

Adverse Health and Psychosocial Repercussions in Retirees from Sports Involving Head Trauma: Looking at the Sport of Boxing

Joseph Lee

Volume 4, Number 1, 2021

URI: <https://id.erudit.org/iderudit/1077632ar>

DOI: <https://doi.org/10.7202/1077632ar>

[See table of contents](#)

Publisher(s)

Programmes de bioéthique, École de santé publique de l'Université de Montréal

ISSN

2561-4665 (digital)

[Explore this journal](#)

Cite this article

Lee, J. (2021). Adverse Health and Psychosocial Repercussions in Retirees from Sports Involving Head Trauma: Looking at the Sport of Boxing. *Canadian Journal of Bioethics / Revue canadienne de bioéthique*, 4(1), 168–178. <https://doi.org/10.7202/1077632ar>

Article abstract

Academic scholarship has steadily reported unfavourable clinical findings on the sport of boxing, and national medical bodies have issued calls for restrictions on the sport. Yet, the positions taken on boxing by medical bodies have been subject to serious discussions. Beyond the medical and legal writings, there is also literature referring to the social and cultural features of boxing as ethically significant. However, what is missing in the bioethical literature is an understanding of the boxers themselves. This is apart from their brain injuries, the debates about the degenerative brain disease known as chronic traumatic encephalopathy (CTE), and related issues about the disease. This article argues that the lives of boxers, their relationships, their careers, and their futures, also requires its own research, particularly in telling stories about their lives, and those lives and futures which boxing affects. The article uses two approaches. First, to imagine a more enduring “whole of life viewpoint” by using an extended future timeframe. Second, to consider perspectives of a person’s significant others. After reviewing the boxing literature, the article discusses social settings and then explores the hidden social relationships in life after boxing. With these longer time and close relationship viewpoints, three important themes emerge: family and kinship; age, stage and career; and the effects of boxing fatalities. These analyses are used in conjunction with relevant clinical findings which complement the telling of stories to improve medical information, and engages professional and public empathy for people’s experience of illness and difficulties in coping.

© Joseph Lee, 2021



This document is protected by copyright law. Use of the services of Érudit (including reproduction) is subject to its terms and conditions, which can be viewed online.

<https://apropos.erudit.org/en/users/policy-on-use/>



This article is disseminated and preserved by Érudit.

Érudit is a non-profit inter-university consortium of the Université de Montréal, Université Laval, and the Université du Québec à Montréal. Its mission is to promote and disseminate research.

<https://www.erudit.org/en/>

ARTICLE (ÉVALUÉ PAR LES PAIRS / PEER-REVIEWED)

Adverse Health and Psychosocial Repercussions in Retirees from Sports Involving Head Trauma: Looking at the Sport of Boxing

Joseph Lee^a

Résumé

Les études universitaires n'ont cessé de faire état de résultats cliniques défavorables à la boxe, et les organismes médicaux nationaux ont lancé des appels à la restriction de ce sport. Jusqu'à présent, les positions prises sur la boxe par les organismes médicaux ont fait l'objet de discussions sérieuses. Au-delà des écrits médicaux et juridiques, il existe également une littérature faisant référence aux caractéristiques sociales et culturelles de la boxe comme étant éthiquement significatives. Cependant, ce qui manque dans la littérature en bioéthique, c'est une compréhension des boxeurs eux-mêmes. Et ce, en dehors de leurs lésions cérébrales, des débats sur la maladie cérébrale dégénérative connue sous le nom d'encéphalopathie traumatique chronique (ETC), et des questions liées à cette maladie. Cet article soutient que la vie des boxeurs, leurs relations, leurs carrières et leur avenir nécessitent également une recherche spécifique, en particulier pour raconter des histoires sur leurs vies, ainsi que sur les vies et l'avenir que la boxe affecte. L'article utilise deux approches. La première consiste à imaginer un "point de vue global de la vie" plus durable en utilisant un cadre temporel futur étendu. Deuxièmement, il s'agit de prendre en compte le point de vue des proches d'une personne. Après avoir passé en revue la littérature sur la boxe, l'article traite du cadre social, puis explore les relations sociales cachées dans la vie après la boxe. Dans cette perspective de temps plus long et de relations proches, trois thèmes importants émergent : la famille et la parenté; l'âge, le stade et la carrière; et les effets des décès liés à la boxe. Ces analyses sont utilisées en conjonction avec les résultats cliniques pertinents. Celles-ci complètent la narration d'histoires pour améliorer l'information médicale, et suscitent l'empathie des professionnels et du public pour l'expérience de la maladie et les difficultés à y faire face.

Mots-clés

effets néfastes sur la santé, sport, boxe, fardeau de la maladie, déficiences neurocognitives, famille et parenté, vie et carrière, bioéthique narrative

Abstract

Academic scholarship has steadily reported unfavourable clinical findings on the sport of boxing, and national medical bodies have issued calls for restrictions on the sport. Yet, the positions taken on boxing by medical bodies have been subject to serious discussions. Beyond the medical and legal writings, there is also literature referring to the social and cultural features of boxing as ethically significant. However, what is missing in the bioethical literature is an understanding of the boxers themselves. This is apart from their brain injuries, the debates about the degenerative brain disease known as chronic traumatic encephalopathy (CTE), and related issues about the disease. This article argues that the lives of boxers, their relationships, their careers, and their futures, also requires its own research, particularly in telling stories about their lives, and those lives and futures which boxing affects. The article uses two approaches. First, to imagine a more enduring "whole of life viewpoint" by using an extended future timeframe. Second, to consider perspectives of a person's significant others. After reviewing the boxing literature, the article discusses social settings and then explores the hidden social relationships in life after boxing. With these longer time and close relationship viewpoints, three important themes emerge: family and kinship; age, stage and career; and the effects of boxing fatalities. These analyses are used in conjunction with relevant clinical findings which complement the telling of stories to improve medical information, and engages professional and public empathy for people's experience of illness and difficulties in coping.

