concussions [10-12]. Reviews of MMA data, including both amateur and professional samples, also showed that amateurs more frequently experienced certain injuries (e.g., concussions and hematomas). Overall, the most common injuries in MMA are soft tissue injuries, including lacerations, abrasions, and contusions, primarily affecting the head and neck.

Krav Maga

Krav Maga is an Israeli self-defense and close-combat system developed in the 1930s by Imi Lichtenfeld. It combines effective techniques from boxing, judo, jiu-jitsu, and other martial arts, focusing on rapid and practical neutralization of threats based on natural human reflexes. A cross-sectional study analyzing injury patterns during training, conducted among 109 participants, reported 65 injuries [8]. Of these, 59.6% were caused by actions of another person and 24.8% were self-inflicted. The most commonly injured areas were the lower limbs, trunk, and upper limbs. The most frequent diagnoses were ligament sprains or tears, followed by fractures. Participants ranged in age from 10 to 65 years, with men sustaining more injuries than women. Significant differences in injury rates were observed depending on training intensity, and recovery periods varied widely. These findings highlight specific injury patterns and risk factors in Krav Maga and emphasize the importance of tailored preventive strategies focusing on flexibility, strength, and proper technique. Facial, nasal, hand, and limb fractures occur relatively frequently in Krav Maga, with fractures accounting for 7.4% to as much as 43% of all injuries in various studies.

Boxing

Boxing is a combat sport in which two competitors wearing boxing gloves strike each other exclusively with their fists in a designated ring. Bouts are divided into rounds, and fighters are matched by weight category. The objective is to land legal punches on permitted areas of the opponent’s body while defending against incoming strikes. Victory is achieved by knockout, technical knockout, or judges’ decision based on points. A 2022 systematic review and meta-analysis comparing 17 cohort studies on

injuries in amateur boxing found a high risk of injury, estimated at one injury per 2.5 hours of competition and per 772 hours of training. The most common injuries during competitions and training were head and facial contusions and upper limb muscle strains. Although injury incidence was lower during training than during competition, injuries sustained in training appeared to be more severe [1]. The review also revealed very limited data on injury mechanisms, circumstances, severity, and risk factors in amateur boxing.

Muay Thai Kickboxing

Muay Thai (Thai boxing) is a traditional combat sport from Thailand, known as the “art of eight limbs,” as it uses fists, elbows, knees, and shins as striking points. Perceptions of injury risk among Muay Thai practitioners align with observed incidence data [3]. A study involving 92 competitors (12 women and 82 men) reported a mean age of 17.3 years and an average of 3.9 bouts per athlete. A total of 588.5 minutes of competition time across 10 events were analyzed. Injury rates were 1.3 injuries per 100 minutes in the lightweight division, 2.25 in the middleweight division, 30 in the heavyweight division, and 2.54 in the super-heavyweight division. Compared with other combat sports, injury rates in Muay Thai were higher. The head was the most common injury site among amateur athletes, while lower limb injuries were rarely reported, differing from patterns observed in other martial arts [13]. Similar training-related injury patterns are observed in other combat sports, such as taekwondo [2].

Brazilian Jiu-Jitsu (BJJ)

Brazilian jiu-jitsu is a ground-based grappling martial art that uses holds, joint locks, and chokeholds to control and submit an opponent, emphasizing technique and positional control rather than striking power. BJJ can lead to injuries during both training and competition. A survey of 881 BJJ practitioners (mostly recreational) defined injuries as those causing missed training or requiring training modification. Injury rates were 5.5 per 1,000 training hours and 55.9 per 1,000 matches. The most common injury sites were the knees and shoulders, with higher rates observed among higher belt ranks [14,15]. Another epidemiological report found that 91% of participants sustained injuries during training, typically sprains, strains, and injuries to the upper limbs or neck. In a study of 70 BJJ athletes, 91% experienced training-related injuries and 60% of

competitive athletes sustained injuries during competition. Overall, significantly more injuries occurred during training than during competition.

Judo

Judo focuses on using an opponent's strength and balance to one's advantage, emphasizing throwing techniques (nage-waza) and grappling techniques (katame-waza), such as holds, elbow joint locks, and chokeholds. A large survey study involving 4,659 judokas of various levels, including recreational and amateur athletes, focused on severe injuries resulting in more than three weeks of time loss. The most commonly injured areas were the upper and lower limbs. Anterior cruciate ligament (ACL) rupture was the most severe injury, followed by intervertebral disc herniation. Regardless of sex or skill level, ACL rupture and disc herniation were the most serious injuries leading to reduced sporting performance [16].

