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Reem AlHashmi & Christopher R. Matthews

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Athletes' understanding of concussion – uncertainty, certainty and the 'expert' on the street

Reem AlHashmi and Christopher R. Matthews

School of Science and Technology, Nottingham Trent University, Nottingham, UK

ABSTRACT

Several scholars have examined the uncertainties faced by sport medicine professionals surrounding their diagnosis, treatment and management of concussion. Yet, recent evidence suggests that combat sport athletes seem to have 'reasonably good concussion knowledge'. How, then, have athletes gained such an understanding when medical professionals have not? We argue that this logical inconsistency is most likely an artefact of inflexible, 'snapshot' methodological procedures rather than a nuanced representation of athletes' actual understanding and experiences of concussion. We address this issue by employing immersive research strategies to provide epistemological space for complexities, contradictions and incoherencies that lie within fighters' understanding of such experiences to come to the fore. In so doing, we demonstrate the interdependence between notions of 'uncertainty' and 'certainty' in fighters' knowledge about concussion. Further to this, we propose the idea of 'the expert on the street' to explain the ways in which fighters gained lay medical certainty and highlight the potential problems that are imbedded within this process. To conclude, we suggest that inflexible, 'snapshot' methods will often produce overly reductive answers which do little to support the generation of the solutions which are needed to tackle concussion in sport.

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Despite having an increase in research dedicated to identifying and managing concussions, they remain one of the most clinically (Putukian et al. 2015), symptomologically (Gaetz 2017), biomechanically (Rowson et al. 2016), neurologically (Sharp and Jenkins 2015) and socio-culturally (Liston et al. 2016; Malcolm 2009) complex injuries that athlete support staff, medical professionals and governing bodies face. Given such complexity, it is possible to understand why many sport medicine professionals favour subculturally normative understandings over current medical definitions and guidelines for concussion assessment and management (Covassin and Stiller-Ostrowski 2009; Liston et al. 2016; Malcolm 2009; McCrory et al. 2009; Notebaert and Guskiewicz 2005).

Malcolm (2009) demonstrated how rugby union club doctors recognised that their diagnosis of concussion was at times influenced by their experiential knowledge and their place embedded within the subcultural networks of sport. Similarly, Liston et al. (2016, 4) argue that 'club doctors replaced medical/clinical definitions of concussion with a lay understanding and definition of it dominant in the sport subculture'. Sport medicine professionals' diagnosis and understanding of concussion are then in part shaped by the social norms that dominate performance orientated sporting spaces, rather than solely being a product of clinical/medical knowledge of the condition (Kotarba 1983; Liston et al. 2016; Malcolm 2009; Safai 2003; Walk 1997, 2004).

CONTACT Reem AlHashmi reem.alsayed.alhashmi@gmail.com School of Science and Technology, Nottingham Trent University, Clifton Lane, Nottingham, NG11 8NS

Sport governing bodies attempted to educate athletes about signs of brain injury and associated risks, and the importance of reporting symptoms (Bagley et al. 2012; Kaut et al. 2003; Miyashita et al. 2013; Robbins et al. 2014). This approach assumes that if athletes have an increased awareness about such topics, their interest in maintaining health will manifest into protective behaviours. However, Conway et al. (2020) argues that despite having 'considerable' knowledge about concussion symptoms and aetiologies, athletes tended to ignore, conceal and/or underreport them (for similar discussions see Chrisman, Quitiquit, and Rivara 2013; Corman et al. 2019; Delaney et al. 2015; Kerr et al. 2016; Liston et al. 2016; Ruston et al. 2019).

Recent studies examining combat sport athletes' attitudes towards and reporting of concussion have revealed several gaps and misconceptions in their understanding (Bennett et al. 2019; Follmer, Varga, and Zehr 2020). Follmer, Varga, and Zehr (2020) show that due to the absence of healthcare professionals during training, fighters were more inclined to seek information from 'unreliable' sources for concussion assessment. This, they argue, largely contributes to the athletes' lack of self-perceived knowledge about concussion. Conversely, Lystad and Strotmeyer (2018, 4, our emphasis) argue that Muay Thai fighters have '*reasonably good concussion knowledge*, attitudes, and reporting intention'. These findings were based on a survey scoring system (Rosenbaum Concussion Knowledge and Attitude Survey (RoCKAS)) similar to the one used by Follmer, Varga, and Zehr (2020).

The reliance in these studies on surveys and questionnaires means that participants' responses were largely restricted to predetermined questions and answers. We argue that employing inflexible, 'snapshot' methods can lead to problems such as limiting respondents' abilities to express themselves and clarify their answers, the reification of researchers' assumptions about important 'themes' and produce a static picture of participants understanding and experiences. While such issues might be somewhat overcome by skilled researchers, given the previously outlined lack of scientific and medical agreement around what concussion is, and is not, we argue that scholars do not have a solid conceptual basis from which to adequality build an inflexible, 'snapshot' method which is effective at faithfully representing the realities of athletes' experiences and understandings of brain injuries. This argument has even been acknowledged by some scholars, with Bennett et al. (2019) pointing out that the absence of definitions of concussion and brain injuries in their questionnaires affected the accuracy of athletes' self-reporting (also see Robbins et al. 2014).