Keywords

adverse health outcomes, sports, boxing, burdens of disease, neurocognitive impairments, family and kinship, life and career, narrative bioethics

Affiliations

^a College of Humanities, Arts and Social Sciences, Flinders University, Adelaide, Australia

Correspondance / Correspondence: Joseph Lee, fllee071@uottawa.ca

INTRODUCTION

Academic scholarship has steadily been reporting unfavourable clinical findings on the sport of boxing (1-6). Similarly, national medical bodies have issued calls for restrictions on this and other combat sports (7-9). Yet, the positions taken on boxing by medical bodies have been subject to serious discussions (3, 10-13), although the ethical tensions are accepted (14). Besides the medical and legal writings (15), there is also literature referring to the social and cultural features of boxing as ethically significant (2, 16-18). Such society-focussed scholarship records how social concerns may be used as contrary data to oppose arguments for restrictions on boxing. However, what is absent in the bioethical literature is an understanding of the boxers themselves. This is apart from their brain injuries (19-20), the debates about the degenerative brain disease known as chronic traumatic encephalopathy (CTE) (21-23), and related issues about the disease (24). CTE is regarded as "a chronic brain syndrome due to effects of repetitive brain trauma, but there are no generally accepted guidelines for a clinical diagnosis of CTE or for how to distinguish neuropathological changes due to CTE from those due to aging and Alzheimer's disease (AD)" (22, p.867). This article contends that the lives of boxers, their relationships, their careers, and their futures also requires its own research, particularly in telling stories about their lives, and those lives and futures which boxing affects. At some inevitable

point in time, these professional and amateur athletes are no longer able to compete due to injuries, declining skill levels, financial issues, and personal and social reasons. One may ask about their health and well-being after leaving the sport, how their lives continue, and the legacy of combat sports which affect the body and mind.

The article uses two approaches. First, to imagine a more enduring “whole of life viewpoint” by using an extended future timeframe. Second, to consider perspectives of a person’s significant others. Both of these are morally relevant to immediate concerns. In other words, in order to reason and decide ethically today, we ponder seriously the time of life after a professional sporting career or even intense amateur participation, and seek insights from the sporting person’s family and social relationships. Such voices are largely absent from professional negotiations and mainstream ethics commentary. The sociocultural findings and boxing-related narratives are important sources for ethical consideration.

The methodology is to research the medical and ethical studies on boxing, by identifying, analysing and presenting appropriate and illuminating examples. The sources used include some boxing case studies, reports of clinical findings, and cultural and anthropological information. There is also interest in using the medical humanities for bioethics; for instance, the arts, media, and culture (25). Here the cases and sources pertaining to timeframe and family relationships are particularly relevant. These are discovered in news reports, features writing, theatre, and films, which all offer descriptive profiles and stories about people, their lives, relationships, and healthcare challenges. In other words, the patients’ circumstances in a narrative form complement the significantly adverse biomedical evidence.

The real life narratives are complemented by some fictional narratives. Fiction and imagination feature in bioethics as seen in the thought experiments and hypothetical scenarios regularly used in ethics education, to begin to engage in issues at hand, to development ethical arguments, and make progress in analysing problems (26). The significance of stories in ethics has been acknowledged by philosophers; fictional accounts assist readers in tackling ethical issues by enabling a person to picture being in the place of another person (26). As the renowned moral philosopher and classics scholar Martha C. Nussbaum writes, the “ability to imagine the concrete ways in which people different from oneself grapple with disadvantage seemed to us to have great practical and public value” (27, p.xvi). Indeed, Nussbaum explains how for Greek thinkers in the fifth and early fourth centuries B.C., questions of morality and questions of aesthetics were not disparate pursuits, rather, “dramatic poetry and what we now call philosophical inquiry in ethics were both typically framed by, seen as ways of pursuing, a single and general question: namely, how human beings should live” (28, p.15). In contemporary times, bioethicists have employed fictional dystopias to explore the possible implications of new technologies, e.g. the dystopian classic *Brave New World* (29) – *Le meilleur des mondes* (30) – by Aldous Huxley (29) which describes ectogenesis or artificial womb technology in a totalitarian World State (31). This can be thought of as contribution to narrative bioethics, where “the person who is entangled in ethical dilemmas and the bioethicist who is theoretically interested in ethical problems do have to talk to each other” (32).

The choice of sources was guided by the limited suitable and available clinical data, writings, and other cultural resources. They are an eye on Canada as well other countries since boxing has a worldwide reach, and some interesting illustrations are found in this material.

This article makes its contribution by examining three areas: the family and kinship relationships of boxers; their age, stage and career aspects; and the effects of the deaths of boxers. These are significant community dimensions which need to be highlighted as ethically relevant to consider. Just as bioethics helped highlight the importance of seeing the “patient as a person” with social constraints and possibilities (33), and not merely as an “organ” or “statistic” or a “consumer,” I argue that a bioethical analysis of boxing ought also to be attentive to boxers’ lives as a whole.

OUTLINE

We begin with a review of the boxing literature, especially the various positions which give rise to ethical debates, and which provides the bioethical background for this article and its methodology. Next we proceed with some comments about the social setting and then explore the hidden social relationships in life after boxing. The retired (and injured) athletes are a look into the future, *now*, so to speak. Such vantage points have ethical weight, though they are sources which remain mostly “out of view.” Within this longer time and close relationship viewpoints, three important themes emerge: family and kinship; age, stage and career; and the effects of boxing fatalities. These analyses are used in conjunction with relevant clinical findings. An investigation into the lives of boxers and their relationships, allied with biomedical data, permit bypassing a scientific adjudication of CTE controversies in order to concentrate on the human reality of previous boxers to inform and contribute to current ethical thought, distinct from the albeit important evidentiary debates.

The careful narrating of stories improves medical information and engages professional and public empathy for people’s experience of illness and difficulties coping (34). The narratives add to the value of using fictional accounts in ethical thought as described above. Only the telling of extended stories of people’s lives “can trace the complex intersectionality between being ill, having and lacking personal and family resources that go far beyond access to treatment, and dealing with multiple responses from other people and institutions” (34, p.13). For patients, illness and treatment are one aspect of a broader story of their life stories; while illness itself can be secondary or life changing, it generally acquires meaning through its relations to a larger story (35).

Ethical problems can be approached through the rhetoric of narrative, when bioethics is seen as seeking to ground moral theory in the real world. Yet, in the past, bioethics has in general been neglectful of how it encounters this world of reality as mediated through narratives (36). Listening to stories offers a sophisticated reading of cases. Such insights are also helpful in enriching ethical deliberations which may otherwise be obscured in philosophical and biomedical debates.

BACKGROUND REVIEW

A condition called *dementia pugilistica* may develop progressively with differing pathologies, e.g., Alzheimer's disease (AD) and concussion-related haemorrhages (21). Dementia pugilistica is a term coined in 1937 to describe the "extensive exposure of boxers to neurotrauma in the early 20th century" and "the so-called punch drunk syndrome, which was formally recognized in the medical literature in 1928" (21, p.1209). Some brain researchers see dementia pugilistica as synonymous with CTE (22,37), whereas others regard the chronic brain damage in retired American Football players as dissimilar to the chronic brain damage of retired boxers from the 1920s (23). It is a contested area in clinical and scientific research.

