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How does health feel? Towards research on the affective atmospheres of digital health

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Abstract

The concept of affective atmospheres has recently emerged in cultural geography to refer to the feelings that are generated by the interactions and movements of human and nonhuman actors in specific spaces and places. Affective atmospheres can have profound effects on the ways in which people think and feel about and sense the spaces they inhabit and through which they move and the other actors in those spaces. Thus far, very little research has adopted this concept to explore the ways in which digital health technologies are used. As part of seeking to redress this lacuna, in this essay I draw on previously published literature on affective atmospheres to demonstrate and explain the implications of this scholarship for future theoretical and empirical scholarship about digital health practices that pays attention to their affective and sensory elements. The article is structured into six parts. The first part outlines the concepts and research practices underpinning affective atmospheres scholarship. In the second part, I review some of the research that looks at place, space and mobilities in relation to affective atmospheres. In the third part I focus more specifically on the affective atmospheres of medical encounters, and then move on to digital technology use in the fourth part. I then address in the fifth part, some relevant scholarship on digital health technologies. I end the essay with some reflections of directions in which future research taking up the concept of affective atmospheres in the context of digital health technologies can go. The key research question that these topics all work towards is that asking 'How does digital health feel?'

Keywords

Affective atmospheres, digital health, digital sociology, feeling, the senses

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Introduction

The concept of affective atmospheres has recently emerged in cultural geography to refer to the feelings that are generated by the interactions and movements of human and nonhuman actors in specific spaces and places. In this literature, affects are conceptualised as relations between humans and nonhumans, perceived and felt through the body. Affective atmosphere is understood as an assemblage of affect, humans and nonhumans that is constantly changing as new actors enter and leave spaces and places.[1–4] An affective atmosphere is often felt or sensed by humans entering a place rather than directly observed or represented in words or images, although these can also contribute to affective atmospheres. Affective atmospheres are diffuse, contingent and emergent, as humans respond to the presence and withdrawals of other humans and to nonhumans.

Affective atmospheres are shaped by their multisensory properties: how spaces and places are physically encountered via their visual, haptic, aural, olfactory and taste properties is central to the feelings they generate. Affective atmospheres can have profound effects on the ways in which people think and feel about and sense the spaces they inhabit and through which they move and the other actors in those spaces. People both contribute to the affective atmospheres they encounter and are affected by them. A key feature of this concept is the recognition that affect is not an individual

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response but is shared and collective, an intensity of feeling that moves between people.[1] Affective atmospheres can be experienced similarly, but the same people in the same spaces may also be experiencing different affective atmospheres as they may be responding to different elements in the space.[5,6]

In this review essay, I discuss the ways in which the concept of affective atmospheres can be applied to understand the sociocultural dimensions of digital health technologies, including their sensory properties. Digital technologies are widely advocated in medical and preventive health settings in the interests of delivering more effective and less expensive healthcare and encouraging people to take responsibility for promoting their health or to engage in self-care for chronic illnesses. Digital health technologies used for these purposes include telemedicine technologies, blogs, wikis, videos, websites, search engines, online discussion forums and social media for the provision of information about medical matters and for patient support, health and medical apps for mobile devices and other software, digital patient self-care and self-monitoring devices, implantable, wearable and ingestible sensors for biometric monitoring, health and fitness gaming devices, smart devices for monitoring and providing care to the elderly, emergency response systems, digital imaging software for medical diagnosis, virtuality reality and augmented reality for medical education and training, electronic patient records and other health informatic systems, digital disease surveillance software, robotic surgery and 3D printing of prosthetics and human anatomical replicas. Many of these technologies are also used in a wide variety of settings beyond the medical clinic and hospital, including the home, workplaces and schools.

Very little scholarship has attempted to apply the concept of affective atmospheres to the context of health, illness and healthcare. Even less research has directly focused on digital health technologies. Using digital health technologies can be a profoundly emotional and sensory experience, with significant implications for the understanding of human bodies, health and illness states and medical care. Discussions about the uses of digital health technologies in popular media, such as technology blogs and research published in the medical literature, tend to emphasise the rationalised purposes and outcomes of these technologies. While these accounts are overtly about the diagnosis and medical care or monitoring of human bodies, they are strangely decorporealised. There is little focus on the sensory and affective dimensions of digital health technologies, and how these may encourage or inhibit people (both patients and practitioners) from wanting to use them or finding them effective. The visceralities, vitalities, fleshiness, messiness, intensities and perversities of the bodies targeted by digital health technologies tend to be glossed over or ignored in these accounts.