We argue further that broad methodological issues with surveys and questionnaires, combined with the lack of clinical and scholarly consensus over what concussions are and how athletes should understand them, create various issues that threaten to undermine the validity of the researchers' recommendations. For example, based on their findings mentioned earlier, Lystad and Strotmeyer (2018, 6) argued that 'only modest overall improvements' are to be expected from further implementation of concussion education programmes that aim to increase fighters' awareness about the topic. In this light, they suggest that further studies should start considering the cost-effectiveness of such programmes. While also suggesting that further education in relation to optimising and addressing the gaps in athletes' concussion knowledge translation is 'vital' (Lystad and Strotmeyer (2018, 6). There is a strange tension here which we believe is produced when scholars unthinkingly reach towards athlete education as a recommendation, while also, employed methods which are not particularly well suited to developing a nuanced understanding of athletes' experiences, knowledge and therefore requirements for education.

To reiterate our position here, given that medical professionals are still striving to achieve 'medical certainty' (Malcolm 2009) about the diagnosis and management of concussion, we expect that combat sports athletes' understandings will be complex, contradictory and incoherent. Given this position, we consider inflexible and 'snapshot' methods to be ill-chosen means of exploring athletes' experiences. We argue that athletes having 'reasonably good concussion knowledge' (Lystad and Strotmeyer 2018, 4) is more likely to be an artefact of inappropriately deployed methods than it is a rigorous representation of the lives of the people that researchers are seeking to

understand. And if this point is accepted, it is important to also acknowledge that the conclusions, recommendations for policy and practice, and suggestions for education that invariably flow from such findings, rest on a foundation of empirical sand.

With all this in mind, we suggest it is time to think again about the conceptual tools and methodological approaches scholars are employing to explore athletes' lay understanding of concussion (and social life more broadly). The goal here is to provide a more coherent alignment between the 'foreshadowing problems' which several scholars (Matthews 2020; Malcom 2021; Malcolm 2009; Safai 2003; Liston et al. 2016) have reported and the strengths and weaknesses of the methods that are open to us.

Considering this, Matthews' (2020) recent work on boxers' embodied understandings of brain injuries provides an instructive example. Matthews (2020, 10) drew on over a decade of research conducted using immersive methodologies to describe how boxers 'made the distinction between the knowledge *that* boxing could cause injuries and "insider" *knowhow* based on lived realities'. In particular, boxers acknowledged that their embodied engagement in the sport largely enabled them to recognise and manage what *they* considered to be 'acceptable' bodily risks that came with subconcussive blows to the head. Such bodily negotiations also provided the basis for their rejection of 'outsider' (often medical) knowledge of brain injuries. Therefore, boxers' understandings of concussion are more influenced by 'risky body cultures' that dominate boxing subcultures (and performance sports more broadly) than medical advice, recommendations and knowledge. In this regard, the process of normalising health compromising practices and understandings about brain injury is most likely 'coded by ideas passed from coach to boxer and boxer to boxer within the gym' (Matthews 2020, 15).

The latter statement can usefully be further developed by the notion of 'team-doctoring' – a term first introduced by Safai (2003) and recently developed by AlHashmi and Matthews (2021) based on long term immersion in Muay Thai. Team-doctoring is understood as:

> The process whereby apparent medical knowledge is (mis)understood, recommended, transferred, interpreted and developed within a somewhat coherent team. While there might be more or less opportunity for those with formal medical knowledge to influence this process, the term is most usefully applied to groups of athletes who exist in relative isolation, for one reason or another, from formal medical expertise. (AlHashmi and Matthews 2021, 8)

This suggests that athletes that lack access to club affiliated medical support are more likely to engage in team-doctoring.

When taken together, these works demonstrate how methodologies that prioritise immersion and repeated bouts of interviewing within sporting subcultures can help produce nuanced understandings of athletes' knowledge and experience of dealing with concussion. In other words, such methodologies encourage an openness and flexibility which allows for different forms of knowledge to be captured. As such, employing immersive research strategies help offer epistemological space for the potential complexities, contradictions and incoherencies within participants' thoughts and behaviours to come to the fore rather than being hidden by inflexible, 'snapshot' methods. In what follows, we used similar methods and conceptual ideas as a basis to look anew at athletes' understanding of concussion. To provide some useful academic building blocks upon which our analysis is constructed, we draw on the intertwined notions of uncertainty, certainty and expertise.

Uncertainty, certainty and expertise

The role of uncertainty in clinical practice comprises one of the major themes in the sociology of medical knowledge (Atkinson 1984; Davis 1960; Fox 1957, 1980, 2000; Light 1979). In one of her earliest and most influential essays, *Training for Uncertainty*, Renée Fox (1957) argued that medical uncertainty stems from: 1) the limitation of medical knowledge, 2) the awareness of not being able to master all aspects of medical practice and 3) the inability to distinguish between the two.

Yair (2007, 689) suggests that one of the ways in which doctors manage their uncertainties is to 'choose what others have elected – so as to gain social validation', this is especially the case when associated with idiopathic diseases – which are often spontaneous conditions with unknown or complex causes, symptoms and prognosis. When considered in relation to sport, Malcolm's (2009) work on the role of medical uncertainty in the management of concussion in rugby captures this really well. The clinicians in Malcolm's (2009) study came to adopt a definition for diagnosing concussion that was accepted by players and coaches because it not only enabled their medical consultations to continue but also maintained their position within the club.

