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To cite this article: John Toner, Jacquelyn Allen-Collinson, Patricia C. Jackman, Luke Jones & Joe Addrison (2023): 'I like to run to feel': embodiment and wearable mobile tracking devices in distance running, *Qualitative Research in Sport, Exercise and Health*, DOI: [10.1080/2159676X.2023.2225516](https://doi.org/10.1080/2159676X.2023.2225516)

To link to this article: <https://doi.org/10.1080/2159676X.2023.2225516>



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Published online: 29 Jun 2023.



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'I like to run to feel': embodiment and wearable mobile tracking devices in distance running

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ABSTRACT

Many experienced runners consider the use of wearable devices an important element of the training process. A key techno-utopic promise of wearables lies in the use of proprietary algorithms to identify training load errors in real-time and alert users to risks of running-related injuries. Such real-time 'knowing' is claimed to obviate the need for athletes' subjective judgements by telling runners how they have deviated from a desired or optimal training load or intensity. This realist-contoured perspective is, however, at odds with sociological research indicating that users of wearables engage in active 'data sense-making' that is highly contextualised. To investigate how athletes use (or not) algorithmic analysis to understand, make sense of, and improve their performance in real-time, we undertook qualitative interviews with distance runners to explore lived experiences of running with wearables. The runners described how they actively interpreted data from wearables, drawing on their own experience, 'somatic knowledge', and embodied ways of knowing. This allowed them to assess the relevance and usefulness of data in relation to their own goals, intentions, and feelings. Our findings challenge the techno-utopic promises of real-time and predictive analytics.

ARTICLE HISTORY

Received 11 April 2022
Accepted 12 June 2023

KEYWORDS

Wearables; self-tracking; running; embodiment; phenomenology of the body

Introduction

Developing cardiovascular and muscular endurance has long been deemed a pre-requisite for distance runners (Bridel et al. 2016; Hockey and Allen-Collinson 2016), who train their aerobic system multiple times a week, to improve maximal aerobic capacity, lactate threshold and running economy. It is now common practice for runners (and coaches) to measure the effects of endurance training by using athlete-monitoring data from mobile tracking devices, to assess fatigue levels, adaptation responses, and susceptibility to injury, for example. Traditionally, athletes used diaries to monitor training-loads, but sport scientists consider this approach fallible, and prey to myriad self-report errors and biases (Dideriksen et al. 2016). To address this 'limitation', wearable mobile tracking devices ('wearables') have been presented as an 'objective' means of tracking and identifying *real-time* 'training load errors' (Moore and Willy 2019, 438). As Matthews (2021) notes, runners engage with digital tracking to monitor the time, speed, location and distance of their runs, arguing that from a 'dataist' perspective the universe is seen as a series of data flows, in which human experience

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is construed as irrelevant. From the sport scientist's perspective, too, wearables can provide a form of real-time 'knowing' that reduces the reliance on subjective human judgements about bodily states (Moore and Willy 2019).

Despite the promise of real-time analytics, and studies of wearables from a range of theoretical perspectives, there remains scant phenomenological research on competitive runners' embodied, sensory experiences of wearables, and how they engage in active and contextualised sense-making. Whilst Esmonde (2019, 2020), for example, examines self-tracking in women's recreational running, we sought to investigate the ways in which competitive, sub-elite, male runners employ their social agency to use (or not) algorithmic analysis to understand their performance and bodily being in real-time. For, as Esmonde (2020) argues, the collection of digital data can have a profound effect on how runners make sense and meaning from their running practices (see also Carlén and Maivorsdotter 2017). Drawing on interviews with male endurance runners who use wearable devices as part of their training regimes, we examine the ways in which these athletes make sense of data in *context*, commensurate with a phenomenological, embodied and emplaced perspective. We begin with a consideration of wearables, and their usage by endurance runners.

Running with wearables

Wearables are small, lightweight, micro-technology devices worn on or close to the body, to monitor, analyse, transmit, and/or receive data from other devices and/or cloud services, with the capability to provide real-time biofeedback (Düking et al. 2018; Matthews 2021). Over 75% of runners have been reported to use wearable technology and/or running-related apps consistently, including for training optimisation (Janssen et al. 2017). Recent surveys indicate many experienced runners consider wearable devices an integral component of the training process, using them to monitor physiological parameters such as heart rate, to regulate pace, and make training-load adjustments (Rapp and Tirabeni 2018). Data-capture systems also link with smart devices, such as the Apple Watch, to provide data in real-time, and it is common to see runners glance at their watch mid-stride to check heart rate, cadence, or some other performance metric.

