Is gender equality in brain damage 'progress' for women and sport?

Abstract

This commentary sits within a context of growing cultural concern over brain damage that occurs in many of the Western world's most popular, profitable and prized sports. After laying out evidence demonstrating this point, we discuss the increasing inclusion of women within sports which involve regular and routinised brain injuries. We problematise this apparent 'progress' with the title of our commentary. In particular, rather than offering some simplified yes/no answer, we argue that in light of the five decades of social scientific scholarship documenting the various harms produced by performance impact sports, working toward gender equality in brain damage is a nonsensical outcome. So, while there is clear evidence from academic gender studies that progress has been made toward tackling issues of exclusion and various forms of discrimination against women and girls in performance sport spaces, there has not been concomitant progress made in tackling the ways bodies and brains are often broken down, damaged and sometimes destroyed during participation in such sports. We do *not* suggest that consenting adults should be prohibited from enjoying impact sports and our aim with this commentary is *not* driven by a paternalistic, patriarchal belief which reflects historical notions around sportswomen being the 'fairer' sex, nor that responses to sport-acquired brain injury should be sex- or gender-specific. Rather, we conclude by suggesting that the emerging science on sport-acquired brain injuries should serve as an important inflection point to those leaders, organisers, practitioners and scholars working in this area to reconsider how we imagine, promote and structure sport – *for everyone*.

Keywords: Sport-acquired brain injuries; concussion; sportswomen; equality; impact sports; performance sport

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In the half a century or so since the appearance of a coherent and consistent critical scholarship focusing on gender and sport, there have been two clear and recurrent findings: 1) various sports, sporting spaces and subcultures serve to exclude, sexualise and otherwise discriminate against women and girls; and 2) that such social spaces are often sites where men's and boy's bodies and brains are broken down, damaged and sometimes destroyed. Of these two problems, the first has been tackled in various ways, and while certainly not 'solved', a large body of research documents broadly positive and progressive shifts in gendered social relations in sports worlds (Bowes and Culvin, 2021). Meanwhile, the second problem persists in much the same way as described by Paul Hoch (1972) in which athletes must choose to 'maim-or-be-maimed' at the behest of sporting 'robber barons'. In this regard, critical gender scholarship has had mixed success – while it has seemingly contributed to traditionally male-dominated sporting spaces becoming more accessible for women, it has *resoundingly failed* to make a sustained difference to the hegemony of the performance sport model and the disabling consequences that flow from participation in various sports.

A presumably unintended consequence of the growth in women's sport has produced a third and more recent finding, that sportswomen are often embedded in sports' 'culture of risk' and increasingly subscribe to the same performance-oriented and health-compromising ideas as sportsmen (Berg et al., 2014; Berg et al., 2023; Charlesworth and Young, 2004, 2005; Paechter et al., 2023; Theberge, 2008; Waldron and Krane 2005; Young and White, 1995; Knapp, 2014). As Forbes argues in Matthews et al. (2023), alignment between the traditional exclusion of women from sporting and medical spaces/cultures means that contemporary increases in participation in performance sport might produce a 'perfect storm' in terms of the specific health outcomes and medical care experienced by sportswomen.

An important organisational and cultural feature, then, of many sporting subcultures, whether dominated by men or by women, is a recreation of an approach to competition, performance, and the body, that is coded in an often-implicit manner by traditional renditions of manhood. That is to say, strength, power, speed, are valorised, alongside the inculcation of a stoic and 'heroic' approach to sacrificing one's self for the 'greater good' (the team or 'sport'). Such features are at the core of many of the most valued sports within the Western cultural imagination. This means that, as women's sport has grown and professionalised largely following the same model as men's performance-orientated sport, sportswomen are having similar deleterious physical experiences as sportsmen. If this broad argument is accepted, there are general and specific problems that sportswomen now face. Of these, the problem of sport-acquired brain injuries is our focus in this commentary as we contend

that the emergent science around the extent of harm associated with such injuries outlines a critical juncture and opportunity for reflection.