There are neurologists who interpret the scientific data for CTE and regard it as a "putative disease" at the lowest rank of credibility, i.e., case reports (24). At the same time, others report on the brain damage in patients as factual, with concerning implications. For example, a recent autopsy of a 93-year-old former street boxer with a premortem diagnosis of severe dementia found pathological evidence of the coexistence of Alzheimer's disease, CTE, dementia with Lewy bodies (DLB), and hippocampal sclerosis with TDP-43 pathology (38). Dementia with Lewy bodies (DLB) is well known "to be the second most frequent dementia following Alzheimer disease (AD)...the name "Dementia with Lewy bodies" was proposed in the first International Workshop on DLB, held in Newcastle upon Tyne, England, in 1995" (39, p.v). Hippocampal sclerosis is a pathology of the brain's neuronal cells associated with dementia and a particular binding protein known as 43kDa (TDP-43) (40). This study of the 93-year-old former street boxer advised clinicians to be aware that traumatic brain injury is a risk factor for dementia and that CTE can coincide with other neurodegenerative diseases. "Head impact in contact sports or in warfare that do not result in apparent clinical symptoms may still result in neuronal injury and late onset CTE and other neurodegenerative diseases including DLB and AD" (38, p.6).

The professional literature has consistently reported adverse clinical findings about the sport of boxing (1-6). Not surprisingly, national medical bodies have issued calls for restrictions on the sport. The Canadian Medical Association/Association médicale canadienne recommends that all boxing be banned in Canada (7). The American Medical Association encourages the elimination of both amateur and professional boxing (8); and the Australian Medical Association opposes all forms of combat sport and recommends their prohibition for people under the age of 18 (9).

The arguments put forward for a ban on boxing include that: boxing can result in death; it generates a disturbing incidence of acute and longer term brain injury; it involves violence and intent to harm (2,16,19-20). The arguments against banning boxing draw attention to how the sport is popular; that boxing has health benefits; that there is little evidence for boxing being especially dangerous when compared against some other sports; and although incidence of injuries is high, more than 70% are superficial (2,16). Other medical and ethical opinions highlight the freedom of consenting adults to participate in boxing, and that a ban represents a form of unjustified paternalism, legal moralism, and restriction on liberty (10,41).

The positions adopted on boxing by medical bodies has been subject to spirited academic debate (3,10-13). An editorial in a leading British medical journal opposed the position of the British Medical Association on criminalising boxing (3,11). DK Sokol (42) comments that where autonomy features in a model of bioethics (43-44), it is perplexing to find that medical associations are calling for a ban on boxing for reasons that the sport is unduly perilous to the health of boxers. If the argument is made on the grounds of health and safety, then others contend that a national medical association should provide explanations as to why boxing should be singled out, compared to other more dangerous or extreme sports such as wrestling, judo, karate, kung-fu, and kick-boxing (17).

Nonetheless, there appears to be a compromise acceptance of the ethical tensions. On the one hand, the American Academy of Pediatrics and the Canadian Paediatric Society recommend "that paediatricians vigorously oppose boxing for any child or adolescent," while on the other hand for amateur boxing they recommend, "ringside physicians must be present for all matches and may stop a match at their discretion at any point during the bout." (14, p.621) But this service of doctors at the ringside is also a question for bioethics. The doctor's role at boxing competitions has developed into a complex specialty in sport medicine with its proper medical responsibilities, alongside important ethical, and legal aspects (45-46). For instance, in Norway the issue concerns whether doctors may participate as the ringside physician in combat sports events where knockout is permitted, or accept the role of medical expert in appeals or approvals boards for such events without violating their code of professional ethics (47).

Besides the clinical, healthcare and legal discussions (15), the literature also refers to the social and cultural features of boxing as ethically important (2,16-18). Some claim that there is no evidence that spectating boxing causes anti-social behaviour (17). There is data that boxing has a role in society in prevention of crime and in rehabilitation. Amateur boxers can develop social capital, which is understood as the bonding between peers who share age and culture (18). But there is also potential for exploitation in the sport. Other studies doubt whether a legal ban would result in a better state of affairs as a ban may drive boxing underground and medical oversight would be minimal or nil (10,48). Yet while this scholarship demonstrates how social concerns can be used as counter evidence to oppose restrictions on boxing, what is missing is an understanding of the boxers

themselves – not just their brain injuries, CTE, and so forth, but their overall lives, their relationships, their careers and their futures. As mentioned earlier, the sporting person's family and social connections are not factors in negotiations about contracts and a subject in bioethical discourse.

SOCIAL CONTEXTS

In the academic realm, a recognised strength of the sociological perspective is that it enables researchers to deploy a more holistic and comprehensive outlook and keep a critical distance from the more emotive dimensions of the “concussion crisis”, even to “constrain the sometimes unsubstantiated and unwarranted reach of the powerful groups that currently dominate public intellectual agendas” (49 p.147). Boxing is of interest to sociologists and ethnographers with the question of domination, though the fight in the ring is also viewed as expressions at the intersections of “gender,” “class” and “race” (50). There are numerous studies of the social and economic conditions of boxing, and the ensuing influence of boxing on the individuals who engage in the sport and on society; research into masculinities, feminism, and gender with regards to boxing; and the phenomenology of boxing as a very highly demanding physical and mental activity (51). Here pugilism is viewed as a theatre for diverse representations of the struggles of subordinate individuals against the forces of exclusion that tend to preserve them in socially dominated positions. Ethnographic studies look at the lives of local fighters, amateur and professional, shadow-boxing drills, sparring and fighting in tournaments (52). Historical studies offer insights on the development of the sport, e.g., medical practitioners held conflicting views about the health of boxers and as well as the status of boxing (53).

In the dramatic theatre, playwrights treat boxing themes such as local neighbourhoods, gyms, fame, racism, competition, friendships, and difficult choices (54-55). There is the feel of fighting for one's club and family to make a place in the world, through the violence and balance of the boxing contest (54). There are stories of redemption, race, and people of colour, ambition, and betrayal set in a local area (55). For instance in the play *Beautiful Burnout* written by Bryony Lavery, the final scene features Carlotta, the mother of a young boxer.

Good news is
It takes a while but she tries to mean this...
 I get my little boy back
 I get my baby
 My Cameron
 I get him every minute of every hour of every day of every week
 Of every year but I get him back...(54, pp.86-87)

The family and personal relationships of boxers is a hidden reality which is thus uncovered.

Looking through a social lens, illnesses are also shaped by the conditions in which people are born, grow, live, work, and age, which are the social determinants of health (56). This includes social policies and programs, economic conditions, and politics. There are also wider social determinants such as commonly accepted behaviours and social norms associated with economic, political, familial, and institutional structures (57). Hence, the extended family becomes important as a social determinant of psychosocial health and wellbeing. This is the first of three themes to emerge.

