Boxing

An update from the Board of Science

British Medical Association
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Editorial board

A web resource from the BMA Science and Education Department and the Board of Science.

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**Summary**

A primary objective of the BMA is to maintain an influential role in forming public and government opinion on key health-related matters and contribute to the development of effective public health policy. The BMA’s policy on the banning of boxing goes back over a decade with overwhelming support from its members to campaign vigorously for legal interventions because of the serious health risks involved. The BMA has renewed its call for action against boxing because of the growing commercialisation of no-holds barred fighting events (euphemistically called mixed martial arts), which have the sole aim to cause physical harm and injury to an opponent until they are unable to continue; the primary goal being to knock the opponent unconscious. Such 'sports' can lead to permanent injury and death.

Other types of sports, such as rugby or motor racing for example, carry some risk of injury and death, but none of these is pursued with the purpose of causing harm. BMA members have no intention to curtail such sports, but rather ensure that the health and safety and medical care are of the highest standards possible. Similarly, the BMA does not seek a ban on proper martial arts sports such as karate and judo where avoidance of harm is intended, and the onus is on technical ability with wins scored on points.

The World Medical Association also recommends that boxing should be banned because it 'can result in death and produces an alarming incidence of chronic brain injury'. Until a total ban is achieved, it recommends a number of measures that should be put in place to maximise the safety for those involved.
The British Medical Association's position on boxing

The British Medical Association (BMA) has been an authority on boxing since 1982 and opposes both amateur and professional boxing and calls for a complete ban on boxing (see appendix 1). As a first step, there should be a ban on children below the age of consent from boxing. Therefore the BMA is campaigning for a ban on boxing in those under the age of 16.

The BMA states that injuries caused by boxing include:

**Brain damage** – the blows received during boxing cause the brain to move within the skull, damaging blood vessels, nerves and brain tissue.

**Acute brain haemorrhage** – this is the lead cause of boxing deaths.

**Eye, ear and nose damage** – in some cases boxing causes permanent sight and hearing loss.

Although some boxers wear head protection, in a bid to prevent injury, they might not guard against brain damage.

The BMA’s report, ‘The Boxing Debate’ (1993) [Reference 1] found no evidence to suggest that boxing was any safer in the 1990s than in the 1980s, when the BMA began its campaign. Pro-boxing arguments point out that other sports result in injury. The BMA’s opposition to boxing is based on medical evidence that reveals the risk not only of acute injury but also of chronic brain damage, which is sustained cumulatively rather than in any one recorded instance, in those who survive a career in boxing. The BMA believes that there is sufficient evidence for the risks of brain injury associated with boxing for the Secretary of State for Department for Culture, Media and Sport to initiate an independent inquiry into these risks.

International medical associations’ perspectives on boxing

In 1991, eleven national medical associations (Australia, Bangladesh, Canada, Denmark, Finland, Ghana, Ireland, New Zealand, Nigeria, Norway and South Africa) confirmed their opposition to boxing, and expressed their concerns regarding the dangers of boxing, believing that ultimately it should cease to exist. These medical associations state that modern medical technology demonstrates beyond doubt that chronic brain damage is caused by the recurrent blows to the head experienced by all boxers, amateur and professional alike.

“As long as it is legal to hit an opponent above the neck, there are no safety precautions which can be taken to prevent this damage”. [Reference 2]

World Medical Association (WMA) policy (2005) states that:
“Boxing is a dangerous sport. Unlike most other sports, its basic intent is to produce bodily harm in the opponent. Boxing can result in death and produces an alarming incidence of chronic brain injury. For this reason, the World Medical Association recommends that boxing be banned”. [Reference 3]

The President of the Australian Medical Association (AMA), Dr Mukesh Haikerwal, (2006) stated:

“International events based on the spirit of goodwill - such as Olympic and Commonwealth Games - are no place for interpersonal violence and injury” and that “it's time to remove boxing from the sporting line-up”. [Reference 4]

**Countries where boxing is banned or challenged**

Professional boxing is banned in a number of countries including Norway and Iceland. [Reference 5] In 2006 Sweden ended its 36-year ban on professional boxing allowing permission to be sought for individual events [Reference 6] although fully-fledged professional boxing is still banned.