GPS devices have been heralded by biomechanists as representing an 'objective' means of tracking training load in real-time, and, via proprietary algorithms, identifying training-load errors and the likelihood of incurring running-related injury (Moore and Willy 2019). Such identification is of importance to performance athletes whose training regimes require covering significant distances, where even small errors in training-load can increase injury risk (Bourdon et al. 2017). Real-time feedback may be given via a prompt or 'nudge' (e.g. beep or vibration) that reminds runners that their cadence, heart-rate or speed has deviated from a specified target, often as part of a training plan (e.g. heart-rate zone training). This 'datafication' process is seen by some as an important step in the evolution of distance running and/or endurance training, as it purportedly obviates the traditional reliance on training diaries, which are construed as subjective and 'flawed'.

Part of the promise of real-time data has been signalled as the possibility of 'objectively' identifying elements such as injury risk, by recording deviation from a desired training load or intensity (Willy 2018), rendering visible those aspects normally beyond the performer's awareness. Sport scientists might be considered to employ a form of 'mechanical objectivity' by utilising wearables to generate what Kitchin (2014, 19) describes as: 'distant, detached, impartial and transparent data that is free of researcher bias and preferences'. This realist-contoured perspective is, however, at odds with a gamut of research highlighting the social agency of wearable-users as: 'active participants in a dialogue that moves between data as an externalisation of self and internal, subjective, qualitative understandings of what the data means' (Nafus and Sherman 2014, 1793). From this perspective, users of wearables engage in active 'data sense-making' (Lupton 2017) that includes decision-making about the value of data and how they might be incorporated into everyday life.

In Lupton et al.'s, (2018) study, for example, commuting cyclists interpreted corporeal experiences in part via the digital data they generate, and in part via their physical sensations, whilst self-tracking devices afforded female participants in Lupton's (2019) study the opportunity to set specific goals. Esmonde's (2020) Foucauldian study analyses the production of running data as both a digital and material process that requires human-data assemblages. Digital data may affect how people think about and experience their bodies, and their decisions about physical activity, even after relinquishing wearable devices (Clark et al. 2022). Further research exploring self-tracking as a social practice (see Couture 2021, Toll and Norman 2021) has been published in a special issue of this journal (Goodyear and Bundon 2021).

The above studies have taken various onto-epistemological perspectives, including feminist new materialism (Lupton 2019) and constructivism (Esmonde 2020), to showcase the agential capacities generated when humans gather in assemblage with nonhuman things. Here, we employ a different theoretical perspective, phenomenology, to investigate such intertwining of humans and objects, and particularly how this is experienced sensorially in everyday life by runners who inhabit the lifeworld of competitive middle/long distance running and use wearables in their everyday, mundane practices. Indeed, analysing such human-object intertwining has long been central to phenomenology (e.g. Merleau-Ponty 2001 writing in the 1940s onwards) but taken up much more recently in other approaches such as sociomaterialist and feminist new materialist (e.g. Esmonde 2019, Lupton 2019) perspectives. Given that entanglements with digital sensors involve such inter-twinings, sensory embodiment, and active sense-making emplaced in specific contexts, employing a phenomenological approach allows us to investigate precisely these kinds of mind-body-wearable entanglements as recounted in the lived experience of those inhabiting the physical-cultural lifeworld of middle/long distance competitive running.

Our sociological phenomenological theoretical perspective (Allen-Collinson and Jackman 2022) highlights the fundamental intertwining of mind-body-world, which lies at the heart of phenomenology (e.g. Merleau-Ponty 2001). Particularly apposite to our research, and to research on sport and exercise more generally, is the phenomenological conceptualisation of the 'body-subject' (Merleau-Ponty 2001): the lived-body that is present to us in consciousness, linking mind-body-world in our experiential encounters, for example with wearables (Toner et al. 2022). Embodiment for Merleau-Ponty (2001) is the intertwining of body-space-time in lived experience. In contrast, the *object*-body is the material body as an *object* of (purportedly) 'objective' investigation, as in the case of much biomechanical and sports-science research on sporting bodies.