As part of seeking to redress this lacuna, in this essay I draw on previously published literature on affective atmospheres to demonstrate and explain the implications of this scholarship for future theoretical and empirical scholarship about digital health practices that pays attention to their affective and sensory elements. The article is structured into six parts. The first part outlines the concepts and research practices underpinning affective atmospheres scholarship. In the second part, I review some of the scholarship that has explored the entanglements of place, space and mobilities in relation to affective atmospheres. These are the principal topics that have been addressed thus far using the notion of affective atmospheres. In the third part, I focus more specifically on the affective atmospheres of medical encounters, and then move on to digital technology use in the fourth part. I then address, in the fifth part, some relevant scholarship on digital health technologies. I end the essay with some reflections of directions in which future research taking up the concept of affective atmospheres in the context of digital health technologies can go.

Affective atmospheres: concepts and research practices

It is important to emphasise the mutual co-constitutive nature of the generation of affective atmospheres between people and nonhuman actors. Scholars who have adopted the affective atmospheres approach often draw on phenomenological philosophical perspectives, particularly as espoused in the work of Merleau-Ponty. In his phenomenology, Merleau-Ponty emphasised the interembodiment and intersubjectivity of humans with other humans and with the environment around them.[7,8] Recent sociomaterialist scholarship has also been influential. Like other sociomaterial perspectives,[9–11] scholarship on affective atmospheres highlights the role of nonhuman actors in human experience: other living things, objects, space and place are accorded detailed attention in what is described as a 'more-than-human world'.[10]

Some scholars working on affective atmospheres now often refer to a post-phenomenological position, in which embodied experience and practices, including the sensory and sensual, are the main foci. This position departs from the interest in language and discourse that has recently dominated much social theory.[12–14] The terms 'non-representational' or 'more-than-representational' are sometimes employed in this literature to emphasise the decentring of language and the turn towards affect and practice. This has entailed a focus on the phenomena of human experience that are felt or performed rather than directly articulated.[2,4]

The practices of sensing through human embodiment, and the emergence of feelings and emotions from these practices, are integral to the production and experience of affective atmospheres.[6,15] Affective atmospheres are sometimes open to conscious identification, but also operate at the pre-conscious or non-conscious level or somewhere between.[16] Some of the feelings and practices that are part of affective atmospheres can be difficult to express in words.[2,15] Research methods in scholarship on affective atmospheres, therefore, tend to employ qualitative and interpretive methods that focus on embodied practices, habits, routines, actions, performances and forms of exchange and communication which often operate subconsciously,[1,2,4] in addition to the words people use to explain their practices and ideas. Researchers adopting these approaches argue that meaning can emerge from routine sensory practices and habits rather than the other way around.[1,12,17,18]

The affective resonances of these embodied practices and the ways in which the senses are engaged are central aspects that are targeted for exploration in this type of research. This research may involve the use of images, autoethnography, detailed fieldwork and ethnographic work with close observations of other people's behaviours and responses in a specific space, audio-recording of soundscapes and notes about sensory perceptions of the environment: how the world looks, smells, feels, sounds and tastes. Researchers exploring affective atmospheres may ask people to re-enact their mundane practices and take photographs, audio-recordings and videos of these re-enactments, move along with them as they move through space and place ('go-alongs'), ask them to use a voice recorder to recount their experiences in the moment, write field notes as part of autoethnographic work on personal experiences, use cultural probes in the attempt to investigate non-obvious and creative responses to research questions, ask people to wear digital sensors to elicit digital data about their bodies, and participate in people's everyday activities (play a game with them, engage in their work with them, spend time in their homes and so on). Part of this focus is exploring aspects concerning how people feel comfortable or 'at home' using digital technologies, while others may feel less secure or at ease, and what the implications are for any differences between people. Some of these methods will be explained in further detail below in relation to specific research projects.

Affective atmospheres of place, space and mobilities

Perhaps because the concept of affective atmospheres was first developed in cultural geography – and particularly in mobilities research – previous work on affective atmospheres and technologies has tended to centre on practices such as cycling[5,14,19] or on other forms of transport, such as travelling on trains[3,20] and driving and parking cars[21] or on specific places and spaces, particularly those that are public.[22–24] This research has identified how space and place can feel safe, secure, pleasurable and pleasant or uncomfortable, risky, threatening or dangerous through a complex combination of elements.