1) FAMILY AND KINSHIP

Although there are few studies of the lived experience of sports-related concussion (49), the harmful consequences of boxing clearly affects those closely connected to the boxer and the situation of the community. This first theme on family and kinship draws on both medical investigations and personal storytelling, centring on the passage of time and boxers' relationships. To illustrate the theme of family and kinship, a series of clinical cases will be presented of the effects of boxer's injuries on their lives, with sensitivity to the societal contexts. This type of study is somewhat rare in the literature. Next, I will look at a recent feature film from the world of big screen cinema, focussing on a boxer with a brain injury, and his family difficulties. Then, I will present an extended health narrative, with an example from Canada with tragic consequences.

Clinical Cases Involving Relationships

The sport of boxing and the boxer's relationships are lived in diverse social settings. The lives of patients and clients from other cultural and language groups, and their interactions with the world, are instructive for healthcare and its delivery (58). Historically and culturally, boxing appears to be an important aspect of some Pacific islands subcultures and male identity development. One study noted how a Pacific islands man reported that, on returning as a child to his mother's village in one of the Pacific islands, he was invited to box against the leading boy of the village in order to be accepted into the local peer group. However, he instead chose to flee so as not to expose his developing brain to the assaults of the older opponent (59).

The boxer's relationships over a period of time are a significant yet neglected area, especially the post-boxing life (59). This study investigated eight former amateur or professional boxers of Samoan and Tongan background living in New Zealand; seven of these presented with early onset dementia (onset prior to age 65) and one with onset of dementia at age 71. The case series was described as unusual and interesting due to an uncommonly high number of people with early onset dementia

from a single ethnic grouping; and a developing understanding of the likely multifactorial nature of early onset dementia in boxers.

What is intriguing is how the case descriptions include the marital status of the eight former boxers, where each begins, “A married man who...” The lead author explained that marital status is an important social determinant of health outcomes so he wished to specify it where possible, alongside factors such as age and educational attainment (Payman, personal communication). Further, the boxers in the sample appeared to be supported well by their spouses, excluding where psychosis had intervened and the former boxers were in psychiatric care. “The spouses generally expressed regrets about their partner’s choice of sport and its consequences. Interestingly, the boxers themselves expressed no regrets. This may have been in part due to their dementia” (Payman, personal communication).

More broadly, these marriage and family relationships are vital in the cultural contexts of the island countries in the Pacific Ocean, and are influential in societal values and norms (60-61). Indeed, almost without exception, no society is without marriage in kinship organisation and it persists in societies notwithstanding cultural variations (62-63). This implies that boxers’ spouses, partnered relationships, and kinship connections are hidden or overlooked aspects of their lives. Boxing undoubtedly affects these relationships.

Family Relationships Explored on Film

Such circumstances invite a family, social, and cultural outlook after boxing that transcends a professional or amateur career. To better appreciate this, we can look to how illness representations in cinematic movies are visually and emotionally conveyed to an audience; and how people’s lives, their family and environments, and caregivers cope with a condition of impairment and the care pathway (64). This artistic genre supplements the work of evidence-based medical care.

Retired and injured boxers struggle with limitations, identity, and disability, as portrayed in the British film *Journeyman* (65), which tells the story of a middleweight boxing champion who, after winning a bruising title defence with a points decision, collapses at home. The film tracks the more demanding journey of recovery of the boxer as he regains his speech, movement and memory. At stake is his relationship with his wife and baby daughter. There are scenes of tensions at home, memory and other losses, rehabilitation, carer roles, and the isolation of a “discard-when-damaged culture” (66) in boxing and contact sports. A writer in the medical journal *The Lancet Neurology* noted that while this film leaves the viewer hope, however, this is not always the case, since “the invisibility of brain disorders is problematic and many injured sporting heroes fall through the cracks. A brutal, but somehow thrilling sport – delivering punch after punch, boxing continues to draw in the crowds and line promoters’ pockets with gold. It is a heavy price to pay” (66).

Health and Relationships Narratives

Consider also the tragic experience of a small town in western Canada. The late journalist Lyra McKee wrote about Maryse, the wife of ex-boxer and three-time national champion Curtis Hatch (67). She recounts how he had been violent to one of their sons. The son did not want to be in the same home as his dad. Maryse encouraged her son to stay, promising to obtain help and that things would be better. But three days later when she could not get help and things were not better, she instructed Curtis to leave: “You’re going to pack a bag.” Curtis instead got a gun and shot himself in the chest. Later the death was declared a suicide, resulting from a history of paranoia and violent behaviour. In the story, McKee writes, “It’s a textbook case: a man abuses and terrorises his family, then harms himself or them. Some men are just evil. But Maryse knows different. She knows something was wrong with his brain” (67). Her extended storytelling journalism shows how damaging neurological outcomes affect the boxer’s relationships. These flow-on effects to the boxer’s family and kinship ties are rarely clinically documented.

These cases are “neurological narratives” so to speak, that elaborate socially on the deleterious effects that brain injuries have on boxers, and contribute much-needed patient and family experiences to clinical research. On the one hand, carers in medical and nursing settings find that the families of patients can be demanding, more than the patients themselves; yet extending care to a patient’s family is part of a holistic approach to patient care as they attempt to secure the best for their relative (68). On the other hand, outside of the hospital context, attentiveness to the spouses, relatives and significant relationships are a source of ethical consideration in evaluating the situation of the effects of a sporting career. This leads to the second theme.

2) AGE, STAGE AND CAREERS

This theme of “age, stage and careers” also uses biomedical research along with sociocultural descriptions of boxing to present a clinically accurate yet subjectively realistic portrait of head trauma and brain injuries in a boxer’s career. In this section, we consider boxing careers and the overall lives of boxers. Then, there is brief look at the physical effects of boxing during a career, which leads to a note about retiring from boxing. This all culminates in an examination of the legacy of illness and injury in retired boxers. Once again, a whole-of-life perspective enriches the objective diagnostic and pathological data on retired and deceased boxers.

Boxing Careers and Lives

The age and stage in life of retired boxers is essentially determined by their boxing careers. This is somewhat consistent with how midlife social circumstances influence health later in life, where the formative period of early adulthood seems to shape opportunities and risks that affect social and economic trajectories over the life course, and has significance for health in old age (69). For instance, occupational exposures are a source of midlife risks that seem to have long-lasting consequences extending into old age, such as the physical and mental demands in shift work where work is outside the hours of 8am to 5pm (69). However, the case of retired boxers, the high performance effects on the body and particularly the head and the brain, are a characteristic feature of the daily work of the athlete.