Sport-acquired brain injuries

Sport-acquired brain injuries refer to mild, moderate or severe traumatic brain injuries that occur in a sporting context and present a range of health problems. Collectively, the observable signs and symptoms following traumatic brain injuries are colloquially, but perhaps incorrectly, called 'concussion' (Wojnarowicz et al., 2017). Brain injuries occur as an aim in some sports, such as a 'knockout' in professional boxing and other combat sports. In others, they are an expected outcome of codified physicality, for example, while tackling in rugby and heading in football. Whilst they occur by accident in some sports, such as crashing in cycling or falling in horse riding. In this commentary, we are focused on what might be termed 'impact sports': those in which brain trauma follows logically and empirically from the rules and normative codes of the sport.

Brain injuries in sport can result in a range of short- (McGuine et al., 2019), medium- (Makdisi et al., 2017) and long-term (Bernick et al., 2020; Pearce et al., 2014) problems for a person's health. Whilst the short-to-medium-term effects of sport-acquired brain injuries can be serious, even fatal (Tator et al., 2019), the chronic, long-term problems of neurodegeneration in former athletic populations has received much popular attention in recent years. Furthermore, data is increasingly pointing towards the 'day-to-day' impacts to the brain that occurs in many sports as the main concern for increased risk of neurodegenerative disease (McKee et al., 2023; Nowinksi et al., 2022). These impacts, such as those experienced from heading a ball or tackling another person, do not usually give rise to readily observable signs and symptoms of brain injury, but their cumulative effect contributes to a volume of damage which increases the risk of neurodegeneration later in life (Daneshvar et al., 2023; Stewart et al., 2023).

Whilst scholars highlight that we have known of the deleterious effects of brain trauma in sport as early as 1928 (Casper, 2022), it is only in the last decade or so that such knowledge has entered the mainstream 'cultural consciousness' (Malcolm, 2019). We consider that a feature of this 'cultural lag' is the complex aetiology of brain injuries, which has resulted in the inability of academics and medics to provide a definitive statement about what constitutes a 'concussion' (Matthews et al., 2023). Such scientific challenges have enabled sport 'insiders' to fall back on calls for absolute proof and 'certainty' over a link between repeated head impacts and neurological and neurodegenerative problems before

taking action (Anderson et al., 2023). Such hesitations, and associated debates, are commonplace within academia, but can lead to confusion, obfuscation and manipulation of scientific understandings. The problem is that, especially in the hands of bad-faith actors, important scientific debate can be used to undermine the clear need for changes in practice. In this regard, the epistemological doubt that is central to the scientific method has, in part, enabled those with various vested interests in the continuation of impact sports – including sports' governing bodies, sport administrators and sport scientists – to do exactly that: cast doubt over the harms associated with sport-acquired brain injuries (for important discussions around this point, please see Anderson et al., 2023; Casper et al., 2022; Fainaru-Wada and Fainaru, 2013; Peters, 2023**;** Piggin et al., 2023, 2024).

The emergence of chronic traumatic encephalopathy (CTE) has particularly captured mainstream media attention. CTE is a form of dementia that onsets much earlier than Alzheimer's disease and manifests almost exclusively among cohorts with a history of repeated head impacts (McKee, 2020). Of course, comorbidities and complexities of CTE exist in athletic populations (Gaetz, 2017), but the common denominator across the groups that are frequently diagnosed with the disease, such as athletes, soldiers and domestic abuse victims, is that they have all been exposed to repeated brain trauma (McKee et al., 2023). The evidence of a link between repetitive head impacts in sport and risk of CTE is increasingly compelling (Nowinski et al., 2022), with the world's largest biomedical research agency – the American Institutes of National Health (NIH) – declaring there is a cause-and-effect relationship between repeated head impacts and CTE (NIH, 2022).

There has also been a substantial increase in post-mortem diagnosis of CTE in impact sportsmen (Alosco et al., 2018), at both professional (Mackay et al., 2019; Mez et al., 2017; Ueda et al., 2023) and amateur levels (Stewart et al., 2023), as well as in athletic populations below 30 years of age (McKee et al., 2023). Importantly, CTE is just one of multiple neurogenerative problems associated with repetitive head impacts, as other forms of dementia, progressive brain atrophy, ALS, Parkinson's and other conditions all pose risks to participants in impact sports (Bernick et al., 2020; Delic et al., 2020). Considering the historic and continued participation of many young boys in impact sports, including in physical education settings (White et al., 2022), the growing evidence around neurodegeneration and neurological issues has been described as an emerging public health crisis (Bachynski, 2019).