A phenomenological concept highly germane to the current study is that of *intentionality*, initially developed in Husserlian phenomenology, and which highlights how consciousness is intentional; that is directed towards something or someone. With his interest in Gestalt psychology, Merleau-Ponty (2001) further developed Husserl's concept of operative intentionality, contouring this as a form of pre-reflective intentionality. Merleau-Ponty's (1969, 2001) focus on the cognitive and corporeal nexus, together with the exploration of embodiment and perception, has proved highly applicable to researchers in sports, exercise and physical cultures¹ (see for example, Allen-Collinson and Jackman 2022; Clark 2018; Hughson and Inglis 2002; Liu 2022; McNarry et al. 2021; Purser 2018; Ravn 2021). As we have examined in earlier work (Allen-Collinson 2009; Toner et al. 2022), more social/sociological forms of phenomenology, such as feminist phenomenology, fully acknowledge and subject to analytic attention the fundamental effects on embodiment of our socio-cultural and social-structural situatedness.

A further phenomenological conceptualisation addressed here draws on the work of Leder (1990), who develops Merleau-Pontian thinking on intentionality in considering the 'dis-appearing' and 'dys-appearing' body. With the 'dis-appearing' body, Leder (1990) highlights how our body, when unproblematic, is largely 'absent' from, or 'backgrounded' in consciousness during everyday life, allowing our intentionality to reach outwards to the world, so we experience an 'ecstatic' body from which 'rays of intentionality radiate outward' (Leder 1990, 73). In contrast, when subject to pain,

illness, or sporting injury, our body moves from this backgrounded position of ease, to feature as a problematic object of intentionality. In this state of bodily 'dys-appearance' consciousness shifts from an outward-facing 'ecstasis' to a more inward, interoceptive focus of intentionality.

The current study was thus undertaken to investigate the lived, embodied, sensory experiences of running with wearables, from the perspective of a group of runners experienced in their usage. The study thereby addresses a key question signalled by Matthews (2021) as to whether people use technologies with an agency that allows for self-determination.

The research

The study was grounded in social constructivism, and thus underpinned by a relativist ontology and a subjectivist epistemology (Sparkes and Smith 2014), highlighting how knowledge of runners' experiences of self-tracking was socially constructed between interviewer and interviewees (see Smith and Sparkes 2017). We note at this juncture that in relation to the phenomenological elements of the research, we are making no claim to using *philosophical* phenomenology as methodology or 'method' (the latter is more a whole *weltanschauung* than 'method' in terms of 'technique') as advocated by Husserlian phenomenologists. Rather, we were undertaking a qualitative study informed by central phenomenological concepts (Ravn 2021; Zahavi 2019; 2021), such as lifeworld, the lived body, and intentionality (see also Bluhm and Ravn 2022; Ravn and Høffding 2017). In this regard, our purpose was to generate novel understandings of the use of wearables via the application of phenomenological insights to qualitative data; an approach known as 'applied' phenomenology (Zahavi 2021).

Participants

Six competitive, sub-elite, male² runners aged between 18–22, based at an English university athletic club, were recruited via a combination of purposive sampling (Etikan et al. 2016) and snowball sampling. To be eligible for the study, participants were required to be competitive runners and had to self-identify as habitual, committed users of a self-tracking device. The initial participant was sought out purposively on the basis of fulfilling the inclusion criteria, and subsequently he assisted with the recruitment of further participants, who were contacted via email and provided with details of the study. All six runners eventually recruited were engaged in running 4–6 times per week, individually and/or in group training sessions, and covering a distance from 1500 m to the marathon. All received coaching, but their coaches had no say over how the athletes used their devices or enacted data, and all wore a Garmin Smartwatch when running, which meant they were subject to similar forms of algorithmic analysis.

Data collection

Ethical approval was granted by the University ethics committee (Reference: FHS298) and participants provided signed consent prior to any interviews, which had to take place via Zoom™ during Covid–19 restrictions. The interviews were recorded and subsequently transcribed by Joe, a co-author and postgraduate student, as part of the data-immersion process. Each participant was interviewed on two occasions, with at least eight weeks between each interview, to gain a more longitudinal understanding of how temporality shaped engagement with wearables. As people are considered to 'co-evolve' with digital technology, and thus how they use, interpret, or enact data may change depending on personal goals and intentions (Kristensen and Ruckenstein 2018), repeat interviewing encourages a better appreciation and understanding of the temporal flows of self-tracking (see Lomborg et al. 2018). Interviews were iterative in nature so that initial findings from the first round informed and shaped the interview guide used for the second round.

