



Facultad de **Medicina**

GRADO EN MEDICINA

TRABAJO FIN DE GRADO

Boxeo y salud:
Un acercamiento desde el ring

Boxing and Health:
An approach from the ring

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1. ABSTRACT

Boxing is a sport and, as such, its practice can be beneficial for both physical and mental health. However, various professionals and health organizations have concluded that it is not a recommended form of exercise, and some even advocate for its prohibition on health grounds. This study explores the basis of such recommendations through a narrative review of medical literature and ethnographic fieldwork. The analysis suggests the presence of bias in clinical studies that discuss boxing-related pathologies, as they often fail to distinguish between non-contact training, recreational boxing, amateur boxing, and professional boxing. The study invites further dialogue with ethnographic research and encourages the incorporation of its methods to gain a more comprehensive understanding of the relationship between boxing and health.

KEYWORDS

Boxing, Health, Ethnography, Contact sports.

RESUMEN

El boxeo es un deporte y como tal su práctica sería beneficiosa tanto para la salud física como mental, sin embargo, distintos profesionales y organizaciones sanitarias concluyen que no es un ejercicio recomendable o incluso recomiendan su prohibición por razones de salud. La presente investigación explora la base de estas recomendaciones desde un trabajo de revisión bibliográfica narrativa y un trabajo etnográfico. El análisis sugiere la existencia de sesgos en los estudios clínicos que al referirse a patología asociada al boxeo no distinguen entre práctica sin combate, práctica recreativa, amateur y profesional e invita a entrar en diálogo o incorporar técnicas de investigación propias de la etnografía para obtener una visión más completa de la relación entre boxeo y salud.

PALABRAS CLAVE

Boxeo , Salud , Etnografía, Deportes de contacto.

2. INTRODUCTION

Boxing is a sport, and it has been recognized as such by various Olympic committees since 1904. It seems reasonable to assume that, like any sport, boxing promotes a healthy lifestyle and provides benefits for both physical and mental health. (1) Participants in a typical boxing training session engage in activities such as jump rope, shadowboxing, stance work, and defensive movements—that is, non-contact exercises that pose no greater risk than any other form of physical activity.

However, an essential part of boxing, if not in daily training then certainly in the sport's actual practice, is sparring or combat. During this phase, participants are repeatedly subjected to significant impacts. As a result, various professionals and health organizations have concluded that boxing is not a recommended form of exercise, and some even advocate for its prohibition on health grounds.

The World Medical Association (WMA), in its October 2017 statement, states: “1. Boxing is a dangerous sport. Unlike other sports, its basic intent is to produce bodily harm by specifically targeting the head. The main medical argument against boxing is the risk of chronic traumatic encephalopathy (CTE), also known as chronic traumatic brain injury (CTBI), and dementia pugilistica or “punch-drunk” syndrome. Other injuries caused by boxing can lead to loss of sight, loss of hearing, and fractures. Studies show that boxing is associated with devastating short-term injuries and chronic neurological damage on the participants in the long term.” And concludes: “6. The WMA believes that boxing is qualitatively different from other sports because of the injuries it causes and that it should be banned.” (2)

This position is not new. Since the 1980s, there have been heated debates regarding the stance that medical professionals should adopt toward boxing. (3) As a medical student and practitioner of the sport since 2019, the forcefulness of the WMA's statement stood in clear contradiction to my own experience and to the fact that medical professionals are necessarily involved in both amateur and professional boxing competitions. (4) It is also striking that calls from various health organizations to ban boxing on medical grounds make no distinctions between different levels of practice and that their arguments often reflect moral rather than strictly medical considerations. (3) Furthermore, it is worth noting that the medical literature on the subject has largely failed to engage with or incorporate research from other scientific disciplines, such as anthropology, which have explored the practice of boxing through the voices of its practitioners. (5) It therefore seems timely to reflect on the relationship between boxing and health in a way that acknowledges the diversity of its practice and incorporates a broader range of perspectives into the debate. (6) (7)

3. OBJECTIVES

This review and ethnographic study has two main objectives. The first is educational: to expose the author to analytical models and ethnographic research techniques that fall outside the conventional medical curriculum. The second objective is to explore the relationship between boxing and health as it is represented both in the medical literature and in the everyday experiences of a group of boxing practitioners. The contrast between these two sources of information will serve as a basis for reflecting on the need to complicate the predominantly negative view of boxing found in the biomedical professional literature.