As Merriman[21] points out in his account of car parking spaces, aspects such as the cost of parking, ease of access, the lighting of the space, its availability, the behaviour of other drivers using the space and many other elements can influence the affective atmospheres of these spaces, and consequently shape whether drivers are willing or able to use them. There are often complex 'affective economies' and aesthetic judgements[21] interbound with affective atmospheres, shaping the ways in which space and places are built, managed and controlled.

Some of this research has centred on the entanglements between bodily sensations and emotional responses. Bissell's[20] analysis of the stress of commuting by train, for example, develops a non-representational perspective on bodies. He draws on his own experience of commuting as well as an interview with another commuter (chosen as a case study from several he had conducted) to examine the gradual processes by which stress develops as a result of regular commuting. Simpson's[5] study involving cyclists in the city of Plymouth, UK, identifies the ways in which other road and footpath users contribute to the cyclists' feelings of comfort and relative safety in moving through these places. The behaviour of pedestrians or car drivers, for example, who express anger, hostility or frustration about having to share paths and roads with cyclists can shape cyclists' felt experiences as they encounter these other users, leading to the creation of 'uncongenial atmospheres'.

The spaces and places in and through which people move and encounter each other and the broader sets of shared practices, rules or laws that may govern these locations are central to the generation of these feelings. People can behave in hostile ways to cyclists, for example, because they feel as if cyclists are encroaching on their space in crowded traffic conditions or breaking the law. Cyclists respond to expressions of this hostility, perhaps leading them to engage in more aggressive styles of cycling or to avoid certain routes. The entanglements of humans, nonhumans, sensory sensations and affect are complex and interactive.

Affective atmospheres of medical encounters

While few scholars have explicitly directed attention to the affective atmospheres of medical spaces, work in

medical geography, science and technology studies and the sociology of health and illness has explored the importance of the emotional dimensions and materialities of care and the nature of space and place in patients' and practitioners' experiences of illness and healthcare. Some of this research has drawn attention to the production of feeling states as part of sociomaterial encounters of humans and nonhumans.

Medical care can be a profoundly emotional experience for the people involved, including healthcare practitioners and other carers as well as patients or other lay people. When people's bodies and health and illness states are the foci of digital technology use, they can often be very vulnerable or otherwise find themselves dealing with strong feelings.[25–27] Sociologists and anthropologists have highlighted the importance of sensory engagements between healthcare professionals and patients as part of diagnosis, assessment of patient wellbeing and recovery, the development of medical knowledge and developing the patient's trust.[28–31]

While interpersonal engagements are vital elements, incorporating space, place and other nonhuman actors extends this understanding of the affective dimensions of the medical encounter. The hospital or medical clinic could be understood as a specific type of affective atmosphere, in which the various human actors involved (e.g. practitioners, patients and their families), together with a range of nonhuman actors (e.g. rooms, views of the outside world through the windows, indoor plants, furnishings, pharmaceuticals, medical technologies and devices, air temperature, odours, sounds and so on) co-produce and experience the feelings that are part of this space and place. These spaces can generate a range of feeling and often ambivalent emotions: anxiety, fear, frustration, shame, distress, pain, boredom and a sense of being at risk may coincide with relief, trust, comfort and feelings of safety. The physical sensations people encounter when they are part of these spaces, including noises, smells, tastes and haptic experiences, are central to their affective responses. These spaces can be healing and calming in their affective atmospheres, but they can also be uncongenial spaces.

In medical geography research, there are references to the contributions that place, space, living creatures and other nonhuman elements make to what has been entitled 'therapeutic landscapes'. Therapeutic landscapes are those natural or built environments, including the people and other living things that inhabit them, in which people feel better and achieve a sense of wellbeing.[27,32–34] The concept recognises that the affective and sensory dimensions of these spaces and places are vital to human wellbeing. Conradson[33] gives the example of an English rural respite care centre. His interviews with the patients spending time there identified elements such as the embodied care they received from the healthcare professionals working at the centre, avoidance of the social expectations of family members, making new friends with other patients and opportunities to move around in the rural setting and observe the wildlife as providing a sense of freedom, relief, expansiveness and calm that promoted patients' feelings of safety, self-confidence and relaxation. Bell and colleagues[34] emphasise the importance of 'green' environments (outdoor areas with vegetation) and 'blue' environments (outdoor areas with bodies of water) in helping people cope emotionally with periods and life transitions involving stress or turmoil, such as the intensive parenting of young children, high work demands or the onset of illness or impairment.