Interviews were approximately 30 minutes in length, semi-structured, with a general interview guide used to pose focused but open-ended questions about participants' experiences. Questions were partly informed by the extant research on runners' utilisation of wearable devices (e.g. Esmonde 2020; Toner et al. 2022) and also by Joe's own experiences using wearable devices to track and analyse his own running performance. The interviewer's position as a 'cultural insider' (e.g. McNarry et al. 2021) to the running lifeworld seemed to help establish rapport with interviewees; for example, by Joe discussing his own involvement in running. The primary challenge engendered by this 'insider' status, however, was the need to identify and thematise his taken-for-granted assumptions regarding experiences of running with wearables. This was assisted by discussions with John, the lead author, as a 'critical friend' (Smith and McGannon 2018; Stenhouse 1975) before interviews took place. These discussions revealed that Joe initially felt wearables could provide an 'objective' rendering of running performance, so he was encouraged to remain critically aware of this assumption during the research. Interviewees were primarily encouraged to direct the conversation themselves, to share experiences that were personally meaningful, rather than those pre-defined by the interviewer. Open-ended questions such as 'Tell me about your experiences using wearable devices' were used to initiate conversation, whilst follow-up probes and curiosity-driven questions (e.g. 'Can you explain in more detail why you focus on this particular metric?') were used to encourage explanation and elaboration. Interviews concluded by inviting participants to discuss anything not previously covered. A decision to cease recruiting further participants was made by the interviewer in conjunction with the first author, when it was deemed that no further new or alternative kinds of responses were being made to the questions posed.

Data analysis

Our approach to data analysis was informed by Braun and Clarke's (2019) reflexive thematic analysis (RTA). Accordingly, the analytic process was recursive and organic, moving forwards and backwards through data familiarisation, coding, developing themes, and writing-up (see also Braun and Clarke 2021). As a team of researchers from diverse disciplinary backgrounds, we acknowledge that our values and self-identities influence how we reflexively position ourselves as insiders or outsiders in the research process (McGannon et al. 2019). Joe, for example, possesses some 'insider knowledge' given his experience as a competitive long-distance runner whilst the other authors run on a recreational basis. Analysis began with the transcription of the interviews and a familiarisation process where Joe and John read the transcripts multiple times. Data-immersion involved reading the transcripts whilst adopting a curious and inquisitive perspective (e.g. asking questions such as 'what implications might this account have?'). Next, data were coded using a succinct label to capture the content and its analytical relevance. Semantic coding focused on experiences and meanings as explicitly stated by participants, whilst latent coding was used to identify underlying assumptions that might inform the semantic content of the data. For example, participants recounted using embodied indicators such as a difficulty in conversing with a running-partner as evidence that their pace was too fast for an 'easy run'. This was semantically coded as 'active monitoring of bodily sensations' and a latent focus was developed by drawing on concepts such as 'somatic knowledge' (Allen-Collinson 2011) to construct a sub-theme around 'bodily attunement'. Having generated initial codes, John and Luke acted as 'critical friends' (Smith and McGannon 2018) by drawing on their disciplinary knowledge to question Joe's initial interpretation of the data. For example, Joe was introduced to the concept 'situated objectivity' to help explain participants' sense-making of data relevant to a specific situation. Similarly, Jacquelyn and Patricia suggested Leder's (1990) concept of the 'disappearing' body might help explain the disruptive nature of real-time feedback. This collaborative and recursive approach to coding encouraged a rich and nuanced reading of the dataset (Braun and Clarke 2019) and opened up opportunities for alternative (and novel) analytic

insights. This nuanced reading involved the identification of more ‘latent’ patterns of meaning across the dataset, as noted above. Further discussions sought to generate themes by clustering similar codes in order to identify ‘higher-level’ patterns. For example, the code ‘running for enjoyment’ was integrated into a subtheme labelled ‘running as a social process’. Theme development involved identifying a discernible organising concept for each theme and determining whether themes were clearly delineated. We sought to generate themes that captured patterns of shared meaning across the dataset. ‘Member reflections’ (e.g., Cavallerio et al. 2020) involved participants being asked to comment on our initial interpretations of their accounts, and also being offered the opportunity to give different interpretations, though none actually did.

Findings

The findings we portray cohere around two key themes generated: 1) easy runs; and 2) disrupted embodiment. These themes represent two of the salient experiential contexts in which the runners sought to question the utility, and sometimes even the veracity, of the real-time data generated by wearables. In the extracts that follow, the age of the participant is included in parentheses.