It is also helpful to use the work of gerontologists who inquire into what makes a good life in later life, “to consider the cultural and societal values – past and present – that shape the experience of aging, to recognize people as complex beings whose individual lives do not follow predictable patterns or easily identified trajectories...” (70, p.S10). They speak of a “life course perspective” where a person’s experience in families, society and other social spheres is influenced by timing of life events and shaped by norms and policies about social equality or inequality, e.g., retirement (70). This is associated with “linked lives” which holds that since most people live and age in relation to others, the timing of life events frequently echoes the needs of others, e.g., caregiver roles, cultural expectations and so forth. Such connections mould an individual’s ideas and options concerning later life and so should be incorporated into thinking about the most recent stage of life.

Effects of Boxing during a Career

Over their careers, boxers receive thousands of blows to the head. The kind and severity of brain injury that occurs with each punch is a complicated result of the force applied, corresponding head movement, and prevailing neurophysiological state (71). Physically, the damage is visible to those who encounter boxers frequently. A Chicago pugilist sees the “barbaricness” of the sport, the “daily grind” and “torture” of preparation for a fight, the physical abuse that can “make scrambled eggs outa your brains” and the dread of the one punch that will make you “look like Frankenstein for the rest of your life” (72, p.520). Phenomenologically, boxing is described as the “fistic dismantling of the face, the disfiguring of faces, which ultimately characterizes the sport..... The fighter’s face – swollen eyes, puffy lips, broken nose, cauliflower ears, lacerated cheeks – if ever there was a dismantled face, it would be the face of the boxer” (73, p.286).

Retirement from Boxing and the Legacy of Illnesses

The oldest professional sport in the United States is boxing, however it lacks a professional players’ association among the major sports, and does not have standardized employee benefits (74). Thus retiring from boxing a “real life crisis, and often quite traumatic. And helping boxers to retire is a formidable task” (74, p.255). Boxers frequently spoke about retirement as “dying” and being “addicted” to boxing; and even during end-of-career counselling, spoke of a willingness to return to fight if given the opportunity to go back to the boxing ring.

A boxer can receive a number of blows to the head during a fight, and the mixture of fatigue and cognitive effects accruing over the duration of a contest can generate a remarkable increase in the risk of brain injury (75). In former boxers, some 15% to 40% have symptoms of chronic brain injury (75). A survey of 632 boxers in Japan found that many experienced memory deterioration that was higher in their everyday lives than during the time just after a fight (76). While the study cautioned against speculating that this was the result of accumulated damage to the brain, the result was nonetheless described as “interesting”. Repeated head trauma from boxing has also been linked with the development of parkinsonism. A study of 21 retired Filipino boxers found seventeen to have parkinsonism (80.95%); the factors that significantly increased the risk for parkinsonism were the number of fights lost and the number of knockouts sustained (77). Another finding was that boxers in heavier weight divisions had higher chances of developing parkinsonism when compared to those competing in lighter weight divisions. But this result was not regarded as significant.

In another case, a 59-year-old French man, who was a former high level professional boxer with a twenty one year career consisting of 310 bouts, eight French titles, and no knockouts, had retired at forty one years old and subsequently met the clinical criteria for probable Alzheimer’s disease (78). This man had first presented to the memory clinic for disturbances of memory, and his wife had also mentioned a loss of leisure activity and household jobs which he was able to accomplish. After his death at age 71, a clinico-pathological study reported observations consistent with the available data on CTE. The title of the study was telling: “Dementia pugilistica: a severe tribute to a career” (78).

Overall, the adverse medical evidence, important sociocultural writings, and insights from gerontology help portray the social and lived experiences of boxers particularly as it affects their (and others’) lives after boxing. During their careers, boxers’ lives and their achievements are centred on the individual and their sporting performance. The reality of linked lives and social networks is largely absent. Yet, the reminder of the course of life helps broaden the current perspective beyond the time of an active sporting career. In the case of these sports with significant head trauma and risks of brain injury that can be enduring, the vision of the whole of life becomes significant in ethics discussions about the sport of boxing.

3) EFFECTS OF BOXING FATALITIES

The third theme is the unseen relationships in the legacy of boxing fatalities. This does not strictly involve all boxers; yet it is a tragic though sobering aspect of the sport, in the professional classes at least. The effects of boxing fatalities is an issue usually highlighted when a boxer dies due to injuries sustained, but its reality deserves more attention beyond the news cycle. In this section we look to historical research and literary writing about the death of boxers. This is followed by an example in Canada of a boxer losing his life as a result of competition. Then, there is presented writings from the viewpoint of observer-participant journalism where the writer becomes an insider-observer and a source of narratives.

Deaths in the ring or soon afterwards affect boxers' time now, their futures, and their relationships. As one trainer and member of a boxing hall of fame said when commenting on a boxer near death during a fight, "One punch ... could change a whole guy's life" (79). The accounts of experiences give colour and descriptions to what lies invisible in the objective statistics.

Historical and Literary Accounts of the Deaths of Boxers

According to the Manuel Velazquez Collection, globally there was an average of 13 boxing deaths per year between the 1900s and 2010s (80). Boxers whose opponents have died in the ring or soon after are affected, and so are those who are witnesses (81). Their lives are changed by violence, devastation, guilt and a professional acceptance of risks. Eliot Worsell has spoken with these boxers (81). One of these was former world featherweight champion Barry McGuigan. At 21 years old he fought Asymin Mustapha who was the same age and was also known as Young Ali. McGuigan recounts that event. "I hit him...right on the nose, and his eyes rolled back...I remember looking at his eyes rolling back so clearly. It was a haunting moment. I knew he wasn't going to get up from that" (81).

Ali did not regain consciousness after that punch. Although treated in hospital, he was flown home to Nigeria but died after six months in a comatose state. Worsell explains how McGuigan's wife Sandra was pregnant and so was Ali's wife. Ali did not see his baby. McGuigan at the time was earning very little money. He recounts,

what could I do? Did I want to become a PE teacher? Did I want to go back to school? The more I thought about it, the more I knew I had to box. Listen, I know it was a tragic accident – I *know* it was – and I know it could so easily have been me, but I had put far too much into boxing to turn my back on it. I said, right, I'm going to go full-blast and give it everything. And if I ever get to fight for a world title, he'll be the first one on my mind (81).

This happened in 1985 when McGuigan became the WBA world featherweight champion.

