Routledge
Taylor & Francis Group

Qualitative Research in Sport, Exercise and Health

ISSN: 2159-676X (Print) 2159-6778 (Online) Journal homepage: www.tandfonline.com/journals/rqrs21

Mapping un/contested knowledge of sex/gender in high performance sport: applying Actor-Network Theory to women's Olympic Weightlifting

Monica Nelson, Holly Thorpe, Belinda Wheaton, Gloria Hinemoa Clarke & Stacy Sims

To cite this article: Monica Nelson, Holly Thorpe, Belinda Wheaton, Gloria Hinemoa Clarke & Stacy Sims (2026) Mapping un/contested knowledge of sex/gender in high performance sport: applying Actor-Network Theory to women's Olympic Weightlifting, Qualitative Research in Sport, Exercise and Health, 18:2, 210-227, DOI: 10.1080/2159676X.2025.2578839

To link to this article: https://doi.org/10.1080/2159676X.2025.2578839

Published online: 26 Oct 2025.

QUALITATIVE RESEARCH IN SPORT, EXERCISE AND HEALTH
2026, VOL. 18, NO. 2, 210–227
https://doi.org/10.1080/2159676X.2025.2578839

Routledge
Taylor & Francis Group

Mapping un/contested knowledge of sex/gender in high performance sport: applying Actor-Network Theory to women's Olympic Weightlifting

Monica Nelson[a], Holly Thorpe[a], Belinda Wheaton[b], Gloria Hinemoa Clarke[c] and Stacy Sims[d,e]

[a]Division of Health, School of Sport and Human Movement, University of Waikato, Hamilton, New Zealand; [b]Te Wānanga o Ngā Kete - Division of Arts, Law, Psychology, and Social Sciences, School of Psychological and Social Sciences, University of Waikato, Hamilton, New Zealand; [c]Division of Health, School of Health Equity and Innovation, University of Waikato, Hamilton, New Zealand; [d]SPRINZ, Auckland University of Technology; Stanford Lifestyle Medicine, Auckland, New Zealand; [e]Stanford Lifestyle Medicine, Stanford University, Palo Alto, California, USA

ABSTRACT

Beliefs about women athletes' bodies, physical capacities, and the 'best' training methods to attain maximal performance are continually debated inside and outside of sport. But it is unclear how these many disparate, and at times conflicting, knowledges come together to shape women athletes' health and performance. In this paper, we engage Actor-Network Theory (ANT) as a methodological framework for examining the variety of sex and gendered knowledges in sport. To illustrate the functionality of this approach to examine extensive, diverse systems of knowledge, we discuss our operationalisation of ANT as a methodology to examine the sex and gender-focused knowledge networks of Olympic Weightlifting. Drawing from a series of linked qualitative methods, we recount the multitude of contested knowledges about sex, gender, and strength that our mapping made visible, as well as the human and non-human entities that acted to facilitate or hinder their travel throughout the sporting network. Combining actor-network maps with creative non-fiction vignettes, we demonstrate the complex interactions of knowledge that circulated between areas of the network (Olympic Weightlifting gyms, Instagram, academia and the International Weightlifting Federation). We conclude by providing concrete methodological recommendations for future researchers that endeavour to use ANT to study systems of knowledge.

ARTICLE HISTORY
Received 11 April 2025
Accepted 19 October 2025

KEYWORDS
Actor Network Theory; methodology; knowledge; Olympic Weightlifting; gender

Introduction

It's Heavy Friday at Solo Weightlifting Club—an Olympic Weightlifting gym in Aotearoa New Zealand—and I am taking a much-appreciated rest between lifts by watching the informal 'Battle of the Sexes' that is brewing. Elise, a young, elite woman weightlifter, has loaded 120 kilograms on her barbell for her next clean & jerk, a match of her personal best. So has Joshua, a man in his mid-thirties with roughly the same best lifts. With silent focus, Elise rubs chalk into her hands, tightens her wrist wraps, approaches the bar, and cleans it to her shoulders. Unfortunately, she fails to secure the weight overhead. Joshua follows, stepping towards his barbell and letting out a wordless yell that draws the attention of everyone in the gym. Like Elise, he makes the clean but misses the

CONTACT Monica Nelson mn266@students.waikato.ac.nz School of Sport and Human Movement, University of Waikato, Knighton Road, Hamilton, 3215 New Zealand

> jerk. Her turn again. Focus, chalk, breathe, brace, go. This time she misses the clean, and her coach tells her to move on for the day. As Joshua returns to the bar for redemption, the mood of the gym shifts. Joshua yells, and shouts reverberate from the men around him. The lift means something now. To my jaded feminist/weightlifter/researcher ears, the men's calls of support are really 'be a man, show that you can out-lift her'. Joshua makes the clean, yells again as he adjusts the bar on his shoulders. He drives the bar overhead, locks his arms straight, and holds it overhead for several seconds longer than needed, drinking in the cheers of the men around him. It seems that a standard of strength has been (re)created: elite women are not as strong as moderately strong men.

Later, in a focus group with the women weightlifters, we discuss the differences between men and women weightlifters. The Battle of the Sexes incident re-emerges:

> One of Elise's teammates mentions the contest. 'It's so annoying that men do that, showing off that they're stronger than you'. Another woman chimes in: 'they're not, though. Did you see Worlds? That 20-year-old, Olivia Reeves, snatched 120. It looked easy'. The conversation turns into a debate about strength levels. Someone pushes back: 'she's strong, but she's not stronger than men at the same bodyweight. They have testosterone and we don't, that's why weightlifting has men's and women's categories'. One of the athletes said they had chatted with their coach about this; he thinks that women just haven't been competing in the sport long enough, and that eventually we won't need gender categories. The debate continues, with no conclusions reached. Joshua's 'victory' might have created knowledge about sex, gender, and strength, but it was ultimately just one piece of information among a vast number of others.

Critical scholars have convincingly argued that our knowledge about how sport 'should' be done and what bodies are capable of is far from neutral. As feminists have long contended, gendered knowledge about the 'natural' athleticism of men's bodies negatively shapes sportswomen's experiences and performances (Cahn 2015; Capranica et al. 2013; Hargreaves 1994). Yet in the current sport knowledge landscape, contested information about women's bodies is multiplying and evolving (Wheaton et al. 2024). Sportswomen are demonstrating ever-higher levels of athletic capacity; exercise scientists are working to amend their field's historical inattention to women athletes (Cowley et al. 2021); and sociocultural scholars continue to resist the assumptions of binary sex and gender that underlie contemporary sporting systems (Bekker and Mumford 2025; Posbergh et al. 2024). In this context, knowledge about the athletic possibilities of women's bodies is highly varied and debated, producing a complex knowledge landscape that interacts with and shapes women athletes' bodies in new, contradictory ways.

In this methodology-focused paper, we argue that existing scholarship might be meaningfully extended by comprehensively examining the contemporary knowledge landscape in sport and its effects on women athletes. We suggest the use of Actor-Network Theory (ANT), a set of methodological sensibilities that aims to closely 'map' the construction of entities and phenomena (Latour 2005; Law 2008) and which has had limited application in the study of sport and gender. To illustrate how ANT research sensibilities can be functionally applied to study sport knowledge networks, we discuss how we operationalised ANT to examine how knowledges of sex, gender, and strength circulate in Olympic Weightlifting, influence women weightlifters' bodily practices, and contribute to their strength outcomes. A barbell-based strength sport wherein athletes compete to lift the most combined weight in the two ground-to-overhead Olympic lifts, the 'snatch' and the 'clean & jerk', Olympic Weightlifting is increasingly populated by talented women athletes, raising new questions about women's strength capacities and appropriate training methods. We draw on examples from this project to provide insights into the complex yet interrelated knowledges in the network we examined, highlighting what an ANT-based methodology can add to our understandings of sex- and gender-related knowledges in sport.

Researching sexed and gendered knowledge in sport

Over the past thirty years, feminist sport scholars have drawn upon diverse theories and concepts to examine the connections between power, knowledge, and bodies (Birrell 2000; Blackman 2021). An important strand of this literature has engaged with poststructural theorisation, particularly that of

Foucault, which frames knowledge as a critical link between power and bodies (Markula and Pringle 2007). Within this framework, knowledge of what is 'normal' and 'doable' within a context determines how bodies 'should' be treated and shaped. Women athletes' experiences can therefore be linked to broader societal, scientific, and medical systems of knowledge about what women's bodies 'should' look like and do (Dworkin 2001; Vargas and Winter 2021). Importantly, poststructural theorisation also recognises the possibility of resistance to dominant discourses (Markula and Pringle 2007). While such scholarship primarily examines institutions and those in positions of power (Kerr, Edwards, and Konoval 2022), women may resist through 'technologies of self', transgressive body projects, and the use of alternative bodily discourses (Jones and Carmichael Aitchison 2007; Markula 2020).