Discussion

The present review highlights that amateur participation in combat sports is associated with meaningful mental health benefits, including enhanced psychological well-being, resilience, emotional regulation, and reductions in anxiety and depressive symptoms. Importantly, these effects are observed not only among elite athletes but also in recreational and amateur practitioners, suggesting that combat sports may serve as a viable preventive and therapeutic adjunct for mental health at the population level.

From a psychiatric perspective, several mechanisms may explain these benefits. First, structured skill acquisition combined with high-intensity physical activity may function as a form of behavioral activation, promoting adaptive coping and reducing vulnerability to mood and anxiety disorders. Second, regular exposure to controlled physical stress and competitive scenarios may act as a form of stress inoculation, enhancing emotional regulation and resilience. Third, the sense of mastery, progression, and personal competence inherent in martial arts training may improve self-efficacy, which is a well-established protective factor against depressive and anxiety symptoms. These mechanisms are consistent with cognitive-behavioral models of stress and coping, suggesting that combat sports may contribute to psychiatric well-being beyond the purely physical domain.

Personality traits also appear to influence both participation in and outcomes of combat sports. Evidence indicates that martial artists tend to exhibit higher levels of openness, conscientiousness, extraversion, and agreeableness, with lower levels of neuroticism. These traits may both facilitate engagement in structured physical activity and mediate psychological benefits. However, the causal direction remains unclear: individuals with such personality traits may self-select into combat sports, or prolonged engagement in training may promote personality development. Longitudinal studies are needed to clarify these relationships.

Despite the psychological advantages, injury risk remains a critical concern, particularly in high-impact striking disciplines such as MMA and boxing. Head, facial, and neck injuries are frequent and, from a psychiatric standpoint, are notable for their potential long-term consequences. Repeated head trauma has been linked to cognitive deficits, mood disturbances, and increased risk for affective disorders. Grappling-oriented disciplines such as Brazilian jiu-jitsu and judo show higher rates of joint and spinal injuries, which, while less directly neuropsychiatric, may contribute to chronic pain, functional impairment, and secondary psychological stress. These discipline-specific injury profiles highlight the need to balance mental health benefits against physical and potential neuropsychiatric risks.

Human and contextual factors significantly influence injury incidence. Training intensity, sparring frequency, competition exposure, technical proficiency, and use of protective equipment all modulate risk. Notably, many injuries occur during training rather than competition, particularly during simulated combat or technical drills conducted without protective gear. From a mental health perspective, this emphasizes the importance of structured, supervised, and safety-conscious training to maximize benefits while minimizing both physical and psychological harm.

Limitations

Several limitations should be considered when interpreting the findings of this review. First, the majority of studies were cross-sectional or retrospective, limiting causal inference and preventing conclusions about long-term mental health effects. Second, many studies relied on self-reported measures of anxiety, depression, and well-being, which may introduce reporting bias or overestimate benefits. Third, definitions and classifications of injuries were heterogeneous across studies, and there is a lack of

standardized assessment of injury severity and recovery, making comparisons difficult. Fourth, the potential neuropsychiatric consequences of repeated head trauma, including cognitive and affective impairments, have not been systematically evaluated in most samples, leaving an important gap in understanding the long-term mental health risks associated with high-contact sports. Fifth, sample sizes in several studies were small, and participants were often recruited from convenience samples, which may limit generalizability. Sixth, few studies considered confounding factors such as prior mental health conditions, socioeconomic status, or concurrent physical activity, which could influence both participation in combat sports and psychological outcomes. Finally, there is limited longitudinal evidence to determine whether observed personality traits among martial artists are a cause or consequence of participation, highlighting the need for prospective studies to clarify directionality.