As reviewer and poet Declan Ryan observes, boxing feeds on the young

those who haven't yet been brutalised by its workings – and demands they internalise a code that says you must be prepared to fight to a conclusion, even a fatal one. The worst harm comes when the fighter, having steeled himself to abide by this code, has to enact it and carry on afterwards. Almost every fighter involved in a death has been drastically altered, unwilling to go all-out for a knockout for fear of repeating the fatal ending, vulnerable themselves to the blows of an unconstrained opponent (82, p.41).

Yet, fatalities are almost accepted. A study of British boxers quotes a former professional boxer named Ged, aged 43, who operated a gym (18). He was a successful trainer and promoter, describing boxing as one of the riskiest sports, perhaps the highest risk. Ged once had a "kid" for a title fight, a hard but not brutal fight, which he won. The opponent had collapsed, went into a coma, and then died. Ged reflects, "I have had 65 pro fights and two years ago was run over at the zebra crossing at the top of the road here so it's just as dangerous crossing the road here" (18, p.207). For him, road dangers are comparable to professional boxing. Thus boxing involves an inherent risk of being associated with a death, which is present in so much of life, but is particular for every boxer entering the ring.

A Boxing Fatality in Canada

In Canada, in March 2018, the boxer David Whittom from St. Quentin, New Brunswick, died aged 39 years (83). He had been in an artificial coma since May 2017 after developing a brain haemorrhage following a fight in Fredericton, New Brunswick. The opponent was Gary Kopas of Saskatoon in a match for the Canadian Professional Boxing Council cruiserweight championship. In round 10, Kopas knew the fight was over, however the referee instructed him to keep boxing, so Kopas threw a few more punches (84). Kopas said that Whittom looked to be in real trouble. "I was really surprised that the referee kept it going. Obviously, everybody wants to knock their opponents out, but you want them to wake up right away and be fine" (84). These remarks of Kopas have affinity with the sentiments of boxers who survive, as noted above. He said he wanted to win there, "but at the same time, I didn't want to hit him again either...Never wish no bad physical health on anybody. ... It's a horrible feeling for sure" (84). Whittom's death affected his partner, his friends, and the Canadian boxing community.

Sportswriter-Academic as Storyteller

Fatalities in boxing are a reality. Boxers who die as a result of a traumatic brain injury all come from families and have relationships, as well as their own personal life stories. Generally, the boxers are young men in their twenties. Their deaths also affect their opponents. But beyond the two boxers, the deceased and the survivor, there are broader impacts.

The Canadian sportswriter Brett Popplewell – an Assistant professor of journalism at Carleton University in Ottawa – had trained as a boxer and competed in a heavyweight bout in the Ontario Golden Gloves Tournament (79). Reflecting on the deaths of two boxers in 2019, he noted that “every fighter who gets in the ring leaves with less of themselves intact. It doesn’t matter whether they win; they always lose something” (79). The sport takes a hidden emotional toll on the mind as well as the body. And this is something in which bioethics is interested, that is, the human lives and futures behind the biomedical research.

CONCLUSIONS

Healthcare professionals and bioethicists depend on reliable evidence to make clinical and ethical decisions. At the same time, there is also increasing attention to thinking through stories in narrative bioethics. Yet, in the present era of performance reviews, many professional caregivers do not have a chance to hear the stories and distress of patients and their families, particularly when experiencing vulnerabilities (85). This article used both approaches, as they are complementary and can be integrated (86). Accompanying the adverse health consequences of boxing are the largely unseen impacts on the close relationships of retired boxers: family, kinship, career, and sociocultural relationships, including fatalities. A different timeframe was used; looking forward to the future by looking retrospectively from the experience of retired boxers, and the perspectives of their close relationships. “[B]oxers know that some of them never come back from the ring alive” (87, p.6), and some of their injuries never heal after an active career is finished.

We can think too in terms of hidden burdens. In global health, the concept of “burden of disease” entails that any health outcome that affects social welfare ought to be expressed somehow in indicators of disease burden (88). It quantifies factors such as duration of life lost due to a death, the value of time lived at different ages, and the time lived with a disability. Qualitatively these indicators are applicable to retired boxers, whose negative health outcomes of brain injury affect their well-being; yet out of the spotlight are the unseen burdens carried by families, e.g., as carers. These experiences should count as data to inform contemporary discussions about concussion and brain injury, CTE, and the neuropsychological sequelae of contact sports. In the world Canadian ice hockey, for example, we now see news headlines such as “Pain, agony and ‘years of duress’: How hockey wives are fighting back over players’ chronic brain injuries” (89).

It is reasonable to note that though the evidence base and science on CTE are being interpreted differently, the reports of deleterious health and psychosocial outcomes in retired boxers and other sports professionals and the effects on relationships, have significance today. The implications are that a future-oriented understanding is more informative, and a matter of justice relevant to current athletes, but also to coaches, clubs, and sports administration bodies, player associations, and businesses. It calls for an adjusted timeframe of now and looking forward, using biomedical research and narrative accounts as imperative data for ethical consideration. Practically, this should translate into revised financial compensation and social security for the elevated risks inherent in competing in head contact sports, in view of long-term player health safety and well-being. This is especially critical if the player is involved in the lucrative sports entertainment industry. In a larger perspective, the narratives from the social relationships in the lives after boxing need to be given greater volume accorded due ethical considerations.

Reçu/Received: 04/06/2020

Conflits d'intérêts
Aucun à déclarer

Publié/Published: 01/06/2021

Conflicts of Interest
None to declare

Édition/Editors: Bertrand Alexandre Stoffel & Aliya Afddal

Les éditeurs suivent les recommandations et les procédures décrites dans le [Code of Conduct and Best Practice Guidelines](#) de COPE. Plus précisément, ils travaillent pour s'assurer des plus hautes normes éthiques de publication, y compris l'identification et la gestion des conflits d'intérêts (pour les éditeurs et pour les auteurs), la juste évaluation des manuscrits et la publication de manuscrits qui répondent aux normes d'excellence de la revue.

The editors follow the recommendations and procedures outlined in the COPE [Code of Conduct and Best Practice Guidelines for Journal Editors](#). Specifically, the editors will work to ensure the highest ethical standards of publication, including: the identification and management of conflicts of interest (for editors and for authors), the fair evaluation of manuscripts, and the publication of manuscripts that meet the journal's standards of excellence.

Évaluation/Peer-Review: Ken Kirkwood & Geneviève Cardella-Rinfret

Les recommandations des évaluateurs externes sont prises en considération de façon sérieuse par les éditeurs et les auteurs dans la préparation des manuscrits pour publication. Toutefois, être nommé comme évaluateur n'indique pas nécessairement l'approbation de ce manuscrit. Les éditeurs de la [Revue canadienne de bioéthique](#) assument la responsabilité entière de l'acceptation finale et de la publication d'un article.