Medical uncertainty is also present within the 'illness experience' of patients, with a central focus on how 'illness' may affect one's life more broadly (Adamson 1997; Conrad 1987; Conrad and Barker 2010; Nettleton 2006; Pierret 2003). Further to this, Atkinson (1984) argues that the idea of 'uncertainty' in medical sociology is over-emphasised and should be considered in relation to notions of 'certainty' when examining the ways that medical discourses are played out during social interactions. Taking this argument forward, we attempt to adopt a similar approach when considering combat sport athletes' (who can be considered as patients in this case) understanding of concussion.

We draw on Schutz's (1970) phenomenology of expertise in which he proposes that the social construction of knowledge is built on three ideal types: the expert, the man on the street and the well-informed citizen. Schutz's work is 'of its time' in his exclusive use of male pronouns, we will try to unpick this where possible. The expert can be considered as knowledgeable in a system of 'relevances' imposed by pre-established problems within their chosen field. Therefore, such knowledge 'is restricted to a limited field but therein it is clear and distinct' (Schutz 1970, 239). The man on the street possesses 'a knowledge of recipes indicating how to bring forth in typical situations typical results by typical means. The recipes indicate procedures which can be trusted even though they are not clearly understood'. Knowledge possessed in this way may be vague but 'is still *sufficiently* precise for the practical purpose at hand' (Schutz 1970, 240). Between these two somewhat oppositional ideal types sits the well-informed citizen, who does not aim at possessing expert knowledge, but does not rely on 'recipe' knowledge alone.

In this paper we explore the intertwining of uncertainty and certainty in knowledge, and align this process with Schutz's (1970) notions of the social construction of expertise, as means of framing combat sport athletes' understandings of concussion. This helps us conceptually frame the ways in which they develop and manage the medical uncertainties that pertain to their 'illness experience' of concussion. In what follows, we focus on describing data that help illustrate these interlinked points after a discussion of some key methodological issues.

Methodology

In a critique of research containing conceptual, methodological and empirical issues surrounding definitions of sport related violence (SRV), Matthews and Channon (2017, 765) demonstrate the need for scholars to attend to cultural definitions, understandings and experiences of the people involved in such action:

> There appears to be an opportunity to think again about violence by adopting a research methodology that pays far greater heed to the lives, experiences and definitions favoured by participants and practitioners who engage with apparent 'violence' on a regular basis. Indeed, we argue that in working with such people to explore and expand definitions of SRV, scholars would be far better placed to appreciate the subtleties and nuances of experiences of being the target and/or perpetrator of physically (or otherwise) injurious action within apparently 'violent' sporting contexts.

We work from this epistemological frame of reference when exploring combat sport athletes' definitions of concussion. We argue that in paying closer attention to the symbolically and experientially meaningful side of athletes' engagement in sport, scholars can more accurately explore understandings of concussion. We then employ immersive research strategies to provide a wealth of opportunities for data to be collected towards this end. Matthews (2021, 41) describes immersive research as:

> Developing an approach to conducting a project which prioritises one or more ways of becoming deeply embedded within some social setting, with the aim of working towards a shared understanding of the behaviours, feelings and lives of those who inhabit that particular world. Data produced in this way is often rich in detail, based on social interactions between the researcher and participants, and likely to produce novel findings.

We use this definition to frame our approach because we, following Becker (2017), feel the term 'ethnography' has become too frequently and unproblematically applied to any and all forms of participant/observation research and has, as such, lost the ability to capture important distinctive characteristics of such work. We then define a central feature of our work as leveraging various forms and degrees of immersion with their associated strengths and weaknesses (see AlHashmi and Matthews (2021) for a more detailed critique and discussion).

It is perhaps useful to point that this study is part of a larger project that has been ongoing for the past two years. Considering this, the majority of the first author, AlHashmi'sinitial observational access focused on shadowing ringside medical personnel in combat sport events, and, because she was situated at the ringside, she was able to establish relationships and build rapport with referees, coaches, fighters and judges who typically also had experience in other aspects of combat sports. This type of access also provided her with another sample source predominantly through informal chats with potential participants backstage. Therefore, by utilising these forms of access, a snowball sampling method was used to help increase the number of participants.

AlHashmi's active involvement in combat sport, specially Muay Thai, for over six years, as a spectator and competitor (7 wins, 2 losses, 0 draws), made it relatively easy to identify with and access members of that particular community. As she can conform with the cultural norms within such spaces, her acceptance as a cultural 'insider' appeared to us to be relatively simple. However, as a Middle Eastern, Muslim woman, researching in a Western setting that was largely the preserve of men (similar to that described by Matthews 2018), we were aware that her presence might alter some established patterns of interaction. But given her continuous and active engagement with people within such spaces, she started to develop similar speech patterns, mannerisms, and cultural norms that pertained to that group. It is important to note that those behaviours were not intentionally adopted for a desire to 'fit in'; rather they were primarily part of a normal process of acquiring membership of that subculture (enculturing) through the production of actions that others recognised and affirmed as constitutive of competence. With that, her cultural differences, although present, became less apparent.