There have been significant attempts in UK and USA to make boxing safer. Short of an outright ban, in the USA a Bill to “establish the United States Boxing Commission to protect the general welfare of boxers and to ensure fairness in the sport of professional boxing” has been considered. Although this Bill has failed a number of times, Senator McCain has stated that he will continue to campaign until it is passed. This Bill was introduced again, after amendment, in January 2007. [Reference 7]

Paul Flynn, Labour MP for Newport West, has been a long-term campaigner on boxing safety. In the wake of Paul Ingle’s injuries (see appendix 2) he pursued his efforts in Parliament to ban blows to the head in boxing in 2000. [Reference 8] Although this campaign was unsuccessful Paul Flynn still remains strongly of the opinion that boxing is the most dangerous of all sports, and that there is compelling evidence for reducing injuries in other sports too. He still campaigns vigorously for this cause and believes that opposition to reform is weakening.

**Injuries sustained during boxing**

**Injury to the brain**

Boxing shares with a few other sports the potential for chronic brain injury. An unpublished survey of British neurologists in 1974 about their encounters with chronic traumatic encephalopathy (CTE) and its association with sport yielded 12 jockeys, five soccer players, two rugby players, two professional wrestlers, one parachutist and 294 boxers. [Reference 9]
Whereas much of the rest of a boxer’s internal organs are protected by bone, fat, skin and well-developed muscle, the soft tissue of the brain is protected only by the skin-covered skull and the three membranes, or meninges:

- dura mater - the thick, tough layer that restricts movement of the brain within the skull, thereby reducing the chance of blood vessels stretching or breaking
- arachnoid - the thin inner layer consisting of threadlike strands that attach it to the pia mater
- pia mater - the thin delicate layer tightly attached to the surface of the brain.

The meninges allow a certain amount of protection, and in addition to these membranes the brain is suspended in cerebrospinal fluid. Even with this protection the meninges and deeper tissues within the brain can become bruised when the head is jarred or shaken. When a boxer sustains a direct blow to the head, likened to the effect of being hit by a 12lb padded, wooden mallet travelling at 20mph, the head rotates sharply and then returns to its normal position at a much slower speed. In addition, the different densities of the various parts of the brain also move at different rates and the overall result is to create a "swirling" effect inside the brain. The resulting tissue trauma includes damage from the brain hitting the inner surface of the skull - this can be at the site of impact, or at the opposite side of the skull due to a contrecoup effect (where the brain moves within skull and impacts the opposite side to the blow); tears to the nerve networks in between the brains hemisphere’s; tension between the brain tissue and blood vessels may cause lesions and bleeding; pressure waves created causing differences in blood pressure to various parts of the brain; and (rarely) large intracerebral clots (as sustained by the boxer, Michael Watson in September 1991).

- Doctors say the risk of damage is great even though the brain is protected by the meninges, because punches cause the brain to strike the walls of the skull
- Blows received during boxing cause the brain to move within the skull, damaging blood vessels, nerves and brain tissue. Acute brain haemorrhage is the leading cause of boxing deaths [Reference 10]

The immediate effects of blows to the head include grogginess, weakness, paralysis, weakening of limbs, inability to focus and possible loss of consciousness, ie the "knock-out" (see appendix 3) for a list of symptoms after injury). The long-term effects of boxing on the brain are cumulative and may not show immediately after a match. Most signs of damage are more likely to appear towards the
end of a boxer’s career or even after retirement. Stretched nerve fibres may recover after many weeks but severed nerve fibres do not repair. Ex-boxers are less able to sustain natural ageing of the brain or diseases of the brain and may be more likely to suffer conditions such as Alzheimer’s and Parkinsonism. Boxers’ brains are smaller, surface grey matter is thinner, and fluid-containing ventricles enlarged because of the decrease in white matter. (See section on long-term effects).

‘Dr. Robert Cantu, medical director of the National Center for Catastrophic Sports Injury Research at the University of North Carolina, is one of many who advocate brain scans before and after fights.’ [Reference 11] More scanning may not be sufficient, as brain damage is always a risk; this is shown by the deaths of Leavander Johnson and Martin Sanchez, both having had MRI scans previously - four months and three days earlier respectively.