The materialities of care literature has also identified the heterogeneous elements that contribute to affective atmospheres in medical and therapeutic settings.[35–37] Van Hout and colleagues[35] have demonstrated how sensory perception is important to palliative care nurses' assessments of their patients when making home visits. The nurses use various sensory appraisals to discern how well their patients are faring, including, not only talking to and looking at their patients to assess their physical characteristics, but also viewing the relative state of tidiness and cleanliness of the home and its garden, its smell and other sensory factors that can hint at the health and wellbeing of its occupant. Although the researchers do not use the term affective atmospheres, their account of the palliative care nurses identifies many elements of how atmospheres are generated in this setting and how the nurses themselves are sensing and contributing to these atmospheres as part of their working routines and habits.

Working from an affective atmospheres perspective, Anderson and Ash[1] recount their (separate) personal experiences in vignettes detailing waiting in UK National Health Service hospitals for medical care to be delivered to a sick child (in the case of one author) and an optometry appointment (in the case of the other). They begin with recounting the importance of attempting to give a name to an affective atmosphere as an initial step in understanding it. Anderson and Ash describe the affective atmospheres they experienced and contributed to as 'anxious waiting', a feeling generated by the emotional demeanours and voices of the people waiting around them in the hospital waiting rooms, the practices of the hospital staff and the sounds, odours, tactility and appearance of the waiting room and the hospital environment generally in which they are located. They refer to incidents they observed when the affective atmosphere suddenly changed because of the cry of a child, or the appearance of a visibly upset patient with a catheter in her nostril, altering the relative calm into a more intense, negative mood.

Affective atmospheres of digital technology use

Bringing this kind of research together with a focus on digital health technology use offers a perspective that can consider the digital dimensions of therapeutic landscapes, including not only how human–nonhuman assemblages generate positive affects that contribute to wellbeing and good health but also how negative affective atmospheres may detract from or hinder good health and recovery from illness. Some researchers adopting these approaches to investigate the affective aspects of media employ a 'not-media-centric' approach to media studies in their work. This refers to the attempt to consider media use (including digital media technologies) in their full environmental contexts, including the ways in which these media are marketed (which serve to suggest how people should emotionally respond to them), the other objects with which people engage as they are using media and the spaces and places in which they do so.[38,39]

This focus on broader contexts has become even more important as digital technologies have become mobile, wearable, implantable and ingestible.[40,41] Human encounters with their digital devices can be highly personal and intimate. As digital devices are constantly moving on and with human bodies, they are thereby continually entering new relations with humans and other nonhumans and generating new atmospheres. Digital devices have become human companions, cohabiting with them.[42] They touch or even enter human flesh; they live on and with human bodies; they monitor human movements in private and public spaces; they can inhabit the intimate domains of mood, slumber and sexual activity with the use of apps and wearables to track these elements of human life.[43]

The visual, aural and haptic aspects of digital device use are becomingly increasingly important to the affective atmospheres of their use. The design of the appearance of the device and its user interface is important in generating feeling. Touchscreens offer new ways of interacting visually and haptically with digital devices.[44,45] Many smartphones, tablets and wearable devices now vibrate, buzz, play music or melodic sounds and make other sounds to notify the user that they have new messages, an appointment coming up or have reached a self-tracking goal. The Apple Watch, for example, described by Apple CEO Tim Cook as 'the most personal device' ever created by the company,[46] not only monitors the haptic functions and movements of the wearer's body, but also communicates with the wearer using 'taptics', or tapping her or him on the wrist. This mode of communication is described on the Apple website as a way of providing alerts intimately and 'with a more human touch'.[47]

Ash's[12] inquiry into the different types of atmosphere generated by the iPhone 4 is one of the few accounts of the affective atmospheres of digital devices and software use published thus far. He places the technology at the centre of his analysis, seeking to identify how this device is part of a set of relations that generates affect. Ash focuses on moments of breakdown, when the iPhone fails to work as expected. One example he gives is the design of antenna in the iPhone 4, which did not work well in picking up signals when the phone was held by users in a certain way. The sensory capacities of the phone and the user were both limited by this problem, causing emotional responses on the part of users (mostly annoyance and frustration). Understanding these kinds of specificities of affordances of technologies (in other words, how they structure and allow use by human and other nonhuman actors) and the ways in which nonhuman actors interact with others (in this case, the mobile phone antenna with the wireless signals in the air around it) is important to realising the affective atmospheres of which they are a part. Ash draws attention in his analysis to the ways in which digital devices like smartphones and their surrounding technological infrastructures (such as wireless signals) generate atmospheres which shape how objects and humans encounter each other.