Easy runs

One of the situations in which participants challenged the value of real-time data was during what they termed ‘easy runs’, which involve running at a lower intensity than would be usual during ‘normal’ training runs where the aim is to develop the runner’s aerobic capacity. Rather than being guided by ‘objective’ data generated by a wearable, easy runs were informed and shaped by embodied indicators, such as ‘the ability to talk or not’, as Tom (21) put it. In this case, being unable to hold a conversation with a running partner would indicate that the pace was too fast to constitute an ‘easy run’. During these kinds of run, participants moderate their pace by drawing on experiential ‘somatic knowledge’ (Allen-Collinson 2011) or ‘bodily knowledge’ that can be informed by physical sensations and heightened bodily awareness (Parviainen and Aromaa 2017). For Paul (19), as for most participants, this means being engaged in active monitoring of corporeal sensations, rhythm, and levels of effort:

... the main focus would be how my legs are feeling and especially when coming back from an injury I’d be looking out for any pain or anything like that. So, I think I’d sort of have that in the back of my head, like am I tightening up or anything like that.

Easy runs serve a dual purpose for many runners: they are physiologically important for building training volume – ‘putting in the miles’ (Allen-Collinson and Hockey 2001), but they also have a psychological and social function within the running lifeworld. Dave (19), for example, noted that in addition to building aerobic base, he also uses easy runs ‘for enjoyment too, just to get out with mates and have a good chat and stuff like that’. Paul (19) echoed these sentiments regarding enjoyment, relaxation and pleasure, describing the purpose of easy runs as:

... to sort of keep the legs ticking over and get the extra miles in. I also think there’s a mental benefit of easy runs, you know just to get out the house, especially in the current times [Covid-19]. And there’s kind of no pressure on the run, like if you’re doing a session, you’ve got targets to hit and you have to perform, but on an easy run I guess you can kind of just enjoy it and relax. And if you’re in good shape, you can do an easy run and feel great all the way through, but definitely the enjoyment side of it, I love running and especially at the moment when we don’t really get that many chances to go outside. So, for me, as much as I love my training and sessions, I’d like I’ll go on an easy run because I want to go outside, and I can kind of kill two birds with one stone.

Commensurate with phenomenological perspectives, participant comments highlight the mind-body-world nexus, and also the sensory and affective dimensions of running, which include ‘our felt sense of the meaning of things ... and our emotional transactions with

other people and our world' (Johnson 2018, 225). Easy runs thus allow conscious enjoyment of intersubjectivity with others in the lifeworld. Participants noted that real-time tracking during easy runs means having 'targets to hit', thus introducing an unnecessary element of pressure or competition, which sits uneasily when enjoyment or relaxation is the principal purpose of the run. Interviewees also suggested that accessing tracking data during easy runs can distract them from running based on their own bodily feelings and somatic 'attunement' (Allen-Collinson et al. 2023). For them, it was important to be able to run 'freely' during easy runs and not feel constrained by specific goals or targets (Jackman et al. 2021). As Tom (21) indicated:

I guess like, sometimes if I'm not actually training specifically for something, I just, like, go for a run to clear my head or something like that. Because sometimes I think, it's important to just go for a free run, and not have it limited to the training plan or something like that. It's like an enjoyable run ... you just want to go and run freely, not be too bothered about your training plan and stats and how you are running because it takes maybe the freedom or the enjoyment out of it. So, if you just want to go for a steady jog around the block, you don't want to be looking at your cadence. Sometimes if you're doing an easy run and it feels too hard it can play on your mind, when really it would be more beneficial to just go out and run off how your body actually feels.

Tom's and others' analogous comments suggest the constraints of continuous tracking by wearables have the potential to transform what is an enjoyable, and for some a ludic activity, into a chore (see also Etkin 2016) or just another form of labour (Moore 2018). From a phenomenological perspective, checking on real-time data might also prove highly disruptive to a runner's experiential 'flow' (Jackman et al. 2021), bringing the normally 'absent' body to the forefront of awareness as an object of intentionality. The body then 'dys-appears' (Leder 1990) when 'its functions, movements and habits, are constantly monitored', and when 'the user is made continually aware of these dispositions', as Lupton (2016, 79) notes. The runners' preference is for easy runs to be characterised by bodily 'dis-appearance' (Leder 1990) where the subject-body stands as a point of outward perception (Merleau-Ponty 2001), rather than being experienced as an intentional object. The participants recounted how the visibility of 'stats' could disrupt corporeal dis-appearance and induce a conscious, reflexive awareness of their performance, which then hindered their ability to 'run freely'. Mark (22) described how predictive data from his wearable device had a negative impact upon his feelings on an 'easy', recovery run:

An example while running was quite a while ago now actually but it was a recovery run and I was tired, so I was running very slow, but my heart rate was still quite high. As a result, my device predicted a decrease in my VO_2 max, and I think that can have quite a negative impact on how you feel especially if you then struggle to get it back to what it was.