Injury to the eye
Eyes are protected by hard bone on many sides but are very vulnerable to direct hits from below. Damage may result from direct contact or from shock waves set up in fluid contents. Most ocular injuries in boxing are those classed as concussional injuries - eg laceration and bruising of the lids, corneal and conjunctival abrasions hyphaema (haemorrhage into the anterior chamber of the eye) traumatic mydriasis (permanent enlargement of the pupil), recession of the angle of the anterior chamber which can lead to glaucoma in later life, dislocation of the position of the lens in the eye, choroidal haemorrhage (bleeding into the structures at the back of the eye) and retinal detachment following retinal tears. [Reference 9]

Problems found in 74 boxers applying for boxing licences in New York State between 1984 and 1986 have been reported. [Reference 12] This study is important because asymptomatic boxers were examined. In this study 66 per cent of those examined had at least one ocular injury, vision-threatening injuries occurred in 58 per cent. Significant correlations were found between the total number of bouts and the total number of losses and the presence of retinal tears.

Long-term risks of boxing
In addition to causing some major acute injuries, boxing can lead to chronic damage following repeated trauma. Each time someone is hit on the head they may sustain a minor degree of brain injury. One neurosurgeon has claimed that eighty per cent of boxers have brain scarring as a result of the cumulative effects of blows to the head [Reference 13][Reference 14] Once damaged, the brain is increasingly susceptible to further damage. Boxing also damages the eyes, ears and nose - in some cases there may be permanent sight or hearing loss.
Some argue that boxers have a lower risk of death per year from acute injury than other sports. But these figures do not take into account the effect of repeated minor brain damage, a fact that is relevant in few other sports. Neither does this reflect the fact that there are fewer boxers than, say, rugby players, and that boxers only compete in a few fights each year. Given the smaller number of people involved, the shorter length of boxing matches compared with, say rugby, and the longer intervals between matches, the real risk of serious injury per boxing encounter is far higher than in any other sport. Once these factors are considered, it can be seen that a boxer faces a far greater chance of death or debilitating injury each time they enter the ring than does a rugby player when he/she steps on to the pitch. Doctors are gravely concerned about the risk of serious impairment to those who survive a career in boxing. These are the post-traumatic brain diseases which can result in a progressive failure of brain function. This health hazard is almost unique to boxing. In the last few years fighters have been left wheelchair bound, blind and comatose after going into the ring. All boxers are at risk of acute and chronic brain and eye injuries. Boxing, therefore, cannot be justified on health and safety grounds as an appropriate or legitimate ‘sport’.

Eighty per cent of professional boxers have serious brain scarring [Reference 13] [Reference 14] and many retired boxers suffer from neurodegenerative disorders. These include Alzheimer’s and Parkinson’s, or more direct brain trauma, such as dementia pugilistica, also called chronic or post-traumatic encephalopathy, (more commonly known as punch-drunk syndrome), caused by repetitive blows to the head over a long period of time and primarily affecting career boxers. Symptoms begin anywhere between six and 40 years after the start of a boxing career, with an average onset of about 16 years. The condition, dementia pugilistica, which occurs in people who have suffered multiple concussions, commonly manifests as dementia, (declining mental ability), and parkinsonism, (tremors and lack of coordination). A minority of boxers further developed speech difficulty, muscular movements like involuntary nodding of the head, hand tremors, and leg dragging. In severe cases, symptoms of memory loss, shuffling gait, dizziness and mental deterioration are observed, similar to that of Parkinson’s Disease. Two of the best known sufferers of these conditions are Muhammad Ali, crowned world heavyweight boxing champion three times, North American Boxing Federation champion and Olympic gold medal winner, who suffers from pugilistic Parkinson’s syndrome, and Wilfred Benitez, who was crowned world champion in three separate weight divisions, and is the youngest world champion in boxing history, who suffers from dementia pugilistica. Other famous boxers who are sufferers include Joe Louis, Beau Jack and, more recently, Jerry Quarry, Mike Quarry, Emile Griffith, Willie Pep and Freddie Roach.
**Review of evidence**

The BMA has been calling for more studies of boxers to be undertaken over longer periods of time. In addition it suggests that the British Boxing Board of Control (BBBC) and the Amateur Boxing Association of England (ABAE) are in a unique position to assist in recording injuries to both brain and eye. Regardless of statistics, however, an overriding point is that damage to the brain in sporting activities is incidental; in boxing, such injury is deliberate. Indeed, the clearest deciding factor in boxing is the knock-out which necessarily results in the risk of significant neurological injury.