In certain situations, AlHashmi's status as a fighter *largely* preceded that of researcher. By presenting herself as a fighter and having the physical skills to back this up, we believe that participants were more comfortable to speak about certain experiences and/or 'controversial' issues that might be left unspoken in the presence of cultural 'outsiders'. In this regard, AlHashmi was able to align herself with participants' experiences of injury and health-compromising behaviours. In particular, her personal experience with concussion provided an interesting viewpoint where she was able to work towards an intersubjective understanding of the normalised acceptance of practices that involved enduring repetitive blows to the head. The following example from AlHashmi's experience during sparring is illustrative:

> I kept a tight guard, or at least I thought I did. But I still could not handle his punches. he was double my size after all. I eventually mustered up the courage and said "Oi, tone it down a notch". He smiled through his gumshield and nodded. We touched gloves. No change. At that point, for some reason, I was convinced that there was no way out of it other than to survive the round. I remember humming under my breath "just one round- just one round". I was too focused on maintaining my defence, so much so that I wasn't paying attention to what was

> happening. I got caught, I'm not sure what it was. probably a right hook by the feels of it. It was almost like I was in a trance for a micro-second. My vision was blurry and the floor felt unstable, like I was standing on a slant. I then walked towards [coach] at the corner. As I collapsed my arms on the ropes he lifted my head up and whispered "did he rock you?" I nodded, "fuck, you OK?" I nodded again. But in my head, I was thinking "oh God, why is he still blurry?" [Fieldnotes, autumn 2019]

AlHashmi's relative closeness to the experiences that are the focus of this study was one of the key elements in the coproduction of the data presented in this paper. It is important to note that accepting and enduring health-compromising practices was certainly not a designated principle of our methodology (try getting that though an ethics committee!). Yet we argue that it did give opportunities to easily gain access to experiences which might have been more challenging to collect for someone with less experience of combat sports.

179 hours were spent conducting observational research across 18 combat sport events (162 hours, 5 multidisciplinary, 1 MMA, 4 boxing, and 9 Muay Thai/kickboxing) and 3 training/sparring sessions (17 hours, across 3 gyms, 1 MMA/boxing and 1 kickboxing/ boxing, and 1 mixed discipline). Alongside this, AlHashmi trained in a combat sport gym 5 to 6 times a week for around 2 to 3 hours each day over the course of 18 months. Observational data was initially recorded as field notes typed on AlHashmi's phone and then expanded upon at home. All participants (of recorded observations and interviews) provided written and verbal consent and were given pseudonyms to maintain their anonymity.

The interview sample comprised of fighters from different combat sport disciplines (n = 76 + 11 supplementary) including Muay Thai (18 male, 23 female), kickboxing (5 male, 3 female), mixed martial arts (MMA, 2 male, 2 female), boxing (6 male, 2 female), Brazilian Jiu-Jitsu (BJJ, 5 male, 7 female), Taekwondo (2 female), and Karate (1 female) with some being active fighters and coaches (n = 18), and coaches/referees (2 males, 1 kickboxing/boxing and 1 Muay Thai). Interviews averaged around 30 minutes to one hour and took place in various locations such as private areas in cafes, backstage at events, university meeting rooms, quite corners in gyms, and venue lobbies. Some interviews (n = 21) were conducted using online video conferencing applications. Interviews were recorded with the consent of the interviewees and transcribed as soon as possible. None of the fighters interviewed in this study had access to club affiliated medical support.

It is worth noting that alongside the formal supplementary interviews, the relationships that AlHashmi developed resulted in participants contacting her informally to continue discussions. Such opportunities, we believe, were a product of some of the forthright but considered ways AlHashmi sought to 'push' or encourage the fighters to reflect upon their relation to risky body cultures, brain injuries and taken for granted assumptions. Given that one of our conceptual points of departure was the interdependence of uncertainty and certainty in knowledge (Atkinson 1984), AlHashmi often prompted participants to justify or provide evidence that supported claims around certainty. Her place as an 'insider' combined with closeness and trust that she developed with the participants ensured these conversations were productive (helped the participants reflect and sometimes reconsider their initial thoughts) rather than provocative (undermined the participants accounts in problematic and potentially mean ways). In short, the interviews themselves, the supplementary interviews and AlHashmi's continued presence in the field enabled participants to acknowledge the limitations of their knowledge and, as such, enable data to be collected to demonstrate the processual rather than static nature of understandings and experiences to come to the fore.

This data was analysed through a process informed by Blumer's (1969) discussion of 'sensitising concepts', Prus (1996, 132) neatly captures our use of these ideas:

> Blumer uses the term sensitizing concepts to refer to these tentative, analytical notions. Sensitizing concepts suggest subsequent lines of inquiry and assessment, but in each case the researcher has the obligation of making the concept match up with the circumstances at hand rather than making the data fit the concept.

In this regard, Blumer encourages scholars to ensure a relentless interaction between their academic ideas and data. In practice, the specifics of this process were worked out over the course of a long-term supervisory relationship. To provide a formulaic account of this process would be impossible and unuseful. Instead, it followed an emergent and shifting, yet systematic, disciplined and coherent path.