Mark proceeded to describe in greater detail how viewing real-time data on his wearable could lead to questioning and even doubting his own embodied understanding of how a run was going:

Let's say I was on a tempo run but quite a long tempo, and I look at my heart rate and it's 190, for example, then all of a sudden, I think 'oh maybe I am actually tired' and that I need to slow down, or I convince myself I can't carry on at the pace I'm going even though before looking at my heart rate I thought I felt fine. So, it could definitely influence performance. And that's why on runs like that I usually just have my pace and the time on my watch, so I haven't got any heart-rate data being shown to me. The main reason for doing this is so that I listen to my body more, and don't overrule my feelings with what the watch is telling me.

As the latter example suggests, the runners can be reluctant to relinquish use of devices even when cognisant of the disruptive influence real-time data might have on running embodiment. Although runners were keen to avoid viewing tracking data during easy runs, many ensured that running activity was 'captured' so that it could be reviewed post-run. Dave (19) reported if he's 'just doing an easier run in the summer on the trails, I sometimes go out and just put my watch on underneath my wrist or something so I can't see its face, or I might put it in my back pocket or something'. In this way, runners employ their agency to re-purpose technology,

allowing them to continue collecting data, but not be subjected to in-the-moment system-initiated feedback, in a form of ‘resistance’ (see Esmonde 2020; Matthews 2021). This might constitute an attempt temporarily to ignore real-time analytics, but people nevertheless remain subject to ‘dataveillance’ (Van Dijck 2014) and the objectification of their bodily processes. Choosing the time and context for reviewing these data thus accords some agency to individuals.

Disrupted embodiment

The second salient experiential context in which athletes found real-time data of limited use was when experiencing disruptions to the mind-body-world relationship, via, for example, fatigue, injury, or challenging environmental conditions. The mercurial nature of the British weather means that runners and other outdoor exercisers must contend with a range of elemental conditions that can change in an instant (Allen-Collinson 2018; Allen-Collinson and Jackman 2022), and algorithmic analysis is unable to account for such context-dependency of running performance. Such circumstances mean runners, even those normally reliant on their tracking devices, must draw on their own (and sometimes others’) somatic knowledge and ways of knowing (Allen-Collinson 2011) to adapt their practices to suit conditions. Simon (21) described a grass-based session that was particularly ‘boggy’, and so he was ‘not fussed by the average pace; I think effort levels are more informative than pace really’. This embodied and experiential evaluation allows Simon to interpret his performance as highly context dependent, in contrast to the device’s ‘uninformed’ data. Other participants similarly noted how different environmental (e.g. terrain, air, weather; see Allen-Collinson and Jackman 2022) conditions made running at a pre-determined pace extremely challenging, even impossible or pointless. Experienced runners then adjust pace according to their own subjective assessment and somatic knowledge. Paul (19), for example, runs according to ‘feel’:

... doing a session that’s not on the track, my paces and stuff are likely to be inconsistent, so if that was the case I’d run more to feel. But I think you can kind of tell how well you’re running from how you feel.

Similarly, Simon (21) explained how training in challenging wintry conditions means privileging his contextualised self-feelings regarding *perceived* effort over any device-generated metric such as running pace:

And it was like, you’re breaking the ice as you run through it. And I think I got to the point where I wasn’t too fussed about what the pace was. Because I kind of thought that the pace would just be skewed by what the conditions were, like ... if you’re putting in the same effort that you would normally do to get x pace. And you’re putting in the same effort ... but you’re like 20 seconds down per mile or something, I think I’d be more bothered about my perceived effort that I’ve put in because it’s kind of like, just putting it into context.

Simon’s account exemplifies the developed situational awareness of the runners’ ‘habit-body’ (Merleau-Ponty 2001) in eschewing ‘objective’ data in favour of their embodied understandings. Simon’s intentionality is directed towards the terrain underfoot and interoceptively towards his own bodily indicators, rather than towards his wearable, thus prioritising his own somatic knowledge (Allen-Collinson 2011) in making situationally relevant decisions. Experienced runners are often highly sensorily ‘attuned’ to nuances (Allen-Collinson and Owton 2015) vis-à-vis pace and cadence, via their ‘felt corporeality’, which Hockey (2013) describes as an embodied sense developed from (sometimes) thousands of miles of being shaped by landscapes through which they run.