4. MATERIALS AND METHODOLOGY

A qualitative review of original and review articles was conducted using PubMed, Dialnet, and Google Scholar. The search for relevant literature was further expanded through the references cited within these articles. The descriptors used in various combinations in the PubMed search included: *boxing*; *boxing and health*; *boxing and health promotion*; *boxing and rehabilitation*; *boxing and injuries*; *sports and wounds and injuries*; *chronic traumatic encephalopathy (CTE)*; *temporomandibular dysfunction (TMD)*; *ringside physicians*; *boxing and gender*; *boxing and bioethics*.

An initial selection of articles was made based on the abstract, followed by a secondary selection aimed at illustrating the broader aspects of boxing practice in relation to health. This approach was complemented by the incorporation of ethnographic research methodologies, including analytical autoethnography, which allowed me to use my own experience as a source of critical reflection. (8)

Using my position as both observer and participant, I was able to access the experiences of a group of six individuals practicing the sport, which enriched the work both in its formative aspects and in its results. To this end, I developed a semi-structured interview script (9) and obtained approval from the Ethics Committee for Research Projects at the University of Cantabria, which was granted. The first draft of the script was explored as an autoethnographic exercise, and discussion with my supervisor of the transcribed responses led to the final version of the script (see Annex I).

The six individuals interviewed voluntarily and altruistically agreed to participate in the project. All interviews were conducted in Santander at the facilities of the Cantabrian Boxing Federation between September 2023 and March 2024, taking advantage of the participants' attendance at training sessions and attempting to disturb their routines as little as possible. The interviews lasted approximately thirty minutes, were recorded, and later transcribed.

There is a growing trend of more women joining boxing gyms. However, due to their scarcity in the context where the base research for this study was conducted, even though two of the interviewees were women, the methodology did not incorporate a gender analysis. (10)

5. RESULTS AND DISCUSSION

5.1. The ring from a medical perspective

A review of the literature on the relationship between health and boxing would support the negative view defended by the WMA, highlighting the short- and long-term risks of repetitive impacts, primarily to the head. However, a more nuanced analysis is needed that, while acknowledging the diversity of subjects and practices under study, evaluates the balance between benefit and harm in relation to health associated with this sport in an unbiased manner.

There is a conceptual and methodological issue in the literature analysed, as studies referring to the negative aspects of boxing in relation to health do not distinguish between the different forms of boxing: non-contact training, recreational practice, amateur (which can reach Olympic level), and professional. Studies that conclude negative aspects are typically conducted with professional athletes or high-level amateur athletes, and it is striking that there is a lack of research focusing on the health outcomes of this practice when it is recreational or non-contact. Unless stated otherwise, when referring to the health consequences of boxing, I will be referring here to its professional and amateur practice as it is represented in the literature.

Starting with the analysis of acute injuries caused by boxing, we will first focus on traumatic brain injury (TBI). TBI can be classified as mild, moderate, or severe, primarily based on clinical symptoms such as loss of consciousness, amnesia, and neurological symptoms. The majority of TBI cases are mild, with approximately 300,000 cases diagnosed annually in contact sports. (11) Mild traumatic brain injury is typically caused by a blunt, non-penetrating impact to the head that produces transient symptoms without any structural abnormalities on a brain CT scan.

In boxing, TBI can develop as a result of repeated blows to the head, either from direct impacts or from falls that generate abrupt head movements. These blows create rapid acceleration and deceleration forces, causing the brain to move within the skull. This movement can result in diffuse axonal injury, inflammation, and abnormal accumulation of proteins such as tau, which over time leads to progressive neuronal degeneration, transforming several TBIs into chronic damage known as chronic traumatic encephalopathy (CTE), which we will examine later. (12)

The symptoms experienced by patients with TBI are influenced by both the personality, psychological, and demographic factors of the individual, as well as by social status, gender, ethnicity, and alcohol consumption. Regardless of these factors, mild TBI may present with post-concussion symptoms. These symptoms

typically resolve within a period of 1 to 12 weeks. However, severe TBI can present as a knockout (KO) or as the death of the individual.