Reviewer evaluations are given serious consideration by editors and authors in the preparation of manuscripts for publication. Nonetheless, being named as a reviewer does not necessarily denote approval of a manuscript; the editors of the [Canadian Journal of Bioethics](#) take full responsibility for final acceptance and publication of an article.

REFERENCES

1. Jordan BD. [Neurologic aspects of boxing](#). Archives of Neurology. 1987;44:453–459.
2. Lundberg GD. [Boxing should be banned in civilized countries—Round 3](#). JAMA 1986;255:2483-2485.
3. British Medical Association. [The boxing debate](#). London: British Medical Association, 1993.
4. Jayarao, M, Chin, LS, Cantu, RC. [Boxing-related head injuries](#). The Physician and Sportsmedicine. 2010;38:18-26.
5. Constantoyannis C, Partheni, M. 2004. [Fatal head injury from boxing: a case report from Greece](#). British Journal of Sports Medicine. 2004;38:78-79.
6. Cournoyer, J, Hoshizaki, TB. [Head dynamic response and brain tissue deformation for boxing punches with and without loss of consciousness](#). Clinical Biomechanics. 2019;67:96-101
7. Canadian Medical Association/Association médicale canadienne [Boxing \(Update 2001\)](#) 2001 May 28.
8. American Medical Association. [Hazards of Boxing H-470.980](#). 2019.
9. Australian Medical Association. [AMA Position Statement: Combat Sport](#) 2015.
10. Warburton, N. [Freedom to box](#). Journal of Medical Ethics. 1998;24:56-60.
11. Gillon R. [Doctors should not try to ban boxing—but boxing’s own ethics suggests reform](#). Journal of Medical Ethics. 1998;24:3-4.
12. Leclerc S, Herrera CD. [Sport medicine and the ethics of boxing](#). British Journal of Sports Medicine 1999;33:426-429
13. Sokol DK. [Boxing, mixed martial arts, and other risky sports: is the BMA confused?](#) BMJ. 2011;43:d6937.
14. American Academy of Pediatrics, Canadian Paediatric Society. [Boxing Participation by Children and Adolescents](#). Pediatrics. 2011;128: 617-623
15. Anderson J. [The legality of boxing: a punch drunk love?](#) London: Birkbeck Law Press, 2007.
16. Rudd S, Hodge J, Finley R, Lewis P, Wang M. [Should we ban boxing?](#) BMJ. 2016;352:i389.
17. Jones K. [A key moral issue: should boxing be banned?](#). Culture, Sport, Society. 2001;4:63-72.
18. Fulton J. [“What’s your worth?” the development of capital in British boxing](#). European Journal for Sport and Society 2011;8:193-218.
19. Dixon N. [Boxing, paternalism, and legal moralism](#). Social Theory and Practice. 2001;27:323-344.
20. Simon RL. 1991. [Fair play: sport, values, and society](#). Boulder, CO: Westview Press.
21. Castellani RJ, Perry G. [Dementia pugilistica revisited](#). Journal of Alzheimer’s Disease. 2017;60:1209-1221.
22. Blennow K, Hardy J, Zetterberg H. [The neuropathology and neurobiology of traumatic brain injury](#). Neuron. 2012;76:886-899.
23. Casson IR, Viano DC. [Long-term neurological consequences related to boxing and American Football: A Review of the literature](#). Journal of Alzheimer s Disease. 2019;69:935-995.
24. Randolph C. [Chronic traumatic encephalopathy is not a real disease](#). Archives of Clinical Neuropsychology. 2018;33:644–648.
25. Rabow MW, Goodman S, Chang S. et al. [Filming the family: a documentary film to educate clinicians about family caregivers of patients with brain tumors](#). Journal of Cancer Education. 2010;25:242–246.
26. Chan S. [More than cautionary tales: the role of fiction in bioethics](#). Journal of Medical Ethics 2009;35:398-399.
27. Nussbaum MC. [Poetic justice: the literary imagination and public life](#). Boston: Beacon Press, 1995.
28. Nussbaum MC. [Love’s knowledge: essays on philosophy and literature](#). New York: Oxford University Press, 1990
29. Huxley A. Brave new world, a novel, Garden City, NY: Doubleday, Doran & Co., 1932.
30. Huxley, A. [Le meilleur des mondes](#). Pocket, 2017.
31. Kendal E. [Utopian literature and bioethics: exploring reproductive difference and gender equality](#). Literature and Medicine. 2018;36(1):56-84
32. Dubiel H. [What is “narrative bioethics”](#) Frontiers in Integrative Neuroscience. 5(10).
33. Jonsen AR. [The birth of bioethics](#). The Hastings Center Report. 1993;23:S1-S4.
34. Frank AW. [Not Whether but how: considerations on the ethics of telling patients’ stories](#). Hastings Center Report. 2019;49:13-16.
35. Kuczewski MG. [The Soul of Medicine](#). Perspectives in Biology and Medicine. 2007;50:410-420.
36. Chambers T. [From the ethicist’s point of view: the literary nature of ethical inquiry](#). The Hastings Center Report. 1996;26:25-32.
37. McKee AC et al. [Chronic traumatic encephalopathy in athletes: progressive tauopathy after repetitive head injury](#). Journal of Neuropathology & Experimental Neurology. 2009;68:709–735
38. Yang C, Nag S, Xing G, Aggarwal NT, Schneider JA. [A Clinicopathological Report of a 93-Year-Old Former Street Boxer With Coexistence of Chronic Traumatic Encephalopathy, Alzheimer’s Disease, Dementia With Lewy Bodies, and Hippocampal Sclerosis With TDP-43 Pathology](#). Frontiers in Neurology. 2020;11:42.
39. Kosaka K (Ed.), [Dementia with Lewy Bodies: clinical and biological aspects](#). Tokyo: Springer Japan, 2017
40. Nag S et al. [Hippocampal sclerosis and TDP-43 pathology in aging and Alzheimer disease](#). Annals of Neurology 2015;77:942-952.
41. Patterson RH. [On Boxing and Liberty](#). JAMA. 1986;255:2481-2482.
42. Sokol DK. [The not-so-sweet science: the role of the medical profession in boxing](#). Journal of Medical Ethics. 2004;30:513-514.
43. Beauchamp T, Childress JF. [Principles of biomedical ethics \(8th ed.\)](#). New York: Oxford University Press, 2019.
44. Collier C, Haliburton R. [The need for a Canadian bioethics](#). Impact ethics. 2013