The small sample sizes involved in studies into the effects of boxing make it very difficult to extrapolate the findings to the entire boxing population. Unfortunately, none of the studies have followed boxers throughout their careers and into retirement, enabling a longitudinal analysis of the progressive deterioration in neurological function. General conclusions can however be made:

**Safety**

Many people think that boxing could be made safer, for example, by using head guards or shorter rounds. Evidence suggests that these changes have minimal effect and in some cases might even have the reverse effect. Even the existence of medical specialists at ringside would not protect boxers suffering acute haematomas etc.

**Professional boxers**

Studies confirm that professional boxers suffer from a cumulative effect of damage to the brain, often resulting in dementia pugilistica. This damage may not show up until after the boxer has retired.

**Amateur boxers**

The evidence is far less clear cut and a number of studies found no evidence of cumulative brain damage. The sample populations were relatively tiny and most authors felt that it would be difficult to extrapolate their findings with any degree of certainty. That said, research into acute traumatic brain injury in amateur boxing has concluded that participation in amateur boxing matches may diminish neurocognitive functioning despite the use of headgear. [Reference 15] More recently, a Swedish study found that when examining the cerebrospinal fluid of amateur boxers levels of one of the markers for neuronal damage, neurofilament light (NFL), were four times as high in boxers after a fight as in healthy non-athletes, and up to eight times as high in boxers who had taken more than 15 high-impact hits to the head. Levels of NFL took three months to return to normal. [Reference 16]
Rules and regulations of boxing and medical controls, however, differed widely from country to country, so it can be difficult to make comparisons.

**The case that changed boxing history**

In September 1991 the British boxer Michael Watson went into the ring for a World Boxing Organisation (WBO) super middleweight bout with Chris Eubank. He came out of the fight in a coma, and endured a desperate nine-year battle back to health.

The 26-year-old fighter sustained two massive blood clots on his brain which left him paralysed down his left side and in need of round-the-clock medical care. In 1999 he won a High Court compensation claim against boxing’s governing body. The BBBC were found to be negligent in the care that it had provided for Watson, who suffered brain damage during the bout. It was suggested that he would have made a much better recovery if a doctor skilled in specialist emergency treatment, had been available ringside to give immediate assistance. [Reference 17]

Following Watson's injuries the BBBC has implemented stricter medical procedures, including a ringside doctor trained in resuscitation and head injuries. Neurosurgeons at the local hospital must be aware of the fight and there are numerous medical checks on the fighter both before and after the bout to check for injuries. All of these new measures were in place for Paul Ingle's bout (2000) – nevertheless he suffered horrific brain injuries (see appendix 2).

**Boxing after serious injury - The case of Joe Mesi**

Las Vegas athletic Medical Advisory Board recommended that heavyweight boxer Joe Mesi stay out of the ring after he suffered bleeding on the brain during a brutal fight in 2004. They heard evidence that Mesi might have had up to three subdural haematomas during the bruising 10-round unanimous decision victory over Vassiliy Jirov in March 2004. The injuries resulted in his indefinite suspension by the Nevada Athletic Commission, effectively banning him from boxing anywhere in the USA. The suspension was officially lifted when his Nevada boxing license expired at the end of 2005 and he was unable to renew the license due to the concerns of Nevada boxing officials. Mesi has since been licensed by the Puerto Rican, Louisiana State, Arkansas State, West Virginia state and the Michigan State Boxing Commission and has competed in six professional bouts, with another scheduled for September 2007.

**Deaths from boxing**

At least 140 boxers, including two women, have died worldwide due to injuries sustained in training
or in bouts since 1990. For information on specific ring tragedies see appendix 2.

The Nevada State Athletic Commission approves approximately 113 bouts per month between male professional boxers, and another 2.5 bouts per month between female professional boxers (based on data for 2002 and 2003). [Reference 18]

Between January 1979 and February 2007, there were 337 months. There were seven documented deaths of professional male boxers in Nevada during those 337 months. Thus, the death rate for male professional boxers in Nevada appears to be about 92 deaths per million participants:

\[
(7 \text{ deaths}/[337 \text{ months} \times 113 \text{ bouts per month} \times 2 \text{ fighters per bout}]) \times 1,000,000
\]

While the number of deaths in boxers is significant and serious, it should also be recognised that a professional boxer's risk of suffering a significant non-fatal injury is also very high, for example, in 2003, an Australian study documented 107 serious injuries during 427 bouts, many of which were to the head and hands. [Reference 19] With this knowledge, it obvious that promoters should routinely provide healthcare benefits for their boxers, there is however, no law requiring them to do so, and with the risks faced it is unsurprising that such measures are rarely implemented.