Concussions are common in a sport like boxing, where every punch to the head is aimed at achieving a KO, which is essentially a brain injury caused by a concussion. (13) (14)

Another acute injury that can occur after a contact sport activity such as boxing is temporomandibular dysfunction (TMD), which includes functional problems that can affect the masticatory muscles, the temporomandibular joints, and related structures. Among the wide variety of symptoms caused by TMD are pain in the masticatory muscles or temporomandibular joints, crepitus, disc displacements, and restrictions or asymmetries in the movement of the lower jaw. (15)

The prevalence of TMD varies depending on the study and the research method. A frequency of 39.3% has been reported in the general population, and this percentage is much higher in athletes participating in contact sports. (16)

In recent years, significant efforts have been made to reduce the injury rate in combat sports, including TMD. Several studies have shown that mandatory helmets, gloves, and mouthguards (dental guards used in boxing) significantly reduced the rate of KOs and head injuries. (17) However, the question remains as to how effective these measures are in both training sessions and actual fights in preventing such injuries. (18)

Among the chronic injuries associated with boxing is the consequence of repeated head trauma. (19) These traumas are a risk factor for multiple neurodegenerative diseases, including Alzheimer's disease (AD), Parkinson's disease (PD), and amyotrophic lateral sclerosis (ALS). (20)

A recent systematic study concluded that there could be an association between repeated concussions and subsequent cognitive decline. It is highly useful to understand whether concussions in sports are significantly associated with worsening cognitive function in later life. This could have significant implications for concussion prevention policies, sports rules, regulations, and possibly for including cognitive decline as an occupational disease for former professional athletes. (19)

However, the most well-known disease related to repeated head trauma is chronic traumatic encephalopathy (CTE), as previously discussed. This condition is the only neurodegenerative disease that occurs almost exclusively in individuals with prior exposure to repetitive head trauma. (21) While it can result from various sports, the image of the fallen hero boxer has become a quintessential representation of this clinical reality in popular imagery.

CTE is a neurodegenerative disease caused by the perivascular accumulation of hyperphosphorylated tau (p-tau) in the depths of cortical sulci. (22) Since CTE is diagnosed pathologically, it can only be diagnosed post-mortem, which makes its diagnosis challenging in routine clinical practice. Just like in AD or PD, neuroimaging

plays a key role in informing the differential diagnosis of suspicion, yet researchers have had little success in identifying imaging biomarkers that are specific to CTE in living adults. (23)

Given that there is no confirmation diagnosis other than pathological anatomy, the diagnosis is made by suspicion and exclusion in adults with disabilities who have had repeated prior exposure to head trauma. CTE refers to the clinical manifestations of cognitive and/or neurobehavioral changes in individuals with repeated head trauma. (24)

The research criteria for diagnosing CTE in 2021 (25) require “substantial” exposure to repetitive head impacts from collision sports, military service, or other causes to qualify for the diagnosis. There must be a predominant cognitive syndrome (episodic memory and/or executive functioning) and/or neurobehavioral syndrome (explosivity, impulsivity, rage, etc.). The symptoms must be progressive and not fully attributable to another neurological, psychiatric, or medical condition, although the suspicion of comorbid diseases (e.g., another neurodegenerative disease) is not exclusionary.

The level of diagnostic certainty is assigned based on the degree of exposure to impact and the manifestation of specific symptoms: “Suggestive of CTE,” “Possible CTE,” or “Probable CTE.” Due to the lack of available data showing specific associations with the pathology, diagnoses can only be made post-mortem.

On the other hand, another entity described is the clinical syndrome of “punch-drunk syndrome” in boxers, which consists of the presentation of the following symptoms: confusion, slow movements, and parkinsonian symptoms, caused by repeated blows to the head. The neuropathological characteristics of this syndrome show a consistent pattern of neuropathological changes upon post-mortem examination of the brains of retired boxers. (26)

Although there is a reasonable basis for concern about the long-term effects of concussions, the evidence is still limited, and many current conclusions are based on biased studies. More research is needed to truly understand the impact of contact sports on brain health. Despite the controversy, this debate has led to improvements in concussion management protocols in sports. (27)

The reviewed literature also acknowledges, albeit to a much lesser extent, the potential positive effects of boxing on health, particularly or combat sports in general. (28) Specifically, boxing training, being a high-intensity interval training (HIIT) workout, includes various types of aerobic and anaerobic activities that improve physical condition, strength, speed, agility, endurance, hand-eye coordination, and balance, which can be beneficial for adults, the elderly, and children. (29) (30)

Some studies suggest the potential mental health benefits of recreational boxing and its use as a tool for modifying certain behaviour patterns in both adults and children. (31) (32) (33) There is also growing interest in exploring boxing or martial

arts programs as supportive therapies for patients with neurodegenerative diseases such as Parkinson's. (34) (35) Additionally, these practices have been explored in the context of cancer-related fatigue, improving well-being and quality of life. (36)