The personal information generated, recorded and assessed by digital technologies can also contribute to affective atmospheres. Digital devices are often imbricated within networks and systems of surveillance: particularly those that generate detailed information about people. Routine encounters with digital technologies – online searches or browsing, smartphone and app use, online purchases, social media interactions, moving around in public spaces fitted with digital sensors – continually work as part of digital surveillance, producing flows of data.[48–51] Awareness of these processes and technologies and encounters with personal data can contribute to affective states.

Focusing on how people generate and respond to their personal data, myself and colleagues[52] conducted what we describe as a 'digital sensory ethnography' to examine both cycling and digital self-tracking practices, examining the affective capacities of the personal data generated by cycling self-tracking. They video-taped cyclists (located in the Australian cities of Canberra and Melbourne) re-enacting preparing for a routine commuting ride, including getting the self-tracking devices ready, positioning them on their bodies or on their bicycles and turning them on, and then re-enacting what they did when they finished the commute. The participants also wore a GoPro (GoPro, Inc, USA) mini camera on their cycling helmets during a typical commute, so that we researchers had footage of the cyclists' perspective of their rides, including whether

they looked at their self-tracking devices during their cycle. The video footage of the trip was viewed together by researchers and participants, discussing how they felt on the trip, what the weather was like, the road conditions, other users of the road or path and how the data they were collecting about their ride may have contributed to their affective and sensory experiences of their cycling.

These methods generated research material that allowed us researchers to discuss the digitised dimensions of affective atmospheres. These included the interactions of weather conditions with how cyclists felt during their trips or how they reviewed their data and their memories of previous cycling trips and their 'datafied' performances, which contributed to their assessments of how good their bodies were feeling and how well they were performing. By incorporating the participants' engagements with their cycling data into the notion of affective atmospheres, this study represents one of the first to acknowledge that these types of digital data can be part of these atmospheres: in the case of these cyclists, as they rode their bicycles and felt the sensation of the cycling trip through and with their bodies and interpreted the digital data generated from their self-tracking devices.

Another relevant study is that conducted by Ellis and colleagues,[16] who conducted interviews with UK respondents about being the subjects of externally imposed surveillance by technologies in public spaces such as CCTV cameras and biometric trackers as well as in private spaces of internet and smartphone use. Ellis and colleagues found that their participants were often unable to fully articulate their concerns about being subjects of such digital surveillance, but rather expressed them in terms of affective responses. These researchers refer to the affective atmospheres of surveillance that they identified in their interviews, noting that these atmospheres tended to be registered in extra-discursive embodied activities. Their participants often felt ambivalent about digital surveillance technologies. They described sensing that someone was watching them, and only sometimes realising this fact: when suddenly noticing a CCTV camera in a public place, for example. Alternatively, these participants talked about feeling wary of revealing too much information about themselves, without being able to fully express why this wariness was warranted.

Ellis and colleagues suggest that because continual digital surveillance has become a feature of everyday life, its affective consequences are often difficult for people to articulate, reflect on or acknowledge. But even when practices are taken for granted, they are not necessarily fully accepted: it is here that sometimes-inchoate affective responses can be generated. Lupton and Michael[53] similarly found that our Australian interviewees talked about 'creepy' digital surveillance practices and their concerns that other actors knew too much about them, without really knowing who these actors were.

As these studies suggest, the ways in which personal data are collected and engaged with can 'feel right' or 'feel wrong', depending on the context. The concept of affective atmospheres recognises these ambivalences and ambiguities, acknowledging their co-existence.[6,16] Just as digital devices and practices related to these devices can contribute to affective atmospheres; so too can the digital data these devices generate.[54,55] We can then begin to talk about affective atmospheres of data: how assemblages of flesh, code, data, device, place, space and time generate feeling.