The host of brain issues associated with impact sports points to a logical and practical outcome: *that leaders within the sport industry, and in particular, sporting organisations and governing bodies, must take clear and bold action to shift the structure and culture of sport in order to reduce the likelihood of*

brain injuries at all levels. There has been much work at the 'edges' of this problem which focuses on education, technology and various attempts at body conditioning to prepare for impact (neck strengthening and neuromuscular warmups getting particular attention) (Patricios et al., 2023). Such approaches proceed from a position which naturalises the dominant model of sport wherein performance most commonly takes precedence over health – a point we return to in our conclusions. Consequently, only limited progress has been made towards dealing with the problem, which now increasingly includes sportswomen.

Sport-acquired brain injuries and 'progress' in women's sport

Due to their traditional exclusion from such spaces (see Dunning 1986; Dunning and Sheard, 1973; Matthews 2016; Matthews and Channon, 2020), women have only had relatively unrestricted access in significant numbers to participate in impact sports in the last 20 years or so. It seems clear, to us at least, that without any substantial changes to impact sports, post-mortem diagnosis of neurodegenerative diseases, such as CTE, and other neurological issues in sportswomen will increase in line with their participation. Unfortunately, evidence appears to be mounting in support of this logical proposition. Researchers from the Australian Sports Brain Bank recently diagnosed the first case of CTE in a sportswomen, Heather Anderson aged 28, an Australian rules football player, who was suspected to have committed suicide (Suter et al., 2023). This diagnosis has been described by the executive director of that organisation, Dr Michael Buckland, as the 'tip of the iceberg' (New York Post, 2023).

The long-term implications for brain health associated with repeated brain trauma are not the only concern. These are coupled with more immediate, acute, problems which can also lead to serious deleterious effects. For example, there are numerous cases of sportswomen dying by causes attributed to sport-acquired brain injuries. Jacinda Barclay, another Australian rules football player, died aged 29 in 2020 following a short and intense period of mental illness, with her autopsy showing neurological damage (Convery, 2021). More recently, the death of 26-year-old Siobhan Cattigan in 2021 brought increased attention to such issues. This case was particularly problematic due to the mismanagement and reported failure in duty of care by Scotland Rugby, with her father commenting, 'they fixed her broken bones but turned their backs on Siobhan's broken brain' (Atkinson, 2022). These examples may appear dramatic, but they serve to highlight the logical, and real, consequences of sportswomen gaining access to sporting spaces where bodily damage is a regular and routinised 'part of the game'.

Within this broader context, there has been a concurrent increase in the uncritical promotion, celebration and support for women entering impact sports. Some recent examples illustrate this point. First, World Rugby, the international governing body for the sport of rugby union, recently reported that one of its three core growth areas for investment is 'increasing women and girls' participation' (World Rugby, 2023). Second, FIFA, the international governing body for association football, have outlined growing women's football as a top strategic priority (FIFA, 2023). Third, Amanda Serrano and Danila Ramos became the first women in boxing's recent history to compete over 12 three-minute rounds, equal to sportsmen (BBC, 2023). Fourth, the American National Football League report the increasing participation of girls in tackle American Football (NFL Football Operations, 2020). Fifth, Australian rules football has seen significant growth in the women's game in recent years with the period 2010-2018 having a net increase of 52,979 (+865.5%) women participating across all participation categories (Burke et al., 2023). This is not an exhaustive list of examples, but it certainly highlights the trajectory of increases in women participating in impact sports which has also been coupled with the creation of new professional leagues for sportswomen across such sports (Burke, 2019). These opportunities have been heralded as breaking barriers and a positive move for women in sport by popular press, academics and sportswomen.