Foucauldian researchers also draw critical attention to coaches' knowledges of sex and gender, which may reinforce existing power relations and ensure women's weakness. By being discursively positioned as 'experts' in sporting spaces, coaches—oftentimes men—exercise power over women athletes' bodies through knowledge. Using their knowledge of the 'right' way to practice sport, coaches determine women athletes' bodily practices, monitor their compliance, and at times encourage invasive forms of surveillance (Barker-Ruchti and Tinning 2010; Schofield, Thorpe, and Sims 2022). Moreover, coaches have been shown to rely on coaching strategies that draw on stereotypes related to women's 'natural' physical inferiority, hindering sportswomen's athletic development (Gosai, Jowett, and Daniel 2022; Norman 2016).

In sociocultural examinations of strength sports, such poststructural scholarship of gender, power, and discourse has provided a vital prompt to consider how dominant and alternative/sport-specific 'commonsense' knowledge about women's bodies maintains gendered power relations and hinders women's strength development. Recent examples include Nelson and Jette (2023) and Vargas and Winter (2021), who conducted research on the impact of dominant and sport-specific discourses about 'acceptable' body types on women Olympic Weightlifters' and Powerlifters' body compositions. Yet while these analyses are well-suited to demonstrate the use of select discourses to enact gendered power relations within specific sporting domains, it remains that contemporary knowledge about sex, gender, and strength is contradictory, highly diverse, and rapidly changing as women increasingly engage in strength sports and researchers take a greater interest in their bodies and experiences (Nelson 2025; Nuckols 2022). Recent sociocultural scholarship indicates, for example, that although beliefs about femininity, muscularity, and strength are changing (Desjardins 2025) and strength training is increasingly framed as a source of empowerment for women (Hockin-Boyers, Pope, and Jamie 2021; Walters and Hefferon 2020), longstanding gender norms that associate strength with masculinity continue to be reflected in gym spaces, positioning women as unwelcome outsiders (Coen, Rosenberg, and Davidson 2018). To comprehensively understand the contemporary sporting knowledge landscape and its effects on women athletes—in strength sports and beyond—we therefore advocate that there is a need to examine the multiplicities of knowledges that are shaping women athletes' experiences and their varying degrees of impact. We posit that ANT might be meaningfully applied to address this gap in our understandings of sex and gendered knowledge in sport.

ANT as methodology to map knowledge of sex and gender

Most frequently credited to the foundational work of Bruno Latour, John Law, Michel Callon and Steve Woolgar, ANT was initially developed in the 1980s through empirical case studies detailing the construction of phenomena (Law 2008). Despite being named a 'theory', ANT's proponents assert that it is a set of sensibilities to guide research, not an explanatory theoretical framework (Latour 2005; Law 2017; Mol 2010). Providing an alternative to 'macrosocial' (Law 2017) theoretical explanations common in sociology, ANT closely describes 'how the social is done or holds together' (Law 2008, 148) by extending 'a basic ontological claim that all entities in the world—from nanoparticles to bodies, groups, ecologies and ghosts—are constituted and reconstituted in shifting and hybrid

webs of discursive and material relations' (Farías, Blok, and Roberts 2020, xx). Researchers adopting ANT sensibilities are therefore directed to map every entity that interacts with others to form a 'network' that constructs the phenomenon that the researcher studies (Latour 2005; Law 2008). ANT adopts a material-semiotic orientation to the construction of reality (Law 2017); all human and non-human entities—i.e. 'actors' – are considered equally agentic in that they actively 'modify a state of affairs by making a difference' in its construction (Latour 2005, 71). Because actors continuously change, join networks and leave them, ANT researchers also explore how networks are 'stabilized' over time by actors and actions (Latour 1987). Broadly used across a wide range of disciplines, ANT has been productively applied in sport studies to map sporting and sport organisation networks (Darnell 2020; Wheaton and Thorpe 2021), examine mega-events and their legacies (Brice and Thorpe 2025; Dawson and Jöns 2018), reframe coaching practices (Kerr, Edwards, and Konoval 2022), understand the role of non-human objects in sporting environments (Geckle 2021; Kerr 2014, 2016; Maclean 2021; Weedon 2015), and map exercise scientists' recruitment into sport spaces (Kerr 2016).

Given its foundation in science studies, ANT scholarship often conceptualises knowledge as a network effect, the product of the interactions of human and non-human actors such as scientists, lab equipment and survey instruments (Jette 2025; Latour 1987; Latour and Woolgar 1979). However, ANT scholarship has also framed knowledge as an actor capable of shaping the networks that it interacts with. For example, Kerr's (2016) analysis of the sociotechnical network of gymnastics examines how knowledges interact with one another and come into conflict within actor-networks. Noting 'tensions regarding knowledge sources and ways of knowing' (98) in gymnastics gyms, Kerr uses ANT to recount the many actors that facilitated or hindered the integration of sports science knowledge into the actor-network and the impacts of this knowledge on other actors. While not explicitly explored in Kerr's writing, this ANT-based framing positions knowledge landscapes as a myriad of interconnected, ever-changing networks wherein knowledges are continuously created, introduced, altered, debated, and rejected, all while shaping and being shaped by the other actors in the network. This framing notably departs from Foucauldian theorisation, which often frames broad systems of knowledge (i.e. *epistemes*) as unquestioned and powerful frameworks that structure individual understandings of reality during a given era (Markula and Pringle 2007). The knowledge networks of ANT are thereby positioned as porous and open for debate: actors 'may pick through what is on offer and take bits and pieces. They do not get overwhelmed by a massive structure or a coherent episteme' (Mol 2002, 64).

We argue that conceptualising knowledge as an actor permits a comprehensive mapping of the variable forms, topics, and networks of knowledge about sex and gender circulating in sport, allowing an exploration of their interactions with/impacts on the actors that they are networked with (e.g. athletes, coaches, academics, social media content producers, medical professionals, sport equipment, training programmes). In the remainder of this paper, we recount our process of operationalising this ANT-based perspective to explore how information about women athletes' bodies circulates (or fails to circulate) across several disparate yet interconnected knowledge networks.

ANT methodology in practice: tracing the Olympic Weightlifting knowledge landscape

The aim of our project was to understand the breadth of knowledge about sex and gender in Olympic Weightlifting and its social and material impacts on women athletes in the sport. Informed by the lead researcher's multifaceted experience in the sport as an athlete, coach, researcher, and former media producer, we knew that many divergent knowledges about sex, gender, and strength circulated in the sport. We therefore anticipated that ANT would align with our interest in achieving an in-depth understanding of the many knowledges that come together to affect women weightlifters' bodily practices while encouraging us to follow these knowledges beyond individual gyms.

To functionally operationalise ANT to trace knowledge, our first concern was determining where to begin our network mapping. While actors 'may pick through what is on offer and take bits and pieces' (Mol 2002, 64), we recognised that not all actors have equal agency to choose the information that guides their practices. We therefore drew on the writing of feminist ANT scholars, who have noted ANT's inattention to major inequalities that impact the networks that researchers observe (Quinlan 2012; Star 1990). Quinlan (2012) argues that ANT can be merged with feminist sensibilities to become sensitive to power and inequality, recommending first that researchers consider power relations when choosing where to begin their network mapping: a researcher who starts with the perspectives of the powerful will recount a network that diminishes the actions of the already-marginalised. Second, she advises that ANT researchers carefully trace the localised construction of power relations, permitting them to avoid 'macrosocial' theorisation while addressing social inequalities. Finally, Quinlan pushes for researchers to consider the political outcomes of their research. Given our interest in understanding the effects of knowledge on women weightlifters, who we believed were likely to have the least agency to choose the knowledges of sex, gender, and strength that shaped their practices, we drew from Quinlan's recommendations and structured our methods to closely map the knowledge networks of women Olympic Weightlifters and expand outwards to other actors.

During data collection, we began by using participant ethnography, journaling, interviews, and focus groups to document the knowledge networks of 17 women weightlifters in Aotearoa New Zealand. Over time, we expanded our network mapping as data collection highlighted new areas of the broader sporting knowledge network, at times necessitating the adoption of additional methods. We gradually added interviews with three local and eight international Olympic Weightlifting coaches, five International Weightlifting Federation (IWF) administrators/committee members, and reviews of academic literature and social media posts. While many of these methods centre humans, we found that non-human actors – e.g. barbells, weightlifting uniforms, menstrual tracking apps, policy documents—emerged in our data as they mediated information transfer between other actors. All non-digital methods received approval from the Human Research Ethics Committee at the University of Waikato, approval number HREC(Health)2023#17. Written consent was obtained from all human subjects prior to data collection. We did not seek ethical approval for our review of social media posts, as all data was open to public view and comment. However, recognising that digital researchers should think 'more about whether the fact that we can technically access it automatically means we should' (Tiidenberg 2018, 469), all social media posts discussed in this paper are anonymised, and no direct quotes are used.

In the remainder of this section, we describe these data collection methods, the knowledges they made visible, and the human and non-human actors that mediated their travel to different areas of the network. We structure this discussion around the four *forms of knowledge* that our methods were designed to trace: embodied knowledge, articulated knowledge, academic knowledge, and mediated knowledge. While each form of knowledge could be the singular focus of a paper (e.g. mediated knowledge about sex, gender, and strength), in this discussion we characterise the circulation of knowledges across the broad Olympic Weightlifting knowledge network. Although we present the methods and forms of knowledge separately, we emphasise that as we traced them using divergent methods, knowledges 'bumped into' one another, allowing us to see how they moved from one form to another as they travelled through the porous, ever-changing knowledge network.