Conclusions

Regular participation in combat sports significantly improves psychological well-being, mood, and quality of life, even among recreational practitioners. Combat sports are high-intensity physical activities, and their structured training provides a sense of progress. Systematic training supports emotional regulation through physical exertion and concentration. For most amateur practitioners, the benefits clearly outweigh the risks, provided that training is conducted sensibly. Injury prevention relies on proper warm-up routines tailored to the required range of motion, consistent work on correct technique and mobility, and mastering technique before applying maximal force. Appropriate protective equipment, such as mouthguards, shin guards, headgear, and properly fitted gloves, is essential. Training intensity and sparring frequency should be controlled, and adequate sleep and recovery are indispensable. The highest injury risk among amateurs is observed in MMA and high-contact striking sports such as boxing, which show the highest injury rates, including head injuries and more severe trauma. MMA presents the greatest variety of injuries due to the combination of striking, wrestling, and joint locks. Epidemiological studies and training observations indicate that “human factors” are among the strongest predictors of injury, often outweighing the discipline itself. Training volume, frequency of competition, and the technical nature of the discipline are key risk variables. A descriptive epidemiological study of 125 recreational practitioners showed that injuries occurred more frequently during simulated fights (43%) than during technical training (26%) and competitions (10%).

Most injuries occurred during technical training and often without protective equipment. Despite limited data, injury incidence in MMA appears to be higher than in most, if not all, other popular combat sports.

Conflict of Interest

The authors declare that they have no conflict of interest.

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Ethics Approval

Ethical approval was not required for this study as it is a narrative review based exclusively on previously published data.

Author Contributions

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References:

1. Alevras AJ, Fuller JT, Mitchell R, Lystad RP. Epidemiology of injuries in amateur boxing: A systematic review and meta-analysis. Br J Sports Med. 2022;56(6):327–334.
2. Lystad RP, Graham PL, Poulos RG. Epidemiology of training injuries in amateur taekwondo athletes: A retrospective cohort study. J Sports Sci Med. 2014;13(4):825–830.
3. Strotmeyer S, Lystad RP. Perception of injury risk among amateur Muay Thai fighters. Inj Epidemiol. 2017;4(1):10.
4. Del Vecchio FB, Farias CB, de Leon RC, Rocha AC. Injuries in martial arts and combat sports: Prevalence, characteristics and mechanisms. Sci Sports. 2014;29(6):259–266.
5. Moore B, Dudley D, Woodcock S. The effect of martial arts training on mental health outcomes: A systematic review and meta-analysis. J Bodyw Mov Ther. 2020;24(2):402–412.
6. Leuzzi G, Giardulli B, Pierantozzi E, Recenti F, Brugnolo A, Testa M. Personality traits and levels of anxiety and depression among martial artists: A cross-sectional study. Front Psychol. 2024;15:1342759.
7. Moore B, Woodcock S, Dudley D. Well-being warriors: A randomized controlled trial examining the effects of martial arts training on secondary students' resilience. Int J Environ Res Public Health. 2021;18(4):1859.
8. Yaacobi EY, Shachar T, Yaacobi DS, Marom O, Gur S, Lvovsky A, et al. Injury patterns in Krav Maga training: A cross-sectional study. BMC Sports Sci Med Rehabil. 2024;16:45.
9. Lin HC, Chen CPC, Yu TY, Wang YA, Wang SH, Chien YM. Risk factors for concussion and head, neck, and facial injuries in amateur MMA athletes. Orthop J Sports Med. 2019;7(12):2325967119889397.
10. Ross AJ, Ross BJ, Zeoli TJ, Brown SM, Mulcahey MK. Injury profile of mixed martial arts competitions in the United States. Phys Sportsmed. 2021;49(3):315–321.
11. Zachovajevas V, Engebretsen L, Moatshe G, Zachovajevas P, Røise O. Injuries in mixed martial arts after adoption of the unified rules: A systematic review. Orthop J Sports Med. 2020;8(6):2325967120926812.
12. Lystad RP, Gregory K, Wilson J. The epidemiology of injuries in mixed martial arts: A systematic review and meta-analysis. Orthop J Sports Med. 2014;2(1):2325967113518492.
13. Gartland S, Malik MH, Lovell M. A prospective study of injuries sustained during competitive Muay Thai kickboxing. Clin J Sport Med. 2005;15(1):34–36.
14. Stegerhoek PM, Brajovic B, Kuijer PPFM, Mehrab M. Injury prevalence among Brazilian Jiu-Jitsu practitioners globally: A cross-sectional study. BMJ Open Sport Exerc Med. 2025;11:e001867.
15. Petrisor BA, Del Fabbro G, Madden K, Khan M, Joslin J, Bhandari M. Injury in Brazilian Jiu-Jitsu training. Sports Health. 2019;11(5):432–439.
16. Akoto R, Lambert C, Balke M, Bouillon B, Frosch KH, Höher J. Epidemiology of injuries in judo: A cross-sectional survey of severe injuries based on time loss and reduction in sporting level. Sports Med Open. 2018;4:22.