Of course, if such developments came without the logical consequence of increases in brain damage to another subsection of the population, we would be supportive of them. However, when reflecting on such 'progress' for women and women's sport, we find it impossible, and *distinctly unethical*, to ignore the lessons that come from over five decades of social scientific research which has *repeatedly* highlighted the damaging consequences of participation in performance sports (AlHashmi and Matthews, 2022; Brohm 1976; Hardwicke, Hurst and Matthews, 2024; Hoch 1972; Matthews, 2019; Matthews and Maguire, 2019; Messner 1990; Rigauer 1981; Young 2012). This knowledge is now combined with more recent science focusing on sport-acquired brain injuries and the harms associated with participation in many of the Western world's most popular sports are becoming increasingly apparent.

Sometimes we must stop and reflect on our direction of travel – in this case, if we care to look back at the trail of evidenced harm behind us, we are forced to reconsider our desired destination for sport and society moving forward. Early scholarship on gender and sport was vocal in its critique of the structure and organisation of sport and the direction of travel for women's sport (for a few examples see Duquin, 1995, English, 1978; MacKinnon, 1987; Nelson, 1991; Theberge 1997, 1998; Young 2009). Such critiques now appear to be less common, and a (neo)liberal framework which promotes equality

of access in impact sport as evidence of positive progress for women and sport, regardless of the price that must be paid, is dominant. This leads us to pose the critical question: is gender equality[1] in brain damage 'progress' for women and sport?

There is a well-developed history of critical scholarship and activism within feminist explorations of sport that can help situate this question. To that end, the liberal and radical feminist positions serve as two core positions framing how such a critical question may be responded to. Liberal oriented feminist research on sport has been largely focused on increasing access for women into male-dominated sporting spaces and, in more recent decades, the professionalisation of women's sport following broadly the same model of men's sports. Scraton and Flintoff (2013) outline that the underlying assumption of liberal sport feminisms is a belief that sport is a fundamentally socio-positive enterprise in which girls and women need access. Such assumptions appear common in scholarship and dominate in popular culture as women's sport has largely acceded to the performance sport model. Conversely, radical feminist approaches place efforts in challenging the dominance of a sporting model so deeply wedded to patriarchal structures and the valorising of sporting practices that are codified in traditional renditions of manhood (Birrell, 2000). Such a position means that, rather than placing efforts on increasing women's participation in such spaces and supporting, or celebrating, the existing structures, the broad sentiment is to reject the very premise of the dominant model of sport and focus efforts on restructuring sport in ways which are more aligned to feminist goals.

With these broad positions in mind, the dilemma we present in this paper exists in much the same way as discussed in early critical scholarship on gender and sport. That is, should (feminist) scholars in sport '…seek redistribution of resources in a troubled, some would say corrupt, institution or… seek a reconstitution of that institution' (Theberge, 1981: 348). There is considerable empirical evidence of redistribution through the increasing access and representation of girls and women in the institution of sport and progress in tackling various forms of discrimination (albeit with work still to be done there). There has, however, been a distinct lack of progress in attempts to reconstitute sport and in tackling the dominance of a model which celebrates masculine coded behaviours in which harm, injury and suffering are normalised features. It is our contention that a refocus on such radical

[1] Throughout this argument, we take 'gender equality' to denote efforts and resources being placed into increasing women's access to, and participation in, impact sports as they are currently structured. In doing so, the logical outcome is a strive for 'equal' opportunity brain damage. We acknowledge that notions of 'equality' and 'equity' have a long history within feminist scholarship, with feminist positions having differences in approaches to each. It is out of the scope of this short commentary to engage fully with this, we simply use 'equality' as a heuristic which broadly captures the current cultural context in sport which is dominated by (neo)liberal conceptions of equality.

approaches to ‘progress’ for women’s sport, and sport more broadly, would provide the best way of addressing the tension that sits at the foundation of the question we pose in this piece.