Embodied knowledge: participant observation & strength tracking

We first aimed to map women Olympic Weightlifters' embodied knowledge of sex, gender, and strength. To engage with these corporeal and sensory forms of knowledge, the first author—a cisgender white American woman and a long-term participant in Olympic Weightlifting—

conducted participant observation of Olympic Weightlifting sporting spaces. Over a 12-month period, she joined team training sessions at two gyms in Aotearoa New Zealand, attended local, national and international competitions, and took regular field notes. During observations, she worked to identify the beliefs being exchanged among women weightlifters and the actors that mediated their dissemination. Aligning with ANT's insistence that phenomena are constructed differently in every context, two gyms were to better understand the breadth of knowledges about sex, gender and strength in the niche sport.

To get closer to athletes' individual embodied knowledges, participant observation was paired with a qualitative form of 'strength tracking' designed to evoke athletes' embodied knowledge and bodily practices. Three months after participant observation began, women weightlifters at the two gyms (three from one gym, four from the other) volunteered to meet individually with the first author to discuss any factors that might impact their performance. Over the next 12 months, the women weightlifters tracked these variables alongside their training via a personalised Google Form or physical journal. While athletes were encouraged to suggest factors to track, they were also presented with a list of options to consider. To frame athletic performance holistically, the structure of this list was informed by Te Whare Tapa Whā (Durie 1998; Rochford 2004), a Māori [the indigenous ethnic group of Aotearoa New Zealand] unified health model that presents four cornerstones of wellbeing: physical health, social health, spiritual health, and emotional health. The 'physical health' category included biomedical considerations (e.g. injury, diet); 'social health' covered relationships (coach-athlete, gym environment); 'spiritual health' related to athlete identity (motivation, perceptions of athletic career) and 'emotional health' concerned mental state (mood, body image). Every four months, athletes completed a semi-structured interview to reflect on their training and the variables they tracked. Over the year of tracking, the athletes evaluated and elaborated on their understandings of how strength training worked for their own body, recounting embodied knowledge that was invisible during participant observation.

These methods painted a detailed picture of women weightlifters' shared and personal embodied knowledges of sex, gender, and strength and the importance of both human and non-human actors. During team sessions, women athletes swapped embodied knowledge about how their bodies responded to training, forging shared understandings of 'what Olympic Weightlifting feels like' as they sat on benches or leaned on chest-high weightlifting blocks between sets. While most explanations were not tied to sex or gender—e.g. they 'used the wrong muscles' during a lift—others were. For example, the menstrual cycle emerged as a major topic of discussion among women weightlifters, who exchanged embodied knowledge—mediated, during some phases of this study, by strength tracking Google Forms, physical journals, and menstrual tracking apps (Matthews 2021) – about impactful phases, symptoms, and solutions. This information was openly exchanged with their (mostly men) coaches, demonstrating that knowledge of sex and gender circulated within the two gyms. Long-term strength tracking further revealed athletes' knowledge of factors impacting their performance that went unmentioned during participant observation, such as the gender composition of the gyms they trained in.

These methods also made other sources and topics of knowledge visible. When athletes experienced injuries and poor training sessions, trusted medical practitioners were drawn into the network. During training sessions, knowledge about men's and women's comparative strength levels were created, such as Joshua's 'victory' in the opening vignette, wherein the men and women weightlifters of Solo interacted with barbells, rubber-coated plates, wood platforms, and noises reverberating within the small gym to construct and disseminate the knowledge that mediocre men weightlifters are stronger than elite women. Yet as noted in our depiction of the event, this knowledge was also contested within the gym, a process that was not traceable during ethnographic observation or strength tracking. To explore a wider range of knowledges and their circulation in Olympic Weightlifting, we turned to other methods.

Articulated knowledge: athlete focus groups & coach/IWF interviews

To map articulated (i.e. spoken) knowledge, we initially conducted two focus groups with women Olympic Weightlifters that trained at the gyms being observed about their understandings and experiences of sex, gender, and strength. One focus group was held at each gym; eight women weightlifters participated in one focus group, and seven participated in the other. Of the 15 total women weightlifters taking part in the focus groups, all actively competed in the sport at the regional, national, or international level. These cisgender women weightlifters were between 18 and 66 years of age and identified with a range of ethnic identities, including Māori (1), Māori/Pākehā (1), Cook Island Māori (1), NZ Samoan (4), Pākehā [NZ European] (4), UK British (1), Pākehā/French (1), Pākehā/Filipino (1), and Chinese (1).

The articulated knowledges that women weightlifters recounted expanded the human and non-human actors mapped in the Olympic Weightlifting network. Athletes elaborated on the influence of knowledges from social media, current and previous coaches, parents, teammates, popular athletes, and others. Knowledge about hormones (e.g. testosterone) was added to the network during discussions of gender categorisation. New non-human actors surfaced in athletes' stories of their encounters with social media, wherein weightlifters asserted the influence of algorithms that fed them content made by accounts that 'matched' their 'interests.' As the gyms differed socioeconomically and ethnically, the knowledges about sex, gender, and strength sometimes diverged between the two gyms in meaningful ways. For example, in one focus group, two women discussed Māori knowledges that shaped their bodily practices, particularly their understanding of bodies as holistic, relational, multidimensional constructions instead of dualistic 'nature-' or 'nurture'-based entities (Rochford 2004; Thorpe, Brice, and Rolleston 2020). The importance of ethnicity in informing these networks will be explored further in future publications.

Following women weightlifters' knowledge outwards, this mapping of articulated knowledge expanded over time to include interviews with these athletes' coaches, the coaches of elite women weightlifters outside Aotearoa New Zealand, and IWF administrators and elected committee members about differences between men and women weightlifters and the 'best' ways to train them. Of the three Aotearoa New Zealand coaches, two were men and one was a woman. The eight international coaches interviewed (two women, six men) were based in Botswana, the Philippines, Canada, the United States, Denmark, Colombia, and China. Finally, interviews were conducted with five IWF administrators and elected committee members about the information they distributed regarding training women weightlifters. All focus groups and interviews were recorded and transcribed.

During interviews, coaches discussed knowledges about training women weightlifters drawn from formal education, workshops, conversations with other coaches, practical experience, academic research papers, and social media posts. Mapped topics of knowledge about women weightlifters expanded, encompassing muscle fibre types, gendered athlete psychology, biomechanics, injury types and rates, dedication to the sport, and weight class considerations. Interviews with IWF administrators/committee members revealed the use of (some) academic knowledge and the practical knowledge of (some) elite coaches in establishing coaching education materials. They also showed the limited topics of information about sex, gender, and strength that the IWF felt were vital to pass to Olympic Weightlifting athletes and coaches. During interviews with coaches and IWF administrators/committee members, challenges with knowledge circulation became evident: coaches noted non-human actors that hindered and facilitated their access to information, from university courses that had given them access to textbooks and online journals to the cost of international flights that prevented them from attending IWF coaching workshops.

Academic knowledge: literature review

During the first phases of data collection, we noted that academic knowledge was highly integrated with the sport's knowledge networks. Athletes often asked 'if there are any studies' on topics related to women weightlifters, while coaches recalled what they knew 'from the [academic] literature'. To extend our mapping of academic knowledge, we reviewed sociocultural and exercise science literature about strength training published between 1970 and 2023. We documented the variable knowledges about sex and gender that were created, their sources and their contestation as they circulated inside and outside of academic spaces.

In this mapping, we identified an academic knowledge network split in two, discussed in depth in Nelson (2025). The sociological side studied gender and strength, while the other—much larger—scientific side examined sex and strength. Very little of the sex- and gender-oriented strength research used Olympic Weightlifters, instead drawing from the experiences of bodybuilders and untrained participants. Some topics experienced elevated investigation and debate, such as the menstrual cycle and strength outcomes (Colenso-Semple et al. 2023). These characteristics—divisions, knowledge sources, and topics of interest—produced research that interacted with other Olympic Weightlifting knowledge networks. For example, coaches read research on the menstrual cycle and strength performance and began to incorporate it into their practices, and IWF administrators/committee members noted the importance of endocrinological research—and its accessibility on research databases like PubMed—on the construction of gender policies.

Mediated knowledge: social media content collection

As with our mapping of academic knowledge, the decision to map mediated knowledge was informed in part by our other methods. Participant observation revealed that women weightlifters posted their embodied knowledge on Instagram as reflective stories about their training. During interviews and focus groups, coaches and athletes referenced the app as a source of academic and articulated knowledge about women's training practices. We therefore mapped the mediated Olympic Weightlifting knowledge landscape on Instagram over a 12-month period, seeking to document the breadth of topics, sources, and actors mediating their distribution. To do so, the first author documented every publicly available Instagram post from the Olympic Weightlifting coaches, athletes, media producers, and research and meme accounts she encountered wherein the creator referenced sex or gender.