Following initial reading around the medicalisation of sport and pain and injury, AlHashmi began collecting observations and discussing them with the second author, Matthews.Over time as gaps in the literature (which we believe could be usefully addressed by the experiences the first author had access to) became increasingly obvious, interviewing commenced. AlHashmi worked diligently to develop her skills as an interviewer while also reflecting on potential effects of her own positionality within the field. Matthews largely acted to encourage clarification over the use of concepts and data, this often took the course of lengthy discussions where the limitations of both data and extant literature were considered. The data was read, reread and reflected in a cyclical fashion to help explore its relation to key literature on concussion, medical knowledge and expertise. Opportunities for conceptual refinement and useful empirical descriptions became increasingly apparent and at this stage we began the final stage of analysis by sketching out this paper. The process of writing helped us see logical tensions between our concepts and data, which were eventually overcome through deeper reading around uncertainty/certainty and a refinement of Schutz's work on expertise. We appreciate that this discussion does not have the reductive clarity which can be gained by overlying a 'how to do your analysis guide' into our research process, nevertheless, this captures the essence of our efforts and the path took to arrive it the evidence and conclusions that follow.

Fighters' understanding of concussion: transient certainty

As a starting point during interviews, AlHashmi sought to establish how the participants understood concussions in a broad sense. All of them understood that concussions were linked to some degree of head trauma. While there appears at first to be a level of certainty here, there was a *transience to this clarity*. Over varying time periods, sometimes during a single answer to a question and/or during the course of an interview, our participants began expressing various levels of uncertainty. These examples are illustrative of such responses:

Abbie[1]: A concussion is when you got a blow to the head and it's like when the brain hits the skull or something and then it like gets a swelling that's on the outside or the inside of – [pause] I don't know exactly, I don't know so much of what a concussion is. I know more of the symptoms of what a concussion is.

Frankie[2]: It's when your brain shakes in your skull and you get memory loss and really bad headaches. I've had that happen to me and I know that's happened to people and obviously that's concussion.

[7 minutes later in the same interview]

Frankie: . . . to be honest, I don't have a clue what's concussion. I don't know if it's just a brain injury or a serious uh – I haven't got a clue. I'm no doctor [laughs] I'm a fighter.

This shift from certainty to uncertainty displayed by the participants revealed their often assumed and loose understandings of concussion. They became uncertain once they started to think about the gaps and inconsistencies in knowledge that lie beneath their initial assertions of certainty.

Indeed, during the interview process some fighters started to recognise that concussions were not explicitly addressed in the way that other 'mechanical' injuries might be. Take Hannah[3] as an example:

Hannah: **. . .** You know what, it [concussion] is not something that people talk about very much. It's something that comes up a lot when people talk about in the context of maybe like really old fighters who maybe have taken too many hits or something . . . It's interesting that you put it like

that . . . I didn't really think about it. Well, yeah, it's not something we talk about directly, like head injury. Like a lot of emphasis is put on protecting your head, but the word concussion was – it hardly comes up.

It seems then, that the direct and long-term health implications of head injuries was sometimes left unspoken within gyms and this added to the lack of understanding about what a concussion was.

This produced a situation where most of the fighters told AlHashmi in quite certain terms that they have never had a concussion, while also being able to describe symptoms that might have led to a diagnosis of one. Take Nathan's[4] description of not being concussed, while getting 'caught by a stray knee' to the head:

Nathan: I remember I instantly saw stars and thought to myself 'fuck am I dazed?'. I didn't know where I was for a split second and I heard like a weird metallic, high dub-step sound from Transformers [both laughing]. Maybe that's what it sounds like when people say they hear bells or something. It was some really weird Transformery [akin to a 'phasing' sound effect] like metal grinding on metal sound. That's the best way to put it, it's real weird.

AlHashmi: do you think you were concussed?

Nathan: No, I don't think so. Cause I've had that before as well that same feeling, where I've almost passed out . . . your head just sort of feels a bit spaced out and sometimes you get this annoying lingering headache for a bit but then it all goes away. So, to answer your question, I don't know what it is, but It can't be good. You're basically depriving your brain of oxygen, it can't be good.

Like Nathan, most of the fighters did not seem to associate these symptoms with concussion or any other medical term linked to brain injury (we are thinking here for example of chronic traumatic encephalopathy (CTE) or secondary impact syndrome, which have recently found their way into some popular discourses around concussion in sport, see Ventresca 2019 and Lupkin 2012). Of course, we do not expect the fighters to have refined definitions of concussion (especially when the medical community are still working towards this). Instead, what we are pointing out here is how the fighters' initial certainty about concussion was 1) transient in that it quickly shifts to uncertainty when questioned and 2) largely based on a lack of knowledge around symptoms and mechanisms.

When the participants did describe mechanisms of head injury, such discussions were largely devoid of reference to medical conditions and assessments. James'[5] description of his 'mentality' and 'thought process' during sparring goes some way to explaining a part of this process:

James: In sparring I'm in the mentality of I'm practicing the fight. So I'm avoiding it all costs to have any kind of hiccup in my mentality in the sense if I get hit or rocked, my mentality needs to be 'I've got to get that point back' or I need to make sure my hands are up. I'm not thinking about, 'Oh, he's hitting me too hard in the head' or whatever, you know? [laughs] So it's not the first thing that comes to my mind aye, when you get caught by a punch what do you do? You automatically bring your guard back up amirite?

AlHashmi: or collapse on the ground [both laughing]

James: yeah that could happen aye [laughs] but my thought process is not to think about it. So, if I get hit, I react to it and forget about it.