This embodied understanding means that runners often adjust expectations of what is achievable during specific sessions. For Paul (19), this means that although checking real-time data out of curiosity when running in differing conditions, he relies more on his own bodily ‘feel’ as strongly contextualised:

I’d look at the paces from my run more out of curiosity. I wouldn’t really look at them to measure if I was getting fitter or anything, just because the conditions could have been so different from one run to the next ... I usually don’t think about hitting specific paces, because a lot of the sessions that I do will be on different surfaces, and

often a session on grass, especially at the time of year, is very boggy and that really impacts the pace. So, like, one week, I'm doing like a tempo on grass and the other one I might be doing on the road, so kind of, I tend to just run to feel.

In these instances, runners might be considered to employ a form of 'situated objectivity' in which prior experiences and expectations shape how users make sense of their data as relevant in a specific situation (Pantzar and Ruckenstein 2017). The data assembled during an activity affected by challenging conditions can be difficult for the runners to interpret. As a result, participants tend to avoid normative comparisons, by bending measurement results to their own purposes and searching for alternatives to algorithmic analysis, as Pantzar and Ruckenstein (2017) found.

Furthermore, runners identified how tracking devices fail not only to take into account environmental conditions, but also, importantly, their own bodily state-of-being:

I think there's sort of those times where I go through spells where if I don't feel I've been running well and I have not been performing in sessions and my body's just feeling a bit rubbish, and I'll just turn off the mile splits and not look at the watch at all during the run, just start it and stop it. This is just so I like to run to feel and I'm not forcing myself to hit any paces or anything like that. (Simon, 21)

Participants described their unwillingness to be subject to system-generated data and feedback when their running is generating degrees of bodily 'dys-appearance' (Leder 1990), such as when recovering from injury, or when suffering the kind of minor 'niggles' frequently affecting most regular runners. Tom (21), for example, revealed his frustration with his inanimate device's inability to factor in his injury status, or more general running state-of-being:

So, I think the watch has no real idea of what muscle tightness I've got; for example, last week I had a tight hip flexor, so I changed the session I was doing to a slow easy run . . . I didn't want to go too fast on that run and risk injury by tearing it.

In such instances, it was clear from the data that the runners had developed an embodied understanding of the level of risk posed by various forms of corporeal 'dys-ease', such as injury. A concern they identified was that the quantification of their running often brought with it an element of competitiveness (including self-competitiveness) that might encourage a running pace that could hinder the injury-healing process. Runners were also cognisant that 'the data' are likely to show them in a negative light (e.g. via a data-double on their Garmin dashboard), and so they exercise social agency by resisting such 'datafication' (Van Dijck 2014), during injury periods when pace is not a key goal:

When I was injured, I did a couple of runs without my watch, I think the main reason for that was because I just didn't see the need, like I was just going for a run to get out the house and just to test how my leg was doing. And when it's just a little run like that, I don't see the need in putting it on Strava because it's not going to have any benefit to my training. And especially like having to wait outside the house for it to get GPS signal, I'd rather just head off on the run straight away. I don't want to get bogged down in all the pace when I'm just running to relax, but yeah, in those situations I definitely would just rather run without the device. (Paul 19)

As Paul and others identified, alongside functional reasons for not wearing a device (such as having to wait for a GPS signal), feeling subject to surveillance by wearables, especially running below one's usual performance level, can create a disconnect between how the athlete actually feels and how the device is telling them they should feel (Smith and Vonthethoff 2017). Algorithmic demands can seem unrelenting, as devices continue to 'encourage' the wearer to set increasingly stringent performance targets, irrespective of salient contextualising factors. This can generate frustration; as Mark (22) noted: 'the race predictor seems to get faster and faster, so you're never actually able to catch it'. When the predictive analysis is not attuned to, or connected with, the runner's lived sensory experience, the advice or prompts offered by the device may have little perceived relevance to users' goals and intentions. Importantly, however, participants exert social agency by actively engaging in sense-making processes whereby they interpret data according to the spatio-temporal context in which these data are generated, and to the user's goals. Such context-

specificity accords with existential phenomenology's highlighting of the salience of spatiotemporal situations in human perception (Merleau-Ponty 2001) and sense-making.