In the posts accumulated, sport-specific knowledge about sex, gender and strength proliferated. As media accounts posted about the 'most impressive performances' from international events, gendered standards of strength were created. A small number of accounts circulated recent sociocultural, psychological, and physiological academic research on sex, gender and strength, covering topics such as biomechanics, gendered coach–athlete relationships, hormones and weight classes. On their personal pages, some women weightlifters distributed knowledge specifically aimed at other women, including hypermobility, body positivity, and pre-/post-natal strength training practices. High-profile coaches presented themselves as trusted experts on topics of biological difference, with followers asking, for example, 'how to work around bloating' during weigh-ins. Even meme accounts were a source of knowledge—e.g. 'normal' body compositions for women athletes and testosterone's role in strength. During this mapping, hashtags, restrictions on video length and number of images in a post, and invisible algorithms providing the lead researcher posts she 'might like' emerged as powerful—but unreliable—actors mediating which knowledges about sex, gender and strength were distributed widely.

Data analysis: mapping the Olympic Weightlifting knowledge network

To bring these methods and forms of knowledge together, we analysed our data by constructing an actor-network map of the Olympic Weightlifting knowledge network. This map (Figure 1) depicts: 1) the sex- and gender-based factors that each mapped area of the network (athletes, coaches, the IWF, academics, and Instagram) believed contributed to sex- and gender-based strength differences; 2) their methods of knowledge dissemination (e.g. athlete seminars, policy documents, social media) and 3) the human and non-human actors that facilitated or hindered the flow of information (e.g. paywalls, competition schedules, menstrual apps, barbells). This mapping makes clear that knowledges about sex, gender and strength were not consistent throughout the network and that not all knowledge dissemination methods were successful in transmitting information across the sport.

To illustrate what this ANT-based approach can allow us to see differently about the circulation and effects of knowledge about sex and gender, we combine this actor-network map with creative nonfiction (CNF) vignettes to evoke selected aspects of the complex knowledge network. Creative and narrative writing styles have long been used by qualitative researchers interested in sport and physical culture to represent nuanced data and evoke more affective and embodied modes of engagement (Bruce 1998, 2019; Edwards and Potrac 2025; Gearity and Mills 2012; Rinehart 2010; Smith, McGannon, and Williams 2015; Sydnor 1998). As an analytic practice, CNF narratives are evocative, composite stories wherein researchers draw together multiple events, accounts, actors and/or methods (Smith and Monforte 2020). While these narratives are imaginatively constructed by the researcher(s) to animate their data, care is taken to avoid embellishment (Edwards and Potrac, 2025). Although CNF has been less frequently applied in ANT sport scholarship, one recent example is Brice and Thorpe's (2025) use of vignettes and photographic montages to recount the more-than-human physical activity networks at the 2023 FIFA Women's World Cup.

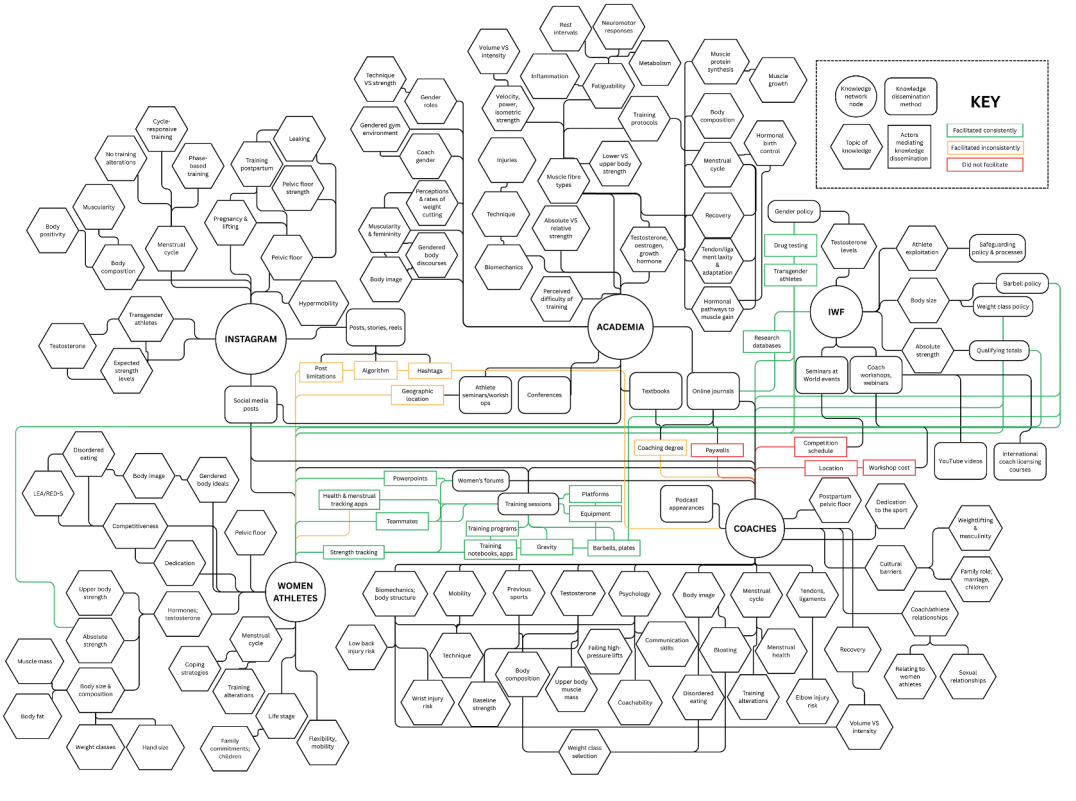

Figure 1. Complete actor-network map of the Olympic Weightlifting knowledge network.

In this paper, we use CNF vignettes to present selected dimensions of the complexities of our data for three reasons: 1) to bring our divergent methods into dialogue; 2) to evoke the non-human actors that mediated information exchange; and 3) to 'show rather than tell' the extensive knowledge networks circulating in the sport. To ensure that our CNF vignettes closely adhered to collected data, their construction was guided by the actor-network map. After having chosen a topic or method of knowledge mediation to analyse, we 'followed' its movements and effects throughout the map. In the narratives we present, we therefore draw only from the methods and data that correspond to the movements of the mediated knowledge we followed. Drawing on this analytic approach, the following sections highlight two key contributions of ANT-as-methodology to study knowledge networks: the ability to map the conflicts between various forms and topics of knowledge about sex and gender that originate in different yet interconnected areas of broad sporting knowledge networks, and the capacity to demonstrate which topics of sex and gendered knowledge are prevalent throughout a network and which are conspicuously absent.

Making sense of ANT knowledge networks: contested, powerful and absent knowledges

Contested forms and topics of knowledge

In this vignette, we demonstrate the first contribution that ANT-based methodology can make to our understanding of sex and gendered knowledge in sport: the ability to examine how various forms and topics of knowledge come into conflict and are resolved within knowledge networks. Paired with a version of the network map that highlights the actors and knowledges pertinent to the CNF (Figure 2),

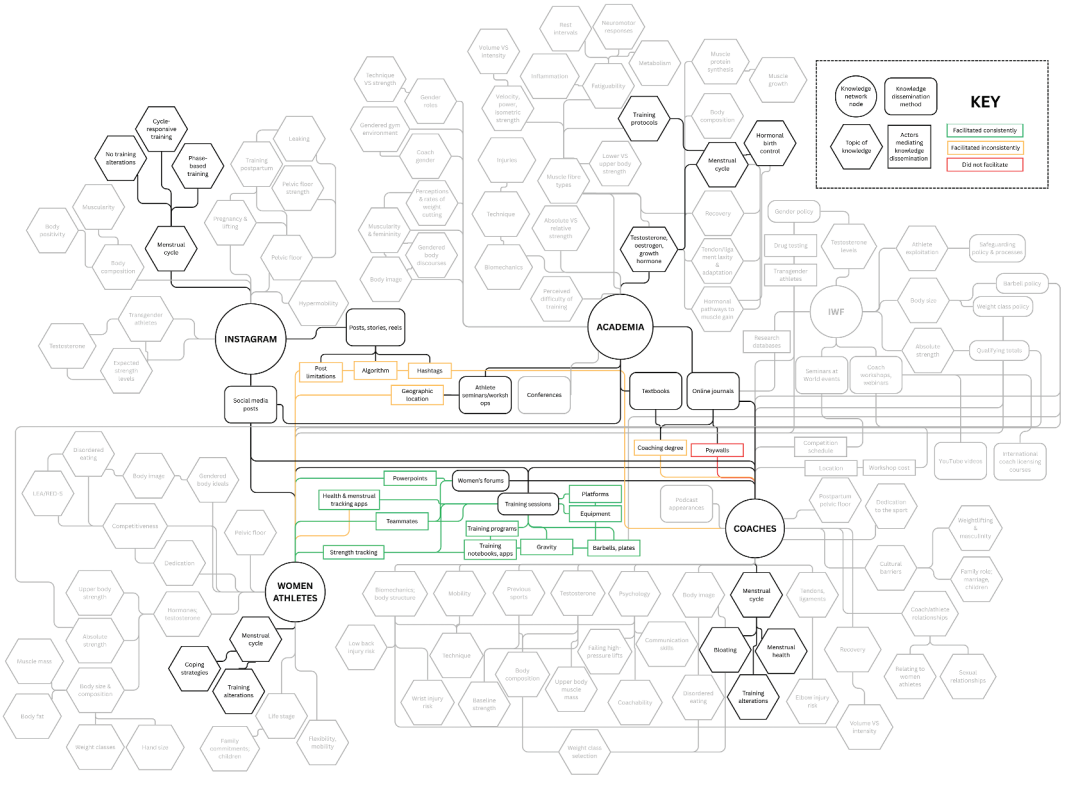

Figure 2. Actor-network map highlighting the circulation of knowledges about the menstrual cycle throughout the knowledge network.

this vignette draws together our social media documentation, participant ethnography, athlete strength tracking, focus groups, and coach interviews, allowing us to indicate how knowledge about training in relation to the menstrual cycle was navigated in Olympic Weightlifting gyms.