45. Trotter G. [Outside outpatient ethics: Is it ethical for physicians to serve ringside?](#) *Journal of Clinical Ethics*. 2002;13:367-374.
46. Schwartz MB. [Medical safety in boxing: administrative, ethical, legislative, and legal considerations](#). *Clinics in Sports Medicine*. 2009;28:505-514
47. Hytten K, Tønsaker SK. [Medical ethics in combat sports that permit knockouts](#). *Tidsskr Nor Legeforen*. 2017;137:17
48. Gauthier J. Ethical and social issues in combat sports: should combat sports be banned? In: Kordi, R, Maffulli, N, Wroble RR, Wallace WA. [Combat Sports Medicine](#). London: Springer, 2009:73-88.
49. Malcolm B. [Concussion in sport: public, professional and critical sociologies](#). *Sociology of Sport Journal*. 2018;352:141-148.
50. Beauchez J. [The 'sweet science' of bruising: boxing as a paradigm of the sociology of domination](#). *Revue française de sociologie*. 2017;58: 97-120.
51. Ribeiro NF. [Boxing culture and serious leisure among North-American youth: an embodied ethnography](#). *Qualitative Report*. 2017;22:1622-1636
52. Wacquant L. [Body & Soul: Notebooks of an Apprentice Boxer](#). New York: Oxford University Press, 2004.
53. Sheard KG. ['Brutal and degrading': the medical profession and boxing, 1838–1984](#). *The International Journal of the History of Sport*. 1998;15:74-102
54. Lavery B. [Beautiful burnout](#). London: Faber and Faber, 2010.
55. Williams, R. [Sucker punch](#). 2010.
56. World Health Organization Commission on Social Determinants of Health. [Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health. Final report of the Commission on Social Determinants of Health](#). Geneva: WHO, 2008.
57. Satariano B, Curtis SE. [The experience of social determinants of health within a southern European Maltese culture](#). *Health & Place* 2018;51:45-51.
58. Martin, AC. [The use of film, literature, and music in becoming culturally competent in understanding African Americans](#). *Child and Adolescent Psychiatric Clinics of North America*. 2005;14:589-602.
59. Payman V, Yates S, Cullum S. [Early onset dementia in New Zealand pacific boxers: a case series](#). *New Zealand Medical Journal*. 2018;131(1474):20-26.
60. Fairbairn-Dunlop TP, Savaii K, Puni E. [What makes for a good marriage or partnership? Samoan case study](#). Wellington, New Zealand: Pasefika Proud, 2016.
61. Morton H. [Becoming Tongan: an ethnography of childhood](#). Honolulu: University of Hawai'i Press, 1996.
62. Al-Zu'abi AZ, Jagdish JS. [Marriage: an integrated study in the context of cultural variation](#). *Domes*. 2008;17(1):68-91.
63. Witkowski SR. [Kinship](#). *American Behavioral Scientist*. 1977;20: 657-668.
64. Marini M.G. The place of illness-centred movies in medical humanities. In: Marini MG., editor. [Narrative medicine: Bridging the gap between evidence-based care and medical humanities](#). Cham: Springer, 2016:71-80
65. Considine, P. director. [Journeyman](#). London: Studiocanal, 2018.
66. Morgan J. [Out of the ring: boxing and long-term brain damage](#). *Lancet Neurology*. 2017;(17):848.
67. McKee L. [The unspoken damage of boxing](#). *The Independent* 2016 November 21.
68. Bradley J. [Lessons from my Life's Work](#). *Narrative Inquiry in Bioethics*. 2011;1:135-137.
69. Berkman LF, Soh Y. [Social determinants of health at older ages: the long arm of early and middle adulthood](#). *Perspectives in Biology and Medicine*. 2017;60:595-606.
70. de Medeiros K. [What Can Thinking Like a Gerontologist Bring to Bioethics?](#) *Hastings Center Report* 2018;48(S3):S10-S14.
71. Seifert T, Bernick C, Jordan B, Alessi A, Davidson J, Cantu,R, Giza C, Goodman M, Benjamin J. [Determining brain fitness to fight: has the time come?](#) *The Physician and Sportsmedicine*. 2015;43:395-402.
72. Wacquant LJD. [The pugilistic point of view: how boxers think and feel about their trade](#). *Theory and Society*. 1995;24:489–535.
73. Rutter JD. [Dismantling the face: toward a phenomenology of boxing](#). *Cultural Studies Critical Methodologies*. 2007;7:281-293.
74. Kamm, R. Boxing. In: Glick, I, Stull, T, Kamis, D. editors. [The ISSP manual of sports psychiatry](#). New York and Milton Park: Routledge, 2018: 236-267
75. Baird LC, Newman CB, Volk H, Svinth JR, Conklin J, Levy ML. [Mortality resulting from head injury in professional boxing](#). *Neurosurgery*. 2010;67:1444-1450.
76. Ohhashi G, Tani S, Murakami S, Kamio M, Abe T, Ohtuki J. [Problems in health management of professional boxers in Japan](#). *British Journal of Sports Medicine*. 2002;36:346-352.
77. Jamora RDG et al., [Parkinsonism among retired Filipino boxers](#). *Basal Ganglia*. 2017;10:1-3.
78. Lepreux S, Auriacombe S, Vital C, Dubois B, Vitaet A. [Dementia pugilistica: a severe tribute to a career](#). *Clinical Neuropathology*. 2015;34:193-198.
79. Popplewell B. [After the death of two young fighters, should we tolerate boxing's brutality?](#) *The Globe and Mail*. 2019.
80. Svinth JR. [Death under the spotlight: The Manuel Velazquez boxing fatality collection, 2011](#). *Journal of Combative Sport* 2011.
81. Worsell E. [Dog rounds: death and life in the boxing ring](#). London: Blink Publishing, 2017. Kindle Edition.
82. Ryan D. [A matter of life and death](#). *New Statesman* 2018;147(January 26-February 1):40-42

83. Harding G. [Boxer David Whittom dies after 10 months in a coma following Fredericton fight](#). CBC News 2018 March 17.
84. Pruss V. [Gary Kopas says he questioned the referee but he also wanted to win the Fredericton fight](#). CBC News 2017 May 29
85. Taylor C. [What the experience of illness teaches](#). Narrative Inquiry in Bioethics. 2013;3(1):45-49.
86. Gillon R. [After 20 years, some reflections and farewell!](#) Journal of Medical Ethics. 2001;27:75-77.
87. Heiskanen B. [The urban geography of boxing: race, class, and gender in the ring](#). New York Routledge, 2012.
88. Murray CJL. [Quantifying the burden of disease: the technical basis for disability-adjusted life years](#). Bulletin of the World Health Organization 1994;72:429-445.
89. Smart V, Ellenwood L. [Pain, agony and 'years of duress': How hockey wives are fighting back over players' chronic brain injuries](#). CBC News 2019 November 24.