Conclusion

According to Andrejevic (2013), data analytics are 'immediated' in that their goal is to produce direct forms of 'objective' knowledge. For many sports scientists, this real-time 'knowing' allows athletes to anticipate injury-risk (Moore and Willy 2019) and optimise performance. This supposedly negates the need for individuals' time-consuming deliberations based, for example, on one's sensory feelings, by providing a purportedly objective measurement of bodily state. As Beer (2019, 48) notes, the speediness of data analytics aims to close 'the gap between data and insight'. Drawing on qualitative findings, we have portrayed how runners' lived experiences challenge this techno-utopic (perhaps dystopic) vision. Participants were habitual users of wearable devices, with self-tracking constituting a key element of everyday training practices. They were acutely aware, however, that real-time analytics are fallible, being de-contextualised and thus failing to factor-in myriad variables such as weather, environmental conditions, running terrain, and runners' 'going' at any moment of a particular run. Instead of treating system-initiated feedback as authoritative, therefore, participants employed their social agency, drawing on their own embodied 'somatic knowledge' (Allen-Collinson 2011) in interpreting data and sometimes making finely-tuned judgement calls as to whether to engage in 'resistance' or 'accommodation' (Esmonde 2020) vis-a-vis wearables. Our findings highlight how decisions about what actually matters are firmly interpretative, requiring athletes actively to make sense of data by drawing on their 'somatic ways of knowing' grounded in the phenomenological notion of the mind-body-world nexus (Allen-Collinson et al. 2018).

Some sport scientists downplay such social agency, arguing that power lies in the mechanics of the algorithm, giving analytical systems the capacity to regulate social lives through the automation of decision-making (Bucher 2018). This has important implications as, with the spread and intensification of measurement systems and technological assemblages, algorithmic processes play increasingly significant roles in how the runner's world is ordered. Algorithms, for example, act as filtering devices that make decisions about what information to include or exclude (Bucher 2018), to inform and shape the choices we make. Participants provided numerous examples of how devices sought to nudge them towards certain behaviours (e.g. when race predictors set increasingly stringent performance targets). Here we see an example of how algorithms exert power by making decisions about the ways in which information is presented, organised and indicated as being important (Bucher 2018). Following Bucher (2018), we acknowledge the productive and generative power of algorithms. Indeed, our findings suggest that the way runners interact with these devices involves a complex meshing of human and machine agency (Beer 2017), in line with phenomenological perspectives on the intermingling of body-and-objects (Merleau-Ponty 2001). Although beyond the remit of this study, future research might adopt a relational perspective to explore how the coming together of runners with wearables becomes more (or less) human or nonhuman. A primary goal for us, and one which our sociological phenomenological perspective allowed us to address, was to understand runners' lived, sensorially-grounded, and in-the-moment meaning making processes regarding algorithmic data, analysing how runners mobilise their mind-body agency in an 'algorithmically negotiated world' (Bucher 2018).

These findings have implications for data intermediaries intent on employing increasingly sophisticated algorithms to analyse users' data to anticipate, or even predict, their future actions (see Williamson 2015). Participants challenged this ultra-rationalised perspective by identifying experiential contexts in which real-time analytics are not perceived as so flexible or 'smart' as data intermediaries might wish. Runners pointed out how wearables were not deemed adaptable or 'active' in responding to users' needs, but rather the algorithmic analysis seemed fixed, rigid and pre-determined, unable to factor in feelings and 'corpo-reality' vis-à-vis specific mind-body-world circumstances. This points to limitations of predictive analytics and suggests that more embodied

accounts are needed if we are to understand how runners actually negotiate the varied spatio-temporal, sensory, social and affective contexts they encounter, and their lived running-body experiences.

We fully acknowledge that ours was a sample of young, competitive, sub-elite, male runners, who were all wearable-users; different findings could well be generated with different participant groups. Our purpose was to develop analytical and theoretical generalisability (Smith 2018) via the application of central phenomenological concepts (see also Zahavi 2019), to generate novel insights into the lived experience of wearing and using tracking devices. As participants explained, whilst wearables were undoubtedly useful in providing data analytics to help enhance performance and ameliorate injury-risk, there were also important limitations, not least in these devices' lack of context-specificity. Our findings highlight how our own sporting sensory embodiment, 'somatic knowledge', and embodied ways of knowing can be far more sophisticated and nuanced than the 'objectivist' information generated by wearable devices. Runners might well draw upon real-time data to help inform their actions, but these data were never allowed to 'speak for them' (Kitchin 2014). Instead, commensurate with our phenomenological perspective, the runners actively and contextually *interpreted* data via their own experiential, 'somatic knowledge' (Allen-Collinson 2011), assessing the relevance and usefulness of data in light of their own embodied feelings, goals, and intentions, as made meaningful within the particular lifeworld of competitive running.

Notes

1. We employ the term 'physical cultures' to incorporate non-sport and 'post-sport' cultures, such as dance, yoga, certain fell-walking and fell-running, etc. See, for example, Atkinson (2010).
2. An exclusive focus on male runners was not intended, but as one of our initial recruits was male, he then recommended additional male runners in his group; a limitation we fully acknowledge.

Disclosure statement

No potential conflict of interest was reported by the authors.

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