> Abby pushes open the door of Atlas Barbell Club and is greeted with blaring house music; she's clearly not the first person to make it to the gym this afternoon. After greeting her coach Patrick, she places her bag on a bench. Based on her loaded barbell, her teammate Bea looks to be partway through her training session. Grabbing a foam roller and lacrosse ball, Abby takes the platform next to Bea's and begins to roll out her stiff upper back, scrolling Instagram and trying to stay out of her friend's line of sight while she takes her next lift. As she scrolls, a 'recommended' post appears. In it, a supremely muscular fitness influencer is hawking her menstrual phase-based training program for 'women who lift'. The influencer writes that women should lift weights that are 30% lighter during their luteal phase. Ridiculous. That would never work for real strength athletes. Abby laughs and shows it to Bea, who scoffs about 'one-size-fits-all clickbait'. Bea pulls up a screenshot she took of a 24-hour Instagram story posted by a high-profile Olympic Weightlifting coach. He says that women weightlifters shouldn't change their lifting around their menstrual cycles since they can't choose the day they'll compete. What does he know? He's never had a period. And he certainly doesn't know what theirs feel like.
>
> Abby finishes her rolling, puts on her lifting shoes, and begins moving the empty barbell around. She's feeling a little off today; the bar just isn't snapping into place overhead. Her first snatches with plates on the barbell are the same, a little slow and out of position. She even misses a snatch at 50% of her best—embarrassing. Patrick notices and comes over to talk. They quickly go over the basics: was work stressful? Did she sleep enough, eat enough? Is she sore from training a few days ago? She answers his questions: work's been fine, she slept and ate plenty, she's only a little sore. Then he asks where she is in her menstrual cycle. Abby isn't surprised by the question: Patrick has tried to establish a 'period-friendly' environment. However, she has noticed that Patrick only asks about her cycle when she's lifting badly, not when she's experiencing her worst symptoms or having an unusually good training day. She once asked him whether he could write a program for her that was synced to her cycle, and he said it was unnecessary. Today, Patrick suggests pulling down the percentages on her lifts for the day, just 10 or 15%. Back to normal tomorrow. Abby agrees, and Patrick moves away to check on another athlete. 'Coach knows best', she tells herself.

This vignette demonstrates variegated understandings of the menstrual cycle as they circulate across the multiple, porous networks that characterise the broader Olympic Weightlifting knowledge network. The topic is up for debate: it is unclear what phases are 'bad' for athletic performance and what women athletes can do to maximise their performance. While an ANT-based mapping might functionally join a growing body of scholarship that examines evolving knowledge of the menstrual cycle (Schofield, Thorpe, and Sims 2022; Tomlinson 2021), we argue that this mapping of knowledge can go beyond tracing conflicting ideas about the menstrual cycle within sport contexts.

While the human actors in this vignette demonstrate Mol's assertion that actors 'may pick through what is on offer and take bits and pieces' (2002, 64) from knowledge networks, this vignette also demonstrates a tension between mediated, embodied, and articulated forms of knowledge. Women weightlifters were exposed to a bombardment of prescriptive advice on social media, but discounted it by drawing on their own and their teammates' embodied knowledge. However, the coach's (at times problematic) articulated knowledge played an instrumental role in the gym's knowledge network, directly guiding women athletes' training practices. It stands to question how men coaches' knowledge of the menstrual cycle—discounted when it came from social media—became superior to women weightlifters' embodied knowledge in the gym.

An ANT-based mapping directs attention towards the actors stabilising this network, facilitating (and manipulating) knowledge moving between social media content creators, athletes, and coaches. Algorithms promoted posts that endorsed menstrual phase-based training to women weightlifters, and lacrosse balls and foam rollers permitted an athlete to remain stationary and create shared knowledge about the menstrual cycle with her teammate. However, coaches played a central, mediating role between athletes and other actors that relayed knowledge about the menstrual cycle and weightlifting performance. As barbells, plates, and gravity interacted in unexpected ways with the athlete's body, the coach acted to interpret the athlete's embodied knowledge about her training and bodily sensations, translating it into articulated knowledge about how the menstrual

cycle 'should' affect a weightlifting body and how to train around it. Stabilising this dominance was the (coach-created) gym-wide training programme, which the coach minimally altered to 'account' for the athlete's menstrual cycle. Ultimately, he asserted knowledge that stood counter to her embodied knowledge and the mediated knowledges she encountered.

Based on this vignette, we argue that by expansively 'following the actors'—in this case, knowledge about the menstrual cycle and strength training—ANT allows researchers a multidimensional view to examine how complex, conflicting knowledges are translated into women athletes' experiences and performances, and the ways that coaches' knowledge of women's bodies can dominate over athletes' embodied knowledge. In doing so, we align with and extend the arguments of other ANT sport researchers that have explored how coaches' power over athletes is constructed and stabilised (Maclean 2021; Maclean and Allen 2022).

Prevalent & absent knowledges

We additionally propose that ANT-based methodology may be used to trace how (some) knowledges of sex and gender are spread across broad sporting networks. To illustrate this contribution, the following vignette recounts a condensed version of our mapping of academic knowledge in Olympic Weightlifting (Figure 3) and is drawn from our review of academic literature, athlete focus groups and interviews and coach and IWF interviews. In this imagined meeting, each person represents a different set of actors in the Olympic Weightlifting knowledge network: academics, women athletes, coaches, and IWF administrators/committee members.

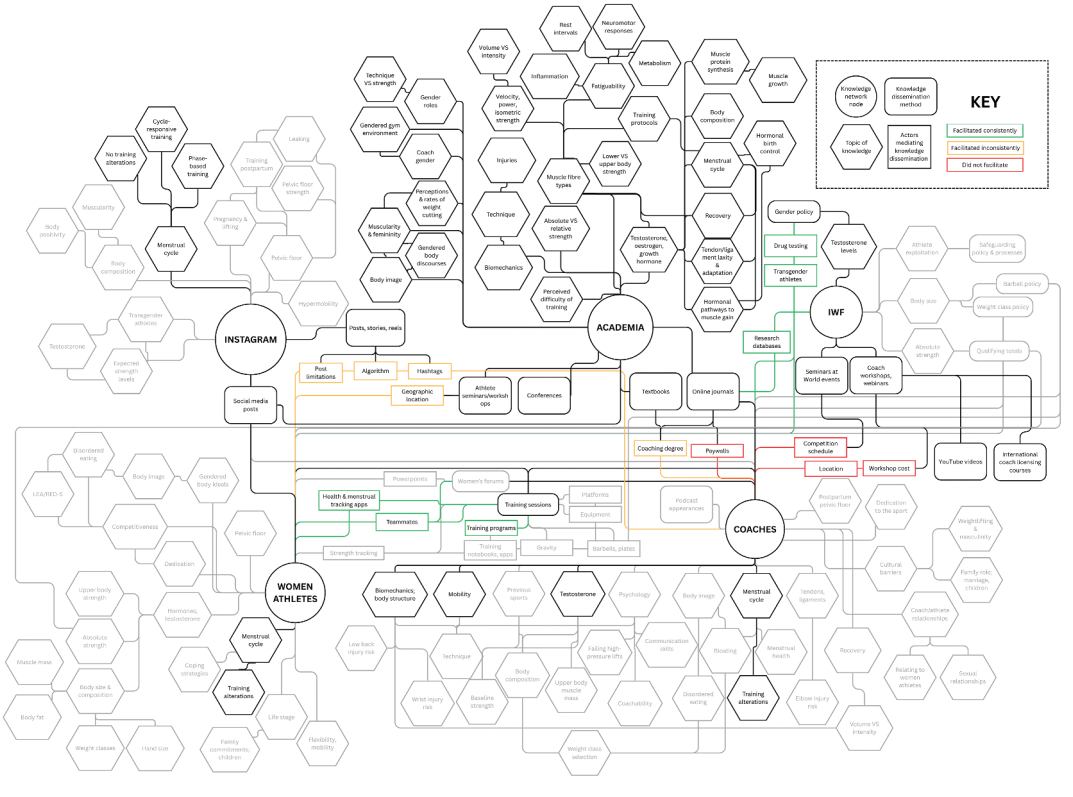

Figure 3. Actor-network map highlighting the circulation of academic knowledge about sex, gender, and strength in Olympic Weightlifting.