5.2. Health and the daily experience in the ring

The conceptual confusion surrounding what is meant by boxing and its various contexts of practice complicates any comparison of the conclusions drawn by the medical literature on the subject. However, it does not seem unreasonable to suggest that the WMA's strong stance on the need to prohibit the practice of this sport for medical reasons should be nuanced. If we consider not only the aforementioned literature on its positive aspects in rehabilitative or therapeutic contexts but also the firsthand experiences of its practitioners, the health benefits associated with its practice are recognized as significant. With the limitations inherent in the sample size and the focus on recreational practice, all participants in the fieldwork reported a self-perception of physical and mental improvement directly related to the routine practice of boxing as their chosen physical activity, which followed previous sports practices.

In none of the cases was there any mention of concern regarding the potential long-term consequences of their practice, nor was there any perception that it was a sport carrying a greater health risk than other sports, although this last point was nuanced. Half of the participants considered it to be a safe sport if specific rules and protections, such as mouthguards or headgear, were followed (P3, P4, P5). On one occasion, risk was associated with participating in fights (P0), and on another, with professional practice (P3). At no point in the gym were they warned about the possible injuries that could result from the practice, and the interviewees showed no interest in seeking independent information.

In all cases, they had suffered some form of injury (rib or hand fractures, swelling of the knuckles, or tendinitis) during their practice, which was resolved by seeing a doctor (P2, P4, P5), following the trainer's advice (P3), or temporarily suspending their practice (P0, P1). A pattern of learning self-care through informal networks of information and help maintained within the sports centre can be detected, along with self-knowledge gained through trial and error: pre-training routines, hand wrapping techniques, physical therapies such as ice/heat use, stretching, or rest. Responses to questions about what they consider to be normal bodily sensations during and after training reveal a shared common pattern that may reflect a learned group culture, something that one participant describes as "we've been taught what is normal" (P0).

In this regard, normal bodily sensations would include pain in the hands, face, ribs, nosebleeds during training, and muscle soreness or lingering pain afterward, although the perception of normality is limited by the intensity and duration ("I don't consider it normal to experience a lot of pain after a training session," P4; "but only 2-3 days, anything more would be concerning," P1; "I don't consider intense hand pain that persists to be normal," P0). All participants are very clear about certain warning signs that may arise during training and which they do not consider normal:

excessive nose bleeding (P1), loss of consciousness (P1, P4, P5), a knockout (KO) (P2, P3), fractures (P1, P2, P3, P4), or excessive pain (P3, P4, P5). All surveys reflect a clear awareness of the healthy limits of practicing this sport, which minimizes the perception of risk. This is nuanced when asked whether they would recommend the practice to their children. Only one of the participants (P3) states that they would not, although they condition their possible recommendation on a minimum age (16 years).

The topic of a minimum age also appears in another participant's responses, but from a positive starting position (P4). The others would recommend it, though with limitations: regarding fighting or competing (P0, P2, P5) and the use of protective gear (P1). It is interesting that only in this reflection on children does the idea explicitly emerge that boxing could be harmful: "Yes, I would recommend it to my children, but not allowing them to fight or spar hard, as I think it is harmful to their health." (P5).

In any case, the interviews clearly show that any health harm is confined to the realm of immediate injuries—blows, fractures, cuts—and not to the long-term effects highlighted by medical literature. Three of the interviewees explicitly acknowledge that it is a sport that carries more risk of injury than others (P0, P4, P5), but all agree on its positive effects on physical and mental health, improving endurance, agility, and overall fitness. One participant highlights the incorporation of healthy habits (P2).

Mentally, participants highlight the beneficial effect of boxing on self-esteem (P0, P1, P2, P5), confidence, and self-assurance (P0, P2, P4), as well as becoming more disciplined (P2, P3, P5). Similarly, they emphasize that boxing practice has a relaxing effect and reduces stress (P3, P4, P5), providing a positive sense of self-efficacy (P1, P3).

6. CONCLUSIONS

Boxing is a sport, and as such, its practice can be beneficial for both physical and mental health. However, various professionals and health organizations conclude that it is not a recommended exercise, or even advocate for its prohibition on health grounds.

The narrative review of the literature conducted highlights that studies on boxing primarily focus on its complications and risks. Medical literature provides evidence of the health hazards associated with this sport, particularly chronic traumatic encephalopathy (CTE), temporomandibular dysfunction (TMD), degenerative diseases, traumatic brain injury (TBI), and, ultimately, knockout (KO). However, the studies present a fundamental methodological issue by discussing boxing generically while focusing on its high-level amateur and professional practice.