The key term here is 'rocked' – fighters will use this, and similar terms, to mean being unsteady on their feet, and perhaps unable to get their bearings, after taking a blow to the head, which passes reasonably quickly, perhaps within seconds (see Matthews 2020 for a similar discussion). James' focus is not on health, well-being or medical interpretations of this potential symptom of a brain injury, instead, his intention is to maintain his sporting performance.

When fighters consider acute brain injuries by drawing on ideas connected to the performance ideologies which dominate the majority of sporting spaces (Hughes and Coakley 1991; Matthews and Jordan 2019; Nixon 1992), it should not be surprising that they do not also reach for medical definitions. As such, they seldom found themselves managing the medical uncertainty which we discussed in the opening of this paper. Instead, as reported by Matthews (2020), they had a simple and clear set of performance focused measures that were designed to ensure they could continue competing while compromised by symptoms that might more readily be recognised as concussion.

Given that medical professionals play a transitory role within combat sport communities, usually under conditions whereby fighters consider them as a potential blockage to their ability to compete at fight events (AlHashmi and Matthews 2021 ; Channon, Matthews and Hillier 2019; 2020a, 2020b; Matthews 2020), medical interpretations, definitions and management strategies were not central to the participants thinking. Instead, the gaps in knowledge in such spaces tends to be filled by the coach whose understanding is largely based on their experiential knowledge in the sport, to which we now turn.

The 'expert' on the street: lay medical certainty

Due to the absence of formal medical support in most combat sport spaces, coaches were often the *de facto* experts that our participants sought help from when they experienced health issues related to their participation in the sport. This position was supported by the coaches' experiential expertise from their own participation in sport and often from years of 'managing' their athlete's health issues (AlHashmi and Matthews 2021). A useful way of thinking about such advice is that it offered *lay medical certainty*. As such, this type of certainty is based on lay medical knowledge acquired from individuals who are viewed as experiential experts within their chosen field.

To further explain these observations, we propose an additional ideal type is added to Schutz's work which sits between 'the expert' and the 'man on the street': *the 'expert' on the street*. If we rework Schutz (1970), we can understand such a person as skilled at employing experiential 'recipes' that are learned from their long-term engagement in their chosen field. In other words, they are considered as 'lay' experts by the virtue of having personal experiences that are otherwise not commonly possessed and/or accepted by conventional experts. Indeed, Schutz (1970, 241-242, our addition in brackets) argues that 'the expert' 'will never accept a layman or dilettante as a competent judge of [their] performances' because the premise of their expertise 'starts from the assumption not only that the system of problems established within [their] field is relevant but that it is the only relevant system'.

While the personal experiences of the 'expert' on the street do not necessarily fit within 'the expert's' system of professional 'intrinsic relevances' (Schutz 1970, 242), they still play a central role in the social construction of lay knowledge. This is evident within sporting contexts where athletes tend to believe that some of their experiences with sport-related pain and injury are more likely to be dismissed and/or misunderstood by medical care providers (AlHashmi and Matthews 2021) Furthermore, unlike Schutz's (1970) well-informed citizen, the 'expert' on the street does not aim for 'reasonably founded opinions' but rather possesses the certainty that nothing more needs to be known in order to justify their pragmatic beliefs. Taken together then,and considering the preceding discussion, we can begin to understand how coaches are seen as the "experts' on the street' that provide fighters with lay medical certainty through the process of team-doctoring (AlHashmi and Matthews 2021).

There is an alignment here with other research which has highlighted the central places that coaches can occupy in setting the tone for what counts as medical knowledge within sporting spaces (AlHashmi and Matthews 2021 ; Kotarba 1983; Pike 2005; Matthews 2020; Safai 2003). Most of the opportunities to study how the coaches operated as experiential experts came when the participants discussed sparring sessions. The following examples are illustrative:

[after describing how he was dazed after getting caught by an elbow to the head]

AlHashmi: Did you tell [coach] that you felt dazed?

Saif[6]: Yeah. He gave me an ice pack to put on my black eye and told me to lay on the floor and rest a couple of rounds. Then I told him 'oh [coach] I can't continue, I think I'm dazed' so he said to rest it out for a few days and go to the doctor. He said 99% you'll be fine but just to stay safe.

While fighters were often told to 'go to the doctor', this rarely happened. The coaches were not observed following up with this request in any committed way and, we tentatively suggest that, the fighters appeared to consider such instructions as guidance that did not need to be heeded.

The coaches often draw on technical pointers to improve performance as a means of helping fighters protect themselves from future brain injuries. In this way, being 'dazed' or 'rocked' become something of a 'teachable moment' for the participants:

[after describing getting rocked by an uppercut]

AlHashmi: What happened after? Did you tell someone?

Dante[7]: Yeah, yeah me coach straight away … so he checked me eyes, felt me head, me chin basically made sure all me faculties were together [laughs]so yeah … sat me out for a few rounds and gave me his words of wisdom [laughs].

AlHashmi: What are his words of wisdom?

Dante: 'Hands up, chin down, son' [laughs].

Further to this, the fighters spoke about engaging in practices set up by their coaches that were specifically geared towards helping them deal with concussive symptoms inside the ring (see Matthews 2020 for another example). They also believed that such practices prevented them from sustaining further injuries to the head. The examples below are indicative:

[After describing a particular drill that prepared her to know 'what it's like to be rocked in a fight']

AlHashmi: So how do you think this drill can help prevent you getting further punishment if you're already getting punched in the head to begin with?