Academic opens the meeting. 'Since we've been working separately to elevate Athlete's performance to the greatest possible heights, I'm glad that we're finally talking to ensure that we're all pulling together. We've been publishing some new and exciting work related to strength that focuses on the menstrual cycle, biomechanics, coach gender, hormones, muscle fibre types, body image, and so on. Are you finding it helpful?'

Administrator is nodding along; they've been keeping up with some of Academic's work. They'd been working on integrating some of the biomechanics research into their coaching workshops, though they hadn't gotten to the RED-S literature from a few years back. Administrator had used recent research on hormones to establish their new gender categorisation policies, too.

Athlete looks at Academic in disbelief. 'I thought you cared about every other physically active population more than us. I hear about your research on women endurance athletes, team athletes, even women who casually lift weights. What about serious strength athletes? There are so many things I want to know that would help me improve my performance! For starters: if we follow the same program, will men get stronger because of testosterone, and does that mean I should train differently from them? When women weightlifters get RED-S,[1] what symptoms do we have? How do I deal with incontinence while lifting heavy?

Academic is a little shocked. 'We've been publishing research on almost all those topics! And your first two questions are something we've been looking at for decades: when they're put on the same resistance training program, men and women tend to put on the same relative amount of strength and muscle mass. Where are you getting your information?'

Athlete looks at Coach. 'Some from Coach. And I went to a general athlete seminar once. Instagram, too'.

Coach avoids eye contact. They hadn't known about the research related to Athlete's questions. Coach had liked reading some of Academic's work when they got their exercise science degree, but their university access to academic journals expired ages ago. And although Administrator once put on a workshop about working with women athletes, Coach hadn't been able to attend.

Academic sighs: this system doesn't seem to work very well. 'Maybe we should have these meetings more often'.

This vignette and network map draw attention to a series of issues with knowledge circulation in Olympic Weightlifting. Although much academic knowledge about sex, gender, and strength is produced, it weaves an indirect and broken path. Drawing on linked methods, it becomes possible to map the information that is distributed, encountered and implemented, as well as the academic research about sex and gender whose travel is impeded. While research databases acted to facilitate sport administrators' access to academic information, coaches noted the hindrance of paywalls. Knowledge that reached women weightlifters first travelled through social media (mediated by post limitations, algorithms, and hashtags), coaches, or the rare (geographically bound) athlete workshop/seminar. And while this mapping can be used to suggest specific areas of intervention in academic knowledge communication—such as increased effort by sport administration to relay research on topics that women athletes need access to (e.g. RED-S symptoms)—we argue that it can also indicate more problematic characteristics of the sport's knowledge network.

In this mapping, it is also apparent that some academic knowledges of sex and gender are more powerful than others. For example, sociocultural research on strength was barely noted, while exercise science was often referenced as meaningful by athletes, coaches, and sport administrators. Specific biological differences between men and women Olympic Weightlifters' bodies were more often translated into knowledge dissemination practices by the IWF, most frequently taking the form of policies that structured how athletes could engage with the sport. For example, the belief that women weightlifters' bodies are smaller and lighter than men's produced a weight class policy that induced women athletes to shape their bodies to be smaller than men's. Binary, sex-based hormonal differences were further asserted through the IWF's gender policy and mediated through routine drug testing and the manipulation of transgender weightlifters' bodies, mirroring broader, gendered disciplinary practices commonplace in competitive sport (Bekker and Mumford 2025; Posbergh et al. 2024). This mapping demonstrates how the preference for biomedical knowledge in contemporary sport is constructed and stabilised (Andrews 2008); the sport administrators in this study found such

academic research easy to access and apply to policies that mediated athletes' and coaches' engagement with the sport.

Yet this vignette can be parsed further. It is notable, for example, that some topics of exercise science were prevalent while others were missing. In particular, knowledge about cisgender men's physical superiority was amplified, while information about the possibility of equivalency between men's and women's bodies was not distributed. For example, knowledge about the role of testosterone in men's strength was traceable throughout the Olympic Weightlifting network (on social media, during coach and administrator interviews, and in athlete focus groups). Yet research about the equivalency of men's and women's increases in strength and muscularity when following the same resistance training programme (Refalo et al. 2025) was notably absent. We therefore argue that by following knowledge as it spreads—or fails to travel—from many areas of the network, ANT-based methodology clarifies the gendered characteristics of sporting knowledge networks that can serve to continuously position women athletes as 'less than' and leave them unable to access information relevant to their bodies.

Conclusion

Starting from the position that knowledge can be considered an actor, and thereby traceable as it travels (or fails to travel) through extensive sport knowledge networks, this paper offers a methodological and empirical expansion to research on the interactions between (women) athletes' bodies, knowledge, and power. As researchers, our use of ANT and its directive to 'follow the actors' pushed us to map forms and topics of knowledge that went beyond those we expected to find, ultimately tracing those that were powerful, emergent, diminishing, or rejected from areas of the network. This allowed the networks we mapped to be complex, contradictory, and fluctuating, more fully reflecting the complexity of (knowledge about) sex, gender, and strength and its application to women's bodies. Moreover, by closely mapping the actors that hindered and facilitated the dissemination of knowledge, we were encouraged to explore how such a widely dispersed network was stabilised over time, further suggesting that Olympic Weightlifting's knowledge network—and its framing of women weightlifters as biologically 'less than'—could be constructed differently.

We conclude with methodological recommendations for those engaging ANT as a method to map broad networks of knowledge (and other such complex and ephemeral phenomena). First, we advocate for methodological flexibility and the use of multiple methods. Even within the 'bounded' contexts we mapped (e.g. training sessions), knowledges and forms of knowledge about single topics were diverse and contradictory. Yet athletes did not train in accordance with each of these knowledges, as some could be more impactful than others. We argue that drawing on multiple methods—e.g. ethnography, coach interviews, athlete journaling, academic literature reviews, and social media mapping—can afford a multidimensional view that is complex and sensitive to the many human and non-human actors contributing to this dominance.

Second, we advocate for the further use of CNF as a representational approach to relay ANT-based knowledge mappings. We found ourselves challenged to present our (largely semiotic and anthropocentric) data in a way that adequately depicted the role of non-human actors involved in the dissemination of knowledge. Yet in combination with our network maps, CNF more meaningfully evoked the complexity of the more-than-human data we presented.

Finally, we argue for researchers to seriously consider the power relations constructed within the knowledge networks they recount. While an ANT-based perspective allowed us to understand the women weightlifters in this study as agentic, able to 'pick through what is on offer and take bits and pieces' (Mol 2002, 64), Quinlan's (2012) guidance was vital in enabling us to explore how that agency was delimited by other human and non-human actors. In prioritising the experiences of women weightlifters, exploring the material-semiotic construction of unequal power relationships within the

network, and maintaining a focus on 'whose political goods we should be orienting our research to' (Quinlan 2012, 7), we found a predominance of gendered knowledges that positioned women weightlifters as 'weaker than'. We also documented a host of actors (e.g. coaches, policy documents, social media algorithms) that contributed to the persistence of the shape of this knowledge network, a mapping that allows us to consider how the network might be alternatively constructed to emphasise women weightlifters' strength and potential. We therefore argue that a sensitivity to the material-semiotic construction of power is vital to map knowledge networks and their effects, not simply disparate knowledges about sex and gender in sport.

Notes

1. Relative Energy Deficiency in Sport (RED-S) refers to a series of physiological and psychological ailments affecting physically active populations that result from a chronic mismatch between energy intake and energy needs (Mountjoy et al. 2018).

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The work was supported by the International Olympic Committee's Olympic Foundation for Culture and Heritage.

Notes on contributors

Monica Nelson is a doctoral student at the University of Waikato in the Division of Health, Department of Sport and Human Movement. Reflecting her long-term involvement in Olympic Weightlifting as an athlete, coach, and a former member of international media, Monica's research primarily explores the gendered experiences of strength sport athletes, including topics related to health, performance, and media coverage. Her current research seeks to construct a transdisciplinary dialogue between exercise science and sociocultural scholarship by analysing how knowledges of sex, gender, and athleticism affect women Olympic Weightlifters' bodily practices and capacity for maximal strength. Monica is a two-time recipient of the North American Society for the Sociology of Sport's Barbara Brown Outstanding Student Paper Award, and a 2025 awardee of the International Olympic Committee's PhD Students and Early Career Academics Research Grant Programme.