**Counter-arguments to banning boxing**

Supporters of boxing claim that if it were outlawed there would be more injuries caused by illegal boxing, undertaken without strict medical controls. Anecdotal evidence however, indicates that in countries where boxing has been banned, such as Sweden, Iceland and Norway, this has not been the case. Supporters argue:

- to outlaw boxing would be a denial of freedom of choice. If somebody wants to take up boxing, then it is their right
- those who want to stop boxing say it is a dangerous sport. Yet far more injuries are sustained in other sports such as football, rugby, and horse-jumping. These pursuits do not attract the same venom as boxing. Deaths occur in three-day eventing, but there's no outcry over that
- boxing is safer than it has ever been. In the amateur game, you have to undergo a strict medical before you get your medical card
- a doctor is always at the fight and he cannot leave until the show is over. The St John Ambulance is on duty, and sometimes an ambulance with a paramedic. In professional boxing, medical expertise is ringside
• boxing helps with discipline and character and should not be banned.

Women and boxing
In October 1996, the Amateur Boxing Association of England announced their plans to allow women to box, a move which was finally sanctioned in October 1997. [Reference 20] The first bout was scheduled for 2 October 1997, between two 13 yr olds - Emma Brammer and Amanda Prime, this bout caused a great deal of controversy at the time, with the BMA finding itself in the unlikely position of being allied with many boxers, in their opposition to the bout. The bout was postponed twice before it finally took place without pre-announcement in March 1998. [Reference 21] An argument raised in favour of women boxing is one of equal opportunities.

Objections to women's boxing as an amateur sport come from many directions in Britain. With some thinking that boxing is fit only for males - too "physical" to be a female sport, while others say that all boxing should be banned because of injuries suffered by professionals. Trauma to the breast can cause a condition called fat necrosis, in which part of the tissue dies and becomes a hard lump - the effectiveness of breast protection is limited.

Children and boxing
Boxing does not provide a unique opportunity for working class boys to "better" themselves, which is a popular, if patronising, argument. The BMA believes that the government should give more consideration to the provision of leisure facilities for the young, particularly in inner cities.

There are two main reasons for banning children under the age of 16 years from boxing:

• children have little awareness of risk, specifically the risk of chronic encephalopathy, which develops only after a lag period measured in decades or more
• there is no place in contemporary society for a youth sport which has, as its primary goal, the infliction of acute brain damage on an opponent.

The medical and ethico-social issues implicit in this subject have been analysed by Professor J Pearn. [Reference 22] Children's boxing is sometimes defended on the grounds that they learn to "work through their aggression" with discipline. The BMA believes there are many other sports, such as athletics, swimming, judo and football, which require discipline but do not pose the same threat of brain injury. While young boxers do not have as powerful a punch as mature boxers, some studies have found that young boxers exhibit early evidence of brain damage. This danger was highlighted in
1987 by the death of 15-year-old amateur boxer Joseph Strickland, due to brain damage.

**Mixed martial arts**
As with boxing the BMA opposes mixed martial arts (MMA) fighting and calls for a complete ban on this type of contact sport.

Ultimate Fighting Championship (UFC) is a mixed martial arts organisation, and was started as a tournament to find the world’s best fighter, irrespective of their style. Early UFC fights were extremely brutal, and was described as “human cockfighting” by Senator John McCain who sent letters to all 50 governors in the United States of America (USA) calling for it to be banned. Political pressures eventually sent the UFC underground, nearly extinguishing its public visibility. This was short-lived however and the UFC has re-emerged and is now more socially acceptable than ever, and has returned to pay-per-view television. MMA is currently undergoing a surge in popularity, with global media coverage, and tournaments regularly taking place in the UK.