Maddie[8]: Hmm … I'd like to think that it prepares my head to get used to it so I'm not as startled if it happens in a fight. I imagine if you're not used to it then … then you're more prone to counts or flash knockout or small concussions maybe? [sighs] I don't know, but it looks to me that if you're prepared for it then the impact isn't as bad.

Jordan[9]: My coach says I'm quite prone to head injury 'cus I've got quite a bendy neck. So essentially he said that means that my head tends to snap back when I get hit quite hard. Which to me means that my brain is shaking a little bit more than if my neck was stiff. I don't know if that's true or not but that's why we spend a lot of time conditioning [strength training] me neck to prevent that from happening.

These examples show that fighters draw on their coaches' experiential knowledge to produce lay medical certainty when dealing with concussive symptoms. In this, the 'doctoring' process is no longer associated with the exchange of medical knowledge in connection to symptom management (AlHashmi and Matthews 2021 ; Safai 2003). Rather, it is centred around the circulation of performance-oriented understandings that were aimed at helping fighters avoid future brain injuries by increasing their skill base or physical capacity to absorb blows to the head. It is important to recognise that the 'layness' of this knowledge described here disconnects it in important ways from medicine in the normative sense. Instead, such knowledge captures any advice that pertain to managing and treating medical conditions regardless of its origins, evidence base or veracity.

Considering this, focusing on performance in favour of health provided the fighters with a level of lay medical certainty by giving them an explanation of what went wrong and what to do to stop it happening in the future. Such a pragmatic and clear 'diagnosis', 'prognosis' and 'treatment' is challenging for medics to develop due to the manifold debates, controversies and inconclusions that characterise medical and scientific understandings of concussion (Gaetz 2017; Malcolm 2009; Sharp and Jenkins 2015). And this helps us to understand the allure of simplistic, performance-based advice regarding concussion.

Given these issues, it is important to highlight the problematic potential of such experiences, as they are part of the basis from which fighters managed concussive symptoms as a 'normal' part of their sport. This was particularly evident in a conversation with Nadia[10], after describing how she adopted a similar 'mindset' to that of her coach when dealing with consecutive punches to the head in her last fight:

Nadia: **...** the thing is like, I know that James has the same mindset as well, and I think I like somehow subconsciously took it from him where I'm like, 'No, I'm stronger than this [head] injury like I can do this' you know? Fighters fight, it's what we train to do. So we can't afford any distractions.

AlHashmi: Do you think that thinking about your brain health is a distraction?

Nadia: Erm – I think [pause] maybe during the fight yes? Cause you have to stay focused on surviving the round . . . but generally uh – I don't think I ever thought about it this way. That's a bit shitty now isn't it? [laughs]

Nadia's (and James') examples are indicative of participants managing, 'surviving' and overcoming symptoms of concussion in order to keep performing. Here, the initial certainty they experience in this process was largely drawn from their coaches' experiential knowledge. This 'expertise from the street' can provide advice that, although useful at times, is only – 'precise for the practical purpose at hand' (Schutz 1970, 240). In this regard, we argue that this knowledge can no longer serve its purpose once notions about health take precedence over performance.

This is evident in the way that some fighters appeared to lack ways to manage the potential consequences of their repeated exposure to blows to the head. Instead, they were largely dismissive of such issues:

AlHashmi: You were talking about how old fighters tend to end up being punch-drunk and stuff. Is it something that you worry about?

Omar[11]: Uh, no. It isn't. If I do become punch-drunk in the future or have some sort of mental illness or whatever, I'll deal with it when the time comes. Otherwise, it's a waste of brainpower to think about it right now. Yeah, just a waste of mental energy. Live and let live.

Izzy[12]: Think about it this way eh, it's like that one time you cross a red light and you get hit by a bus cause you didn't see the bus coming, like you never know what's gonna happen in life. I don't like thinking about these things 'oh brain damage, Oh CTE, oh whatever' cause this is what makes me happy and fuck knows what's gonna happen tomorrow so why worry about it – I really don't like talking about these things, it puts me on edge and I don't like it.

In this regard, the dominance of ideologies of performance, which were well suited for managing acute and relatively minor symptoms of concussion to enable continued participation in sport, failed to provide *any* sustained and considered means of accounting for, and then managing, long-term health consequences. Instead, the athletes were unequipped for issues which lay beyond an immediate focus on sporting performance, other than an acceptance of possible physical and mental decline.

Conclusion

In this paper, we demonstrate the importance of Atkinson's (1984) discussion of the interdependence of certainty and uncertainty. Considering such an understanding enabled us to account for the changing nature of our participants' experiences of concussion. We prioritised a method that provides epistemological space for the complexities, contradictions and incoherencies that lie within our participants experiences and understandings which, as argued earlier, might otherwise be hard to capture using inflexible, 'snapshot' methods. As such, the immersive methodologies employed in this study have helped us highlight a critical element in fighters' illness experience and understanding of concussion that is – the transient nature of lay medical certainty.