Professor Holly Thorpe (PhD) is a feminist sociologist of sport and physical culture working in Te Huataki Waiora Division of Health at the University of Waikato, New Zealand. She has published over 100 articles and chapters, with some of her most recent books including Sport and Physical Culture in Global Pandemic Times (edited with David Andrews and Joshua Newman, 2023), Action Sports and the Olympic Games: Past, Present, Future (with Belinda Wheaton, 2022), Gender, Sport and Development: Intersections, Innovations, and Future Trajectories (with Lyndsay Hayhurst and Megan Chawansky, 2021), Feminist New Materialisms, Sport and Fitness: A Lively Entanglement (with Julie Brice and Marianne Clark, 2020) and Sport, Physical Culture and the Moving Bodies: Materialisms, Technologies, Ecologies (edited with Joshua Newman and David Andrews, 2020).

Belinda Wheaton is a Professor in the School of Psychological and Social Sciences at the University of Waikato, Aotearoa New Zealand, teaching in the Sociology Programme. She is an interdisciplinary researcher, with interests across leisure, sport, health and wellbeing, and a focus on identity, inclusion, and inequalities. Belinda is best known for her research on informal and lifestyle sport cultures and practices which includes two monographs (The Cultural Politics of Lifestyle Sports, Routledge 2013; Action Sports and the Olympic Games: Past, Present, Future; Wheaton & Thorpe, 2022). Belinda is co-editor of The Palgrave Handbook of Feminism and Sport, Leisure and Physical Education.

Dr. Gloria Hinemoa Clarke is a lecturer in Health Equity and Innovation at the University of Waikato in Aotearoa New Zealand. Employing qualitative Kaupapa Māori methodologies, her current research focuses on improving the clinical experiences of young parents living in rural and remote communities, and developing Māori movement analogies for stroke survivors and lower limb amputees. Working for and with families raising young Māori boys, her PhD examined the sport and leisure patterns of successful young Māori men from age of five-years-old.

Dr. Stacy Sims is a forward-thinking international exercise physiologist and nutrition scientist who aims to revolutionize exercise nutrition and performance for women. She currently holds a Senior Research Associate position with SPRINZ-AUT University, an adjunct position with the Stanford Lifestyle Medicine Group, supervises PhD students, is on the advisory board of several cutting-edge companies, and is a regularly featured speaker at professional and academic conferences. She has published over 100 peer-reviewed papers and several books, including ROAR, a science-based layperson's book that explains sex differences in training and nutrition across the lifespan. Her contributions to the international research environment and the sports nutrition industry have established a new niche in sports nutrition and solidified her reputation as the expert in sex differences in training, nutrition, and health.

References

Andrews, David L. 2008. "Kinesiology's Inconvenient Truth and the Physical Cultural Studies Imperative." *Quest* 60 (1): 45–62. https://doi.org/10.1080/00336297.2008.10483568.

Barker-Ruchti, Natalie, and Richard Tinning. 2010. "Foucault in Leotards: Corporeal Discipline in Women's Artistic Gymnastics." *Sociology of Sport Journal* 27 (3): 229–250. https://doi.org/10.1123/ssj.27.3.229.

Bekker, Sheree, and Stephen Mumford. 2025. *Open Play: The Case for Feminist Sport*. Reaktion Books.

Birrell, Susan. 2000. "Feminist Theories for Sport." In *Handbook of Sports Studies*, edited by Jay Coakley and Eric Dunning, 61–76. SAGE Publications.

Blackman, Lisa. 2021. *The Body: The Key Concepts*. Second ed. Routledge.

Brice, Julie, and Holly Thorpe. 2025. "Sporting Mega-Events, Physical Activity, and Actor Network Theory: Mapping Actants of Movement at the 2023 FIFA Women's World Cup." *International Review for the Sociology of Sport* 60 (5): 828–846. https://doi.org/10.1177/10126902241288264.

Bruce, Toni. 1998. "Postmodernism and the possibilities for writing vital sport texts." In *Sport and postmodern times*, 3–19. New York: State University of New York Press.

Bruce, Toni. 2019. "The Case for Faction as a Potent Method for Integrating Fact and Fiction in Research." In *Innovations in Narrative and Metaphor: Methodologies and Practices*, 57–72. Singapore: Springer Singapore.

Cahn, Susan K. 2015. *Coming on Strong: Gender and Sexuality in Women's Sport*. University of Illinois Press.

Capranica, Laura, Maria Francesca Piacentini, Shona Halson, Kathryn H. Myburgh, Etsuko Ogasawara, and Mindy Millard-Stafford. 2013. "The Gender Gap in Sport Performance: Equity Influences Equality." *International Journal of Sports Physiology and Performance* 8 (1): 99–103. https://doi.org/10.1123/ijspp.8.1.99.

Coen, Stephanie E., Mark W. Rosenberg, and Joyce Davidson. 2018. "'It's Gym, Like G-Y-M Not J-I-m': Exploring the Role of Place in the Gendering of Physical Activity." *Social Science and Medicine* 196 (January): 29–36. https://doi.org/10.1016/j.socscimed.2017.10.036.

Colenso-Semple, Lauren, M. Alysha, C. D'Souza, J. Elliott-Sale Kirsty, and M. Phillips. Stuart. 2023. "Current Evidence Shows No Influence of Women's Menstrual Cycle Phase on Acute Strength Performance or Adaptations to Resistance Exercise Training." *Frontiers in Sports and Active Living* 5 (March): 1054542. https://doi.org/10.3389/fspor.2023.1054542.

Cowley, Emma S., Alyssa A. Olenick, Kelly L. McNulty, and Emma Z. Ross. 2021. "'Invisible Sportswomen': The Sex Data Gap in Sport and Exercise Science Research." *Women in Sport and Physical Activity Journal* 29 (2): 146–151. https://doi.org/10.1123/wspaj.2021-0028.

Darnell, Simon C. 2020. "Reassembling 'Sport for Development and Peace' Through Actor-Network Theory." In *Sport, Physical Culture, and the Moving Body: Materialisms, Technologies, Ecologies*, edited by Joshua I. Newman, Holly Thorpe, and David L. Andrews, 229–245. Rutgers University Press.

Dawson, Jordan, and Heike Jöns. 2018. "Unravelling Legacy: A Triadic Actor-Network Theory Approach to Understanding the Outcomes of Mega Events." *Journal of Sport & Tourism* 22 (1): 43–65. https://doi.org/10.1080/14775085.2018.1432409.

Desjardins, Bridgette. 2025. "Muscularity and Femininity: No Longer a Contradiction?" *Journal of Gender Studies* March:1–14. https://doi.org/10.1080/09589236.2025.2473926.

Durie, Mason. 1998. *Whaiora: Māori Health Development*. 2nd ed. Oxford University Press.

Dworkin, Shari L. 2001. "'Holding Back': Negotiating a Glass Ceiling on Women's Muscular Strength." *Sociological Perspectives* 44 (3): 18.

Edwards, Christian Nicholas, and Paul Potrac. 2025. "Combining Crystallisation and Creative Non-Fiction to Develop New Insights on the Politically Astute Use of Humour in Sports Coaching." *Qualitative Research in Sport, Exercise & Health* 17 (2): 93–107. https://doi.org/10.1080/2159676X.2024.2411979.

Farías, Ignacio, Anders Blok, and Celia Roberts. 2020. "Actor-Network Theory as a Companion." In *The Routledge Companion to Actor-Network Theory*, Routledge.

Gearity, Brian T., and Joseph P. Mills. 2012. "Discipline and Punish in the Weight Room." *Sports Coaching Review* 1 (2): 124–134. https://doi.org/10.1080/21640629.2012.746049.

Geckle, Bethany. 2021. "Skateboarders' Representations of Materiality: A Case Study of Rodney Mullen and Spike Jonze." *Somatechnics* 11 (3): 359–375. https://doi.org/10.3366/soma.2021.0365.

Gosai, Jyoti, Sophia Jowett, and J A Rhind. Daniel. 2022. "Coaching Through a "Gender Lens" May Reveal Myths That Hinder Female Athletes: A Multistudy Investigation." *International Sport Coaching Journal* 9 (2): 222–233. https://doi.org/10.1123/iscj.2021-0046.

Hargreaves, Jennifer. 1994. *Sporting Females: Critical Issues in the History and Sociology of Women's Sports*. Routledge.

Hockin-Boyers, Hester, Stacey Pope, and Kimberly Jamie. 2021. "# Gainingweightiscool: The Use of Transformation Photos on Instagram Among Female Weightlifters in Recovery from Eating Disorders." *Qualitative Research in Sport, Exercise & Health* 13 (1): 94–112. https://doi.org/10.1080/2159676X.2020.1836511.

Jette, Shannon. 2025. "Studying Humans and Non-Humans in Risk Governance: How Actor-Network Theory Can Help Us Do 'Non-Modern' Research." *Qualitative Research in Sport, Exercise & Health* 11:1–16. June. https://doi.org/10.1080/2159676X.2025.2516526.

Jones, Amanda, and Cara Carmichael Aitchison. 2007. "Triathlon as a Space for Women's Technologies of the Self." In *Sport and Gender Identities: Masculinities, Femininities, and Sexualities*, edited by Cara Carmichael Aitchison, 63–83. 1st ed. London: Routledge.