Affective atmospheres of digital health technologies

Little research thus far has investigated the affective intensities of digital health technologies in the context of the generation of affective atmospheres. However, a body of literature exists in the sociology of health and illness and science and technology studies that identifies the sensory and affective dimensions of patients' and practitioners' engagements with digital health technologies. Contributors to this literature do not engage with the affective atmospheres concept and tend to focus on individuals' experiences and how they are socially produced rather than take the collective and heterogeneous sociomaterial perspective promoted in the affective atmospheres approach. Nonetheless, some of their findings are relevant to understanding elements of the atmospheres that are generated with these technologies.

This research has revealed that people can come to rely emotionally on their digital health devices. Some patients monitored by telemedical and other remote monitoring devices think about them as caring machines, in whom they invest their trust and faith.[56] People can be reliant on life-giving devices like insulin pumps and pacemakers and they can gain reassurance and a sense of security from using them.[57,58] These at-home or in-body technologies, along with the human caregivers attending patients, can contribute to therapeutic affective atmospheres. The opposite is also true, however. If digital health technologies such as these fail to work as expected, users often respond with negative strong emotions. This can be even more the case of they are relying on the technologies to support their health or provide relief from illness or pain. As Oudshoorn[57] has noted, the vulnerabilities that these dependencies may generate are rarely acknowledged. Some people do not like how their homes are transformed into medical clinics when they are encouraged to engage in self-care and self-monitoring, finding the technologies and

their notifications intrusive and constant reminders of their illness, or resent the invisible labour that is required of them to learn about and tinker with the technologies to make them useful and domesticate the technologies into their mundane routines.[59–63]

The often very personal and sensitive information generated by digital health monitoring technologies devices can also stimulate strongly-felt responses. Research on people who are engaging in self-tracking or self-care practices has demonstrated that when the numbers 'look good', they feel confident, happy and gain comfort.[52,64,65] However, when their data are 'bad', suggesting that people's health is suffering or they are failing to achieve the goals they have set themselves, this can be unsettling and anxiety- and fear-provoking.[52,58,66,67]

The intimate interpersonal nature of digital technologies used for communication with other people also requires consideration. Digital media forums and social media provide a multitude of opportunities for people to engage in communication with each other that may be intensely personal. As researchers in cultural studies and internet studies focusing on the intersections of place, space, emotion and digital technologies have recently argued, digital media can provide a space in which people can exchange personal details, thoughts and feelings, become friends and develop feelings of intimacy: in some cases, without ever meeting face-to-face.[68–72] As part of the sharing affordances of digital media,[73] many discussion forums, blogs, content curation platforms and social media sites as well as messaging services explicitly encourage users to share their feelings with other users and to engage in practices such as liking, sharing or commenting on their content and using visual media such as selfies, images, memes and emoji symbols to convey and share affect.[74–76]

Sometimes these social networks can be important sources of emotional support related to health, illness and other embodied experiences. Research on women's use of digital media in pregnancy and during the early years of motherhood, for example, has demonstrated that women find blogs, online discussion forums and websites that offer information and allow users to share their experiences with each other to be helpful and reassuring, alleviating some of the isolation, uncertainty and heightened sense of responsibility that many feel during their transition to motherhood.[77] The use of online forums for discussing experiences of illness has been very popular since the early days of the internet, now augmented by social media, content curation platforms, apps and dedicated patient support platforms such as PatientsLikeMe.[78–80] These and other digital media for the representation and discussion of personal experiences could readily be conceptualised as spaces that generate affective atmospheres.

A lot of self-tracking software enables people to share their data with others. The athletic platform and app Strava, for example, has an overt focus on promoting 'social fitness', involving members exchanging their data and providing support and motivation to each other by commenting on each other's data.[81] It also provides a function for members involving uploading images of their cycling trips or runs, so that they can show other members where they have travelled.[65,82] Several other self-tracking apps encourage users to upload their data to social media platforms like Facebook or Twitter. As this example demonstrates, the developers and marketers of technological products sometimes make deliberate attempts to create certain kinds of affective atmospheres in their users. They recognise the importance of sociality, support from others and feeling part of a community of users with similar objectives. Social media platforms are an obvious example, with their invitations to users to share their thoughts, feelings and experiences in verbal or image form with other users and to comment on those uploaded by others. Indeed, the move towards the visual in social media platforms (greater use of photographs and videos) as well as the use of hashtags, emojis, images and memes, are all techniques that are used to express and share feeling states more potently.