The UFC uses an octagonal metal caged enclosure, “The Octagon”, to stage bouts, which last 3-5 rounds of 5 minutes each, or until submission, knock-out or disqualification. Because of its ‘no holds barred’ nature, the UFC fighters are open to a myriad of injuries, including subdural haematoma, thought to be the most common cause of fatalities in boxing. [Reference 23][Reference 24] In addition to fractures, tears, sprains of the ligaments and muscles, primarily knees, shoulders and ankles, there is also the risk of “subclinical electroencephalographic perturbations” due to the use of neck-holding manoeuvres. [Reference 25] Injuries sustained in full-contact fighting arts, in particular martial grappling arts and professional MMA competitions, have not been well catalogued in peer-reviewed medical and scientific research methods, there is however, some evidence of increased risk of brain and joint injuries; with brain injuries more common in striking sports while joint injuries are more common in grappling sports. [Reference 26]

Since 1993, with the inception of UFC and the introduction of MMA to the American mainstream there has been only one death reported, that of Douglas Dedge in 1998. It should be noted, however, that MMA tournaments such as UFC are still in their infancy; so it is too early to draw any meaningful conclusions.
References

17. Watson v British Boxing Board of Control - The Times Law Reports, 12 October 1999.


Appendix 1: BMA policy history

1982: The BMA 1982 Annual Representative Meeting (ARM) resolved

“in view of the proven ocular and brain damage resulting from professional boxing, the Association should campaign for its abolition”.

1984: The BMA set up a working party to review evidence of injuries and the final report published in 1984 concluded that damage occurred to the eye and brain in both professional and amateur boxers.

1987: Further ARM resolution passed on boxing:

“in view of the continuing serious ill effects on the health of boxers, this Meeting requests the BMA to pursue the government with renewed vigour until there is a ban on boxing, and until such time as this is achieved, believes that television coverage should include a statement of the damage which results from boxing.”

BMA Board of Science set up a steering group to review the evidence published on boxing injuries.

1992: Two further ARM resolutions passed on boxing:

“that the forthcoming publication of the revised report on boxing be welcomed and that this meeting calls for a total ban on amateur and professional boxing in the UK”. ARM also passed a policy on boxing among children:

“this meeting believes that as the next stage of our campaign against boxing we should seek a ban on children below the age of consent from boxing”.

1993: ‘The boxing debate’: The BMA published a report [Reference 1] reviewing the existing evidence on injuries related to boxing and considered the mechanisms by which injuries can occur and the available techniques for detecting such injuries.

1996 Oct: BMA Anti-boxing film launched – a 60 second film which uses the analogy of a game of
conkers to put across its message. It won three awards in the advertising industry's prestigious Creative Circle Honours.

1998: 'Boxing packs a punch': A survey undertaken by the Board in September 1998 found that nearly a third of local authorities that responded gave financial support to boxing, either as grants to boxers or by providing facilities for local boxing clubs. A leaflet, Boxing packs a punch was published on the BMA website (open access) and sent to all local authorities in the UK who were asked to review their policies on providing support for boxers and boxing, especially in relation to under-16s boxing, in view of the proven danger of brain injury. The debate in UK local authorities received widespread local and national media coverage and encouraged a number of authorities to review their policies. [Reference 2]

References

Appendix 2: Boxing ring tragedies

UK Ring tragedies [Reference 1]

Johnny Owen – 1980
Died during a bantamweight world title fight against Mexican Lupe Pintor in Los Angeles in 1980. He was knocked out in the 12th round and lay in a coma for six weeks, before dying at the age of 24.

Steve Watt – 1986
The British boxer died after a Southern Area welterweight clash with Rocky Kelly in Fulham in 1986. The inquest into his death found he had suffered extensive brain damage. The fight was stopped in the 10th round. Doctors later discovered that Watt had been suffering from brain damage for quite some time and his death was caused by the recurrence of an old injury.

Rod Douglas – 1989
Rod Douglas needed brain surgery following his ninth round British middleweight title defeat to Herol 'Bomber' Graham 11 years ago. He made a recovery after a life-saving operation.

Michael Watson – 1991
After felling Eubank in the closing stages of the 11th, Watson needed only to survive the remaining seconds of that round. But he went in to attack Eubank, who countered with a huge right uppercut which knocked Watson off his feet, his head bouncing off the bottom rope as he landed.

Amazingly, he got up and staggered to his corner as the bell rang. But he was no longer in control of his senses and the fight was stopped in the following round as he soaked up punch after punch without striking back. Watson spent 40 days in a coma, and a blood clot in his brain left him partially paralysed. He had six brain operations, after which doctors told him he would never walk again. He spent many years in hospital, slowly recovering some of his movements, in 1999, his neurosurgeon wrote that Watson would never be able to walk again. Soon after, the doctor’s prognosis began to change, as Watson started getting out of bed and beginning walking therapy. On April 19, 2003, Watson became an instant national hero when he completed, after six days, the London Marathon in aid of the Brain and Spine Foundation. In 2004 Watson was awarded an MBE for his achievements.
Bradley Stone – 1994
A young bantamweight, Stone entered his fight with Richie Wenton off the back of a savage knockout loss. After 10 rounds of hard, brutal combat, Stone was stopped after absorbing a terrible amount of punishment. Initially, there seemed little wrong with him as he left the ring, but he later collapsed on returning home and never regained consciousness.