The recreational practice, which also involves combat or non-combat training, and its relation to health problems, is not reflected in the literature on the topic, underscoring the need for research that clearly distinguishes the type of boxing practice being referred to, something that does appear when the literature discusses the use of boxing in neurorehabilitation contexts. On the other hand, the conclusions drawn from the ethnographic approach developed in this work highlight the need to include such tools in medical research as well.

With the inherent limitations of the sample size and its focus on recreational practice, the fieldwork conducted reveals that all participants report physical and mental improvement directly linked to their routine boxing practice as their physical activity of choice. In no case is there mention of any fear regarding potential long-term consequences of their practice or the perception that it is a sport that carries a higher health risk than other sports, despite all participants having experienced some form of injury.

The contrast between the relationship between boxing and health as reflected in the medical literature analysed and the daily experience of this group of practitioners underscores the need to reassess the prevailing view of boxing practice in biomedical professional literature and to incorporate new tools for research.

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8. ANNEXES

8.1 ANNEX (I)

Interview model (original in Spanish and English translation)

Modelo de Entrevista

1. ¿Cuánto hace que entrenas?
2. ¿Haces o has hecho de manera regular otros deportes u otro tipo de ejercicio físico?
3. ¿Por qué elegiste el boxeo?
4. Describe una jornada típica de entrenamiento
 - .- ¿Qué haces antes (horas o el día antes)/después?
 - .- ¿Cómo te sientes antes/durante/después?
5. En vacaciones, ¿dejas de entrenar? Durante el confinamiento por Covid, ¿qué hiciste?
6. ¿Qué consideras normal que suceda durante un entrenamiento/combate –dolor, contusiones ... y qué no?
7. ¿Qué consideras normal que suceda después de un entrenamiento/combate –agujetas...- y qué no?
8. ¿Has tenido algún problema de salud a causa de la práctica del boxeo? Describe algún episodio que consideres banal por rutinario y algún episodio que te resultase preocupante y explica qué hiciste para resolverlos.
9. Ante cualquier otro problema de salud, ¿acudes al médico? Y si acudes, ¿sigues sus indicaciones?
10. Consideras que la práctica del boxeo es un deporte de riesgo? Y, ¿al nivel que tu lo practicas? Cuando comenzaste a practicarlo, ¿te dieron información o la buscaste en relación a sus posibles consecuencias para la salud?
11. ¿Lo recomendarías a tus hijos (hijo/hija)?
12. En general, ¿cómo piensas que te afecta la práctica de este deporte en el plano físico, psíquico y social?

Interview Model

1. How long have you been training?
2. Do you currently engage in, or have you previously engaged in, other sports or types of physical exercise on a regular basis?
3. Why did you choose boxing?
4. Describe a typical training session.
 - What do you usually do before (hours or the day before) and after the session?
 - How do you feel before, during, and after training?
5. During holidays, do you stop training? What did you do during the COVID-19 lockdown?
6. What do you consider normal to experience during a training session or a bout (e.g., pain, bruises)? What would you consider not normal?
7. What do you consider normal to experience after a training session or a bout (e.g., soreness)? What would you consider not normal?
8. Have you experienced any health issues as a result of boxing? Describe an incident you consider minor due to its routine nature, and another that you found concerning. Explain what you did to address each situation.
9. When facing other health problems, do you consult a doctor? If so, do you follow their advice?
10. Do you consider boxing to be a risky sport? And at the level at which you practice it? When you began practicing, were you given any information or did you seek information about its potential health consequences?
11. Would you recommend boxing to your children (son/daughter)?
12. Overall, how do you think practicing this sport affects you physically, psychologically, and socially?

8.2 ANNEX (II)

Interviewed Participants

Participant 0 (P0): Female, 24 years old, student, training since 2019, self-interview, interview conducted in October 2023.

Participant 1 (P1): Male, 44 years old, civil guard, training since 2018, interview conducted in December 2023.

Participant 2 (P2): Male, 34 years old, nutritionist, training since 2014, interview conducted in November 2023.

Participant 3 (P3): Male, 50 years old, national police officer, training since 2000, interview conducted in December 2023.

Participant 4 (P4): Male, 28 years old, preschool teacher, training since 2019, interview conducted in January 2024.

Participant 5 (P5): Female, 37 years old, physiotherapist, training since 2018, interview conducted in January 2024.

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