The majority of the fighters' knowledge about concussion was built on practical advice passed on to them by their coaches whose expertise was key in offering lay medical certainty. This, in Matthews' (2020) words, largely influenced how fighters 'negotiated personal acceptance of culturally shaped notions of appropriate bodily risk'. Indeed,when speaking about their personal health and safety in relation to concussion, it was almost always associated with their ability to perform in the ring rather than their overall well-being and seldom included references to formal medical knowledge and expertise.

As such, we describe the participants understandings of concussion as transient, as their initial, and somewhat confident, expressions of certainty tended to falter once their thoughts went beyond performance-oriented ideas. This was clearly evident in conversations about long-term consequences of brain injuries. It is only then that their responses appeared to be 'more governed by sentiment than by information' (Schutz 1970, 241) as they tended to manage feelings of uncertainty by speaking about the personal benefits and enjoyments they have gained through their embodied experiences in combat sports.

Furthermore, considering Schutz's (1970) ideal types of expertise as a frame for our analysis have allowed us to bring forth an additional type – the 'expert' on the street – which helped us explore the circulation of knowledge in spaces that lack access to conventional medical experts. Given that coaches dominate power relations in most combat sport settings, fighters tend to avoid challenging this status by overtly questioning the training methods they suggest or by seeking alternative advice elsewhere. And apart from offering context-specific and relatable advice compared to formal medical professionals (AlHashmi and Matthews 2021), the coaches reduced the uncertainties associated with concussion to practices that, even though not clearly understood in a medical, clinical or mechanistic manner, made sense to both them and their fighters. Because, more often than not, focusing on performance as the main underlying principle for considering and managing concussion, enabled fighters (who follow such advice) to continue their participation in the sport. As such, thinking through this ideal type has enabled us to highlight some important nuances that lie within the social production of lay expertise. It is here where we can begin to understand why some athletes continue to engage in health-compromising practices despite apparently having 'considerable' awareness and education about their implications.

To conclude, the purpose of this paper is not to provide recommendations or solutions on how to better equip athletes to understand and deal with the deleterious effects of brain injuries. Rather, our aim here is to further highlight the complexities that lie within the different ways athletes develop their understanding of concussion (Matthews 2020; Liston et al. 2016). Other work that explored athletes' knowledge about concussion were quick to recommend further athlete and/or coach education and awareness as part of a working solution within their concluding remarks (Bennett et al. 2019; Follmer, Varga, and Zehr 2020; Lystad and Strotmeyer 2018). This seems to be their default option when considering future directions, regardless the outcome of their findings (as discussed in the opening of this paper). However, as mentioned earlier, even with 'considerable' and/or 'reasonably good' concussion knowledge, athletes still chose to engage in health compromising practices and performance continues to take precedence over health. We argue that suggesting such solutions from findings

based on inflexible, snapshot methods which do not maintain epistemological space for the process of knowledge building and the interdependence of uncertainty and certainty, is fundamentally problematic.

We have demonstrated that immersive research strategies, and the conception of knowledge as a process rather than a static picture, can provide a more nuanced understanding of some of the reasons why athletes choose to continue to engage in health-compromising behaviours. We have offered continuing insight into the experience of concussion which, when further developed, will be a useful component of future recommendation for policy and practice.

More detailed research is needed and we argue in the strongest terms that such work should maintain a dedicated closeness to the the way athletes experience and understand concussion with as much of the complexities, contradictions and incoherencies accounted for as possible. In this regard, we suggest that inflexible, 'snapshot' methods will often produce simple, static and theoretically flat answers which do little to support the generation of the solutions which are needed to tackle concussion in sport. And if as Liston (2019) argues, 'culture eats protocols for breakfast', we suggest that protocols, policy and changes to practice which are cooked up from a base of overly reductive empirical conclusions should not even be served up in the first place.

Notes

1. BJJ blue belt in her 20s. picked up the sport in university 3 years ago.
2. Professional Muay Thai fighter and coach in his late 30s. Retired from the sport 5 years ago shortly after the birth of his first child.
3. Professional Muay Thai fighter in her early 30s. holds several international titles.
4. BJJ blue belt in his 20s. Works as a laboratory research assistant.
5. Professional Muay Thai fighter and coach in his 30s. currently taking a break to recover from a knee-replacement surgery.
6. Amateur Muay Thai fighter in his 20s. picked up the sport in university 4 years ago. Works part-time as a receptionist in a local hotel.
7. Amateur boxer in his early 20s. Picked up the sport in university 2 years ago.
8. Professional Muay Thai fighter and freelance artist in her 20s.
9. Professional Muay Thai fighter in his 20s. Works as an engineer in a private company.
10. Amateur Muay Thai fighter in her 20s. Works as a teaching assistant in a primary school.
11. Amateur kickboxer and psychology student in his 20s.
12. Professional Muay Thai fighter and coach in her 20s. holds several area titles.

Disclosure statement

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Notes on contributors

Reem AlHashmi is a PhD candidate in the sociology of sport at Nottingham Trent University. Her work explores the medical regulation and athletes' experiences with pain and injury in Combat Sport.

Christopher R. Matthews is a social scientist and epidemiologist who specialises in developing immersive research strategies, he recently published Doing Immersive Research Vol.1.

ORCID

Reem AlHashmi http://orcid.org/0000-0002-9499-0951
Christopher R. Matthews http://orcid.org/0000-0001-8561-2863

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