Gerald McClellan – 1995
Both men suffered two counts, with Benn knocked out of the ring during the opening minute. However it became increasingly apparent as soon as the fight stopped that the American was suffering from more than just exhaustion. He slipped into a coma after being stretchered out of the ring and remains in a wheelchair to this day, with only 20 per cent vision and in need of 24-hour-a-day attention.

James Murray – 1995
Scottish boxer Jimmy Murray died following a bantamweight bout with Drew Docherty in Glasgow in 1995. Murray collapsed in the 12th round and was not given oxygen until he arrived in hospital. Doctors operated on him to remove a blood clot but he died days after collapsing.

Paul Ingles – December 2000
The twenty-eight year old boxer failed to get up after being knocked down for the second time in the twelfth round in a world title fight against the South African, Mbulelo Botile. Injury to the delicate tissue of the brain had caused a large blood clot to form, putting pressure on the brain surface. Although surgeons acted promptly to operate and remove the clot, it will be sometime before neurologists know how much permanent damage has been done.

Worldwide ring tragedies
There have been no reported boxing tragedies in Britain since 2000, so some example cases from the world stage involving better known/successful boxers have been included here.

Emiliano Valdez – January 2000 (died March 2002)
Dominican Republic welterweight Emiliano Valdez was a beaten into a coma during a bout with Teddy Reid in January 2000, and then died in March 2002 without regaining consciousness. It was a gruelling ill-tempered fight, with Valdez visibly shaken in the eighth round, but his corner refused to throw in the towel. The bout ended abruptly in the 10th round, after Reid hit the battered Valdez with a left hook, who then turned away, waving his raised left arm towards his corner. With Valdez
an open target, Reid administered the final few blows sending the unconscious Valdez crashing to
the canvas, his head bouncing off the bottom rope as he fell. Valdez was immediately given aid by
the ringside physician, and taken to hospital where he received emergency surgery to remove a
blood clot and relieve swelling to the brain. Trainer Nelson Lopez later said ‘How could I stop the
fight? They would have said, 'It's ridiculous, a trainer bringing a fighter and not letting him fight.' I
don't want anyone to get hurt, but that's the sport we choose.'

Pedro Alcazar – June 2002
Pedro Alcazar, died after losing his world Flyweight championship in Las Vegas, Nevada to Fernando
Montiel in Las Vegas the night before. Immediately following the bout, Alcazar was declared healthy
by ringside doctors, with no visible signs of any trauma. He went sightseeing the day after the fight
and was in his hotel room getting ready to fly back to Panama when he collapsed. He was taken to
hospital, where he died. This was the first time in boxing history that a boxer is known to have
collapsed so long after the end of a fight. Alcazar’s death highlighted the manner in which it can
take an extended time before potentially life-threatening symptoms present themselves.

Luis Villalta – March 2004
Luis Villalta died defending his North American Boxing Association lightweight title against Ricky
Quiles at the Seminole Tribe of Florida Coconut Creek Casino. He collapsed moments after losing a
unanimous decision, and was rushed to the North Broward Medical Center. He died after
undergoing surgery for head trauma having never regained consciousness.

Martin Sanchez – July 2005
The twenty-six year old firefighter, died in a Las Vegas hospital a day after he was knocked out in the
ninth round of a super lightweight bout against Rustam Nugaev of Russia. Despite bleeding from the
nose and mouth, Sanchez did not appear seriously injured as he left the ring under his own power
after being examined by the ringside doctor. He was also examined in his dressing room by a second
doctor. Later, after a commission inspector noticed Sanchez walking strangely, he was examined
again and rushed to a local hospital where he underwent emergency surgery for a subdural
haematoma. He was placed on a ventilator, but died the following morning.