Kerr, Roslyn. 2014. "From Foucault to Latour: Gymnastics Training as a Socio-Technical Network." *Sociology of Sport Journal* 31 (1): 85–101. https://doi.org/10.1123/ssj.2013-0015.

Kerr, Roslyn. 2016. *Sport and Technology: An Actor-Network Theory Perspective. Globalizing Sport Studies*. Manchester University Press.

Kerr, Roslyn, Sarah Edwards, and Timothy Konoval. 2022. "The Athlete-as-Network and the Athlete Multiple: Potential Contributions of Actor-Network Theory to Sports Coaching Research." *Sports Coaching Review* 11 (1): 5–22. https://doi.org/10.1080/21640629.2021.1995238.

Latour, Bruno. 1987. *Science in Action: How to Follow Scientists and Engineers Through Society*. Harvard university press.

Latour, Bruno. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory. Clarendon Lectures in Management Studies*. Oxford University Press.

Latour, Bruno, and Steve Woolgar. 1979. *Laboratory Life: The Social Construction of Scientific Facts*. Sage Publications.

Law, John. 2008. "Actor network theory and material semiotics." In *The New Blackwell Companion to Social Theory*, 141–158. Wiley Blackwell.

Law, John. 2017. "STS as Method." In *The Handbook of Science and Technology Studies*, edited by Ulrike Felt, 31–58. Fourth ed. The MIT Press.

Maclean, Jordan. 2021. "Coaching the Beautiful Game: An Actor-Network Theory Study of Sport Coaching." *Studies in Continuing Education* 43 (3): 328–342. https://doi.org/10.1080/0158037X.2021.1900095.

Maclean, Jordan, and Justine Allen. 2022. "Coaching with Latour in the Sociomateriality of Sport: A Cartography for Practice." *Sociology of Sport Journal* 40 (1): 60–68. https://doi.org/10.1123/ssj.2021-0171.

Markula, Pirkko. 2020. "Foucault's Poststructuralist Approaches to Understanding Movement Learning." In *Learning Movements: New Perspectives of Movement Education*, edited by H Larsson, 90–102. Routledge.

Markula, Pirkko, and Richard Pringle. 2007. *Foucault, Sport and Exercise: Power, Knowledge and Transforming the Self*. ed. Routledge. https://doi.org/10.4324/9780203006504.

Matthews, Adam. 2021. "Blurring Boundaries Between Humans and Technology: Postdigital, Postphenomenology and Actor-Network Theory in Qualitative Research." *Qualitative Research in Sport, Exercise & Health* 13 (1): 26–40. https://doi.org/10.1080/2159676X.2020.1836508.

Mol, Annemarie. 2002. *The Body Multiple: Ontology in Medical Practice*. Duke University Press.

Mol, Annemarie. 2010. "Actor-Network Theory: Sensitive Terms and Enduring Tensions." *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 50 (1): 253–269.

Mountjoy, Margo L., Jorunn Kaiander Sundgot-Borgen, Louise M Burke, K. E. Ackerman, C. Blauwet, N. Constantini, C. Lebrun, et al. 2018. "IOC Consensus Statement on Relative Energy Deficiency in Sport (RED-S): 2018 Update." *British Journal of Sports Medicine* 52 (11): 687–697. https://doi.org/10.1136/bjsports-2018-099193.

Nelson, Monica. 2025. "Stronger Together: Towards Constructive Conversations About Strength Differences, Gender, and Sex." *Sport, Education and Society* 30 (5): 622–634. https://doi.org/10.1080/13573322.2024.2338401.

Nelson, Monica, and Shannon Jette. 2023. "Weighing the Body: Women Olympic Weightlifters Negotiating Weight Class, Body Image, and the Unruly Body." *Sociology of Sport Journal* 41 (1): 1–9. https://doi.org/10.1123/ssj.2022-0152.

Norman, Leanne. 2016. "Is There a Need for Coaches to Be More Gender Responsive? A Review of the Evidence." *International Sport Coaching Journal* 3 (2): 192–196. https://doi.org/10.1123/iscj.2016-0032.

Nuckols, Greg. 2022. "Where Are All the Female Participants in Strength, Hypertrophy, and Supplement Research?" *Stronger by Science*. June 1. https://www.strongerbyscience.com/representation/.

Posbergh, Anna, Anna Baeth, Sheree Bekker, and Roc Rochon. 2024. "Sports and the Limits of the Binary: An Introduction." *Sociology of Sport Journal* 41 (4): 325–331. https://doi.org/10.1123/ssj.2024-0187.

Quinlan, Andrea. 2012. "Imagining a Feminist Actor-Network Theory." *International Journal of Actor-Network Theory and Technological Innovation* 4 (2): 1–9. https://doi.org/10.4018/jantti.2012040101.

Refalo, Martin C., Greg Nuckols, Andrew J. Galpin, Iain J. Gallagher, D. Lee Hamilton, and Jackson J. Fyfe. 2025. "Sex Differences in Absolute and Relative Changes in Muscle Size Following Resistance Training in Healthy Adults: A Systematic Review with Bayesian Meta-Analysis." *PeerJ* 13:e19042. https://doi.org/10.7717/peerj.19042.

Rinehart, Robert E. 2010. "Poetic Sensibilities, Humanities, and Wonder: Toward an e/Affective Sociology of Sport." *Quest* 62 (2): 184–201. https://doi.org/10.1080/00336297.2010.10483641.

Rochford, Tim. 2004. "Whare Tapa Wha: A Māori Model of a Unified Theory of Health." *The Journal of Primary Prevention* 25 (1): 41–57. https://doi.org/10.1023/B:JOPP.0000039938.39574.9e.

Schofield, Katherine L., Holly Thorpe, and Stacy T. Sims. 2022. "'This Is the Next Frontier of Performance': Power and Knowledge in Coaches 'Proactive' Approaches to Sportswomen's Health." *Sports Coaching Review* 11 (3): 324–345. https://doi.org/10.1080/21640629.2022.2060635.

Smith, Brett, Kerry R. McGannon, and Toni L. Williams. 2015. "Ethnographic Creative Nonfiction: Exploring the Whats, Whys and Hows." In *Ethnographies in Sport and Exercise Research*, 59–73. Routledge.

Smith, Brett, and Javier Monforte. 2020. "Stories, New Materialism and Pluralism: Understanding, Practising and Pushing the Boundaries of Narrative Analysis." *Methods in Psychology* 2 (November): 100016. https://doi.org/10.1016/j.metip.2020.100016.

Star, Susan Leigh. 1990. "Power, Technology and the Phenomenology of Conventions: On Being Allergic to Onions." *Sociological Review* 38 (1_suppl): 26–56. https://doi.org/10.1111/j.1467-954X.1990.tb03347.x.

Sydnor, Synthia. 1998. "A History of Synchronized Swimming." *Journal of Sport History* 25 (2): 252–267.

Thorpe, Holly, Julie Brice, and Anna Rolleston. 2020. "Decolonizing Sport Science: High Performance Sport, Indigenous Cultures, and Women's Rugby." *Sociology of Sport Journal* 37 (2): 73–84. https://doi.org/10.1123/ssj.2019-0098.

Tiidenberg, Katrin. 2018. "Ethics in Digital Research." In *The SAGE Handbook of Qualitative Data Collection*, edited by Uwe Flick, 466–479. Sage Publications.

Tomlinson, Maria Kathryn. 2021. "Moody and Monstrous Menstruators: The Semiotics of the Menstrual Meme on Social Media." *Social Semiotics* 31 (3): 421–439. https://doi.org/10.1080/10350330.2021.1930858.

Vargas, Maria Luisa Fernanda Pereira, and Stacy Winter. 2021. "Weight on the Bar vs. Weight on the Scale: A Qualitative Exploration of Disordered Eating in Competitive Female Powerlifters." *Psychology of Sport & Exercise* 52 (January): 101822. https://doi.org/10.1016/j.psychsport.2020.101822.

Walters, Ronie, and Kate Hefferon. 2020. "'Strength Becomes Her'–Resistance Training as a Route to Positive Body Image in Women." *Qualitative Research in Sport, Exercise & Health* 12 (3): 446–464. https://doi.org/10.1080/2159676X.2019.1634127.

Weedon, Gavin. 2015. "Camaraderie Reincorporated: Tough Mudder and the Extended Distribution of the Social." *Journal of Sport & Social Issues* 39 (6): 431–454. https://doi.org/10.1177/0193723515570676.

Wheaton, Belinda, Louise Mansfield, Jayne Caudwell, and Beccy Watson. 2024. "'Flourishing Against the Normative." In *The Routledge International Handbook of Transdisciplinary Feminist Research and Methodological Praxis*, edited by Jasmine B Ulmer, Michelle Salazar Pérez, and Carol A Taylor, 161–174. Routledge. https://doi.org/10.4324/9781003303558-22.

Wheaton, Belinda, and Holly Thorpe. 2021. *Action Sports and the Olympic Games: Past, Present, Future*. 1st ed. Routledge. https://doi.org/10.4324/9781351029544.