Concluding considerations

To be clear, we do *not* suggest that consenting adults should be prohibited from enjoying impact sports. Adults can, and should, be allowed to participate in risky sports on the basis they are informed of the known and very real risks to health. Our aim with this commentary is not driven by a paternalistic, patriarchal belief which reflects historical notions around sportswomen being the ‘fairer’ sex and thus more vulnerable to harm (Cahn, 2015; Hargreaves, 1994), nor that responses to sport-acquired brain injury should be sex- or gender-specific (see Malcolm 2023 for an overview of the problems with this). These, and connected issues, certainly add complexity to the discussion we’re outlining and we are aware of the need to tread with caution when approaching this topic.

We also understand and acknowledge the research highlighting that the opportunity to participate in impact sports can be empowering for women as it allows a transgression of gender norms (Berg et al., 2014; Berg et al., 2023; Channon and Matthews, 2016; Liechty et al., 2015; Liechty et al., 2016; Madrigal et al., 2015). This aligns with the notion of ‘physical feminism’, whereby women’s development of bodily competence is, in and of itself, a personal and political project which can undermine the assumed, and sometimes real, physical power men hold over women. Marta McCaughey’s work exploring this, in *Real Knockouts* (1998) and with Neal King in *Reel Knockouts* (2001), stands out to us as a particularly powerful illustration of sport’s embodied and symbolic role in such a feminist project (see also Matthews and Channon 2016 for various chapters on this). Yet it is now clear that, by experiencing such forms of empowerment, individual women must pay a price in terms of their brain health.

In this commentary, we have drawn attention to the five decades of social scientific analysis, which has shown the various ways men's and boys’ bodies and lives have been broken, and sometimes taken away, as an outcome of involvement in performance-focused impact sports. Given the strength of this evidence base, we think it is clearly unethical to ignore that recent shifts in the gendered landscape of sport have seen women and girls increasingly becoming central characters in such stories. This issue is now coupled with the more recent science on the consequences of brain trauma in sport. Thus, by raising the critical question posed in our title, we are not trying to diminish women’s chances to be involved in sports worlds, but rather, *we are challenging the very premise of valuing, promoting and*

progressing sports which involve brain damage as logical and empirical outcomes. This applies to everybody.

We expect that readers will be aware that the question we pose is being used to frame discussions rather than to produce a simplistic yes/no answer. In framing our discussion in this way, we have highlighted the increasing clarity of evidence around sport-acquired brain injuries which certainly signals an important inflection point which *should* make people reflect on the value of impact sports, for all sportspeople. If during readers' reflections on our argument, it becomes apparent, as it has become so plainly to us, that working towards equality in brain damage is a completely nonsensical thing to do, we suggest that leaders, organisers and practitioners in women's impact sport reconsider what they are striving toward and reflect on where their future efforts may be better placed. If political claims are to be made that the rise in women's impact sport is a sign of progress, we call on scholars, sport fans and any other stakeholders to reflect on the debts incurred to athlete's bodies and brains for such 'progress'. More broadly, scholars uncritically supporting sports worlds which rest on a foundation of harm are personally benefiting from the maintenance of the current status quo – there is something of an ethical blind spot at the core of such research which must be considered and addressed more overtly.

Therefore, whilst we accept the importance of research within the sociology of sport exploring and encouraging sportswomen's entrance into traditionally male-dominated sporting spaces, we more readily support thinking 'outside of the performance sport box' in order to challenge the further naturalisation of a model of sport which clearly produces a range of harms. Our commentary focusing on brain injury should be a catalyst for a more sustained effort in challenging the prioritising, prizing and promotion of performance focused impact sports. We are at a crossroads and have an opportunity to avoid the continued harm caused by the dominance of this model and with it the sustaining of ideas which valorise, normalise and enable the breaking of bodies and brains. We hope the question we have posed in this piece helps colleagues engage in tough reflections about the sports they are aligned with, embedded within and, in some cases, build careers upon. If such critical thinking does not take place, scholars are at risk of the sort of 'evangelistic ontology' that Matthews and colleagues describe as foundational to the remaking of the great sport myth (Matthews et al, 2023). We also note that those who are centrally involved in impact sports that rest on a foundation of harm to brains and bodies are best placed to do something about this problem. It is our contention that if the current trajectory continues, they, and we, are at risk of sleepwalking into the uncritical promotion of equality in brain damage. History will likely not judge such efforts kindly.

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