Leavander Johnson – September 2005
One-time holder of International Boxing Federation world title died defending his title for the first
time against Mexican Jesús Chávez. The fight was stopped early in the 11th round after Johnson
received a barrage of punches from his opponent. Despite being able to leave the ring under his own
momentum, he collapsed in his dressing room shortly afterwards. He was rushed to the hospital and had emergency surgery to correct a subdural haematoma. Following the surgery, Johnson was placed in a drug-induced coma, he survived into the next week and was showing early signs of improvement, but remained in critical condition. His condition stopped improving and it was decided to discontinue efforts to artificially prolong his life.

Kevin Payne – March 2006
Kevin Payne died at the age of 34 from injuries sustained during a match with Ryan Maraldo the night before in Evansville, Indiana, his hometown. Payne won the eight-round fight, but had to be helped from the ring and was taken to a hospital where he died after brain surgery.

USA Female boxer ring tragedies
Stacy Young – June 2003
It was Young's first fight, and she entered because the other female entrant needed an opponent. The deceased weighed about 240, while her opponent weighed about 180. Cause of death was swelling and bleeding in the brain. This is the first known death in women's boxing. This happened during a 'Toughman Contest' – a tournament for novice amateur fighters (those with no more than 5 winning fights in the past 5 years), generally local residents living within a 75-mile radius of the event. It employs standard boxing rules, big gloves, headgear, and very short rounds. Although Toughman has had over 100,000 participants in its tournaments since 1979 and boasts a stellar safety record, it remains a highly controversial event and is banned in some States. [Reference 2]

Becky Zerlentes – April 2005
During the third round, Zerlentes took a straight right over her left eye. She staggered forward and collapsed. She never regained consciousness, and died in hospital a few hours later. Cause of death was listed as blunt force trauma that caused internal bleeding. On the date of this contest, USA Boxing had 2,200 registered female amateur boxers.

Appendix 3: Brain injury

The information reported in this appendix can be found online at www.retiredboxers.org/Resources.htm

A wide variety of symptoms can occur after "brain injury". The nature of the symptoms depends, in large part, on where the brain has been injured. Below find a list of possible physical and cognitive symptoms which can arise from damage to specific areas of the brain:

**Frontal Lobe: Forehead**
- loss of simple movement of various body parts (paralysis)
- inability to plan a sequence of complex movements needed to complete multi-stepped tasks, such as making coffee
- loss of spontaneity in interacting with others
- loss of flexibility in thinking
- persistence of a single thought
- inability to focus on task
- mood changes
- changes in social behaviour
- changes in personality
- difficulty with problem solving
- inability to express language (Broca's aphasia).

**Parietal Lobe: near the back and top of the head**
- inability to attend to more than one object at a time
- inability to name an object (anomia)
- inability to locate the words for writing (agraphia)
- problems with reading (alexia)
- difficulty with drawing objects
- difficulty in distinguishing left from right
- difficulty with doing mathematics (dyscalculia)
- lack of awareness of certain body parts and/or surrounding space (apraxia) that leads to difficulties in self-care
- inability to focus visual attention
- difficulties with eye and hand coordination.
Occipital Lobes: most posterior, at the back of the head
- defects in vision (visual field cuts)
- difficulty with locating objects in environment
- difficulty with identifying colours (colour agnosia)
- production of hallucinations
- visual illusions - inaccurately seeing objects
- word blindness - inability to recognize words
- difficulty in recognizing drawn objects
- inability to recognize the movement of object (movement agnosia)
- difficulties with reading and writing.

Temporal Lobes: side of head above ears
- difficulty in recognizing faces (prosopagnosia)
- difficulty in understanding spoken words (Wernicke's aphasia)
- disturbance with selective attention to what we see and hear
- difficulty with identification of, and verbalization about objects
- short term memory loss
- interference with long term memory
- increased and decreased interest in sexual behaviour
- inability to categorise objects
- right lobe damage can cause persistent talking
- increased aggressive behaviour.

Brain Stem: deep within the brain
- decreased vital capacity in breathing, important for speech
- swallowing food and water (dysphagia)
- difficulty with organization/perception of the environment
- problems with balance and movement
- dizziness and nausea (vertigo)
- sleeping difficulties (Insomnia, sleep apnoea).

Cerebellum: base of the skull
- loss of ability to coordinate fine movements
- loss of ability to walk
- inability to reach out and grab objects
- tremors
- dizziness (vertigo)
- slurred Speech (scanning speech)
- inability to make rapid movements.