One of the few studies to focus on affective atmospheres in a healthcare setting is that undertaken by Hollett and Ehret of a hospitalised child's use of the online game Minecraft.[83] The authors show how these types of games generate feeling between human players and the nonhuman entities in the game, facilitating the construction of active, sensing bodies. Human and nonhuman bodies together configure atmospheres that can affect other bodies interacting in the game (including the researchers themselves, who were participating as players). The hospital setting in which the young boy was playing Minecraft also contributed to the affective atmosphere of the game as he experienced it, while the affects generated by the game spilled into the hospital environment.

In this space, medical actors interacted with gaming actors to generate the affective atmosphere experienced by the young oncology patient who was playing the game. As Hollett and Ehret[83] put it, in this context, 'material things (e.g. beanbags, zombie moans, nurses, intravenous (IV) poles) are agentive, affective bodies'. They use the notion of 'the interruption' to examine the ways in which the flow of experience is disrupted, causing bodies to move or behave unexpectedly. These interruptions contribute to the affective atmospheres of digital game-playing. Thus, for example, in the hospital setting in which the boy in their study was playing Minecraft, a nurse sometimes entered while he was playing to administer his medication and check on his

wellbeing, or a biometric monitoring technology started beeping insistently, signalling his sensory reactions to the game he was playing. These were interruptions to his game-playing (and those participating with him). However, the game-playing also interrupted the bodily care the boy was scheduled to receive from the medical or therapy staff. The interruptions were part of the affective atmospheres in which the boy was both playing the game and receiving medical care.

Future research directions for digital health affective atmospheres

In this review, I have drawn attention to the ways in which scholarship on affective atmospheres may have relevance for critical digital health studies research, including analysis of the sensory dimensions of digital health technologies. To summarise, the following elements are central in previous research in affective atmospheres:

- acknowledgement of the role of the human senses in responding and contributing to affective atmospheres;
- the shared and relational nature of affective atmospheres across and between human and nonhuman actors;
- the ephemeral, emergent and often subconscious nature of affective atmospheres; and
- the importance of using research methods which focus on embodied practice, feeling and action as well as on language and discourse.

The concept of affective atmospheres offers many possibilities for future research in critical digital health studies. Rather than positioning patients or lay people as disaffected, rational and autonomous consumers of digital health technologies (who may need to be persuaded or nudged to recognise the potential and benefits these technologies may offer them), this focus on affect acknowledges the often barely conscious feelings that underpin motivations to engage in the use of these technologies – or alternatively, how people improvise or resist using them – and the collective and relational nature of these feelings. Some of the topics and research questions that might be addressed include the following:

- the sensory and affective dimensions of the ways in which people touch, carry, wear and implant digital health technologies on and into their bodies;
- the ways in which these technologies interact with each other as well as with humans and other nonhumans, generating affecting atmospheres via these encounters;
- the mobilities of digital health affective atmospheres – what changes when people move through space and place and interact with other people and other technologies during this movement?;
- the specific affordances of digital health technologies in place, space and time for lay people, their family carers and healthcare practitioners;
- the intimacies, vulnerabilities and ambivalences of the affective atmospheres of digital health;
- the affective and sensory dimensions of people's encounters with and interpretations of the personal health and medical data generated by digital health technologies; and
- the implications of all of these aspects for how lay people and practitioners respond to and engage with digital health technologies.

The key research question that these topics all work towards is 'How does digital health feel?'. There are several deliberate ambiguities in this question, as it inquires not only *what people feel* (which can refer to both to sensory responses and affects) when they use these technologies but also *how the technologies participate in feeling* (or how they act as sensors working on the human body and generate affects in human bodies). Research that can engage with these topics and questions will go some way in providing greater insights into the experience of using digital health technologies and what capacities these technologies have for fulfilling the kinds of promises they make in improving health and medical care.

How does it feel to use health and medical apps to track your bodily functions (or those of the people you care for)? How does it feel to be a doctor in the telemedicine encounter, bereft of the sensory knowledges of your patients' bodies that hands-on examination provides you and attempting to compensate and improvise in this situation? How does it feel to be an elderly person or person with a chronic illness monitored by a range of smart objects at home? How does it feel to be a medical trainee learning about human bodies using a virtual patient's body? How does it feel to be an operating theatre nurse assisting in robotic surgery? How does it feel to engage in self-tracking of your biometrics and attempt to make sense of what the data 'tell you'? In all these cases, and in many more concerning the use and meaning of digital health, an understanding of feelings in both meanings of the word – sensory and affective – and the atmospheres they create is integral to fully comprehending how digital health technologies inhabit and generate lifeworlds.

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