



Digital care at home: Exploring the role of smart consumer devices

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A B S T R A C T

In-home 'smart' consumer devices such as voice assistants, doorbells, thermostats, and lightbulbs have been advocated by organisations in the UK such as the RNIB, Alzheimer Scotland, and the NHS. Yet the use of these devices, which are not purposely designed as care devices and therefore are not subject to evaluation and regulation, has been neglected in the academic literature. This paper reports on a study which examined 135 Amazon reviews of 5 'top-selling' smart devices, concluding that such devices are being used to supplement informal caring, albeit in different ways. The implications of this phenomena are necessary to consider, specifically the consequences for 'caring webs' and expectations about the future role of digital devices within the landscape of informal caring.

1. Introduction

'Smart' technologies are expected to radically transform care, reducing trips to hospital, and providing greater opportunity to live longer, healthier lives at home (Reid 2021), potentially democratising healthcare (Hardey 2010). Organisations such as the Nuffield Trust (2020) and British Medical Association (2020) have reported an acceleration in use of smart consumer devices at home to manage health and care. Specifically, in-home smart domestic 'consumer' devices such as Amazon Echo, Google Home, Hive, smart video monitors, and Ring Doorbells appear to be gaining popularity (Nuffield Trust, 2020). These can be an alternative or supplement to 'commissioned' services such as telehealth/care, ehealth, door/bed/chair occupancy sensors, and heat alarms, installed and monitored by public sector organisations following well-established protocols.

Although research on the use of consumer wearables for health is well established (Ding et al., 2020; Lupton 2018), by comparison, little is known about the use of in-home consumer devices for healthcare, and especially for informal caring purposes. For instance, smart voice assistants can provide medicine reminders, smart doorbells allow family members to remotely check who is at the door (e.g. letting in care professionals and deliveries but preventing unwanted visitors), smart baby monitors enable family members to observe a loved one from afar, smart thermostats provide automated temperature adjustments, and smart fridges with sensors have automatic inventory tracking systems for food and medicines. However, the extent to which these devices are bought to complement or replace 'commissioned' digital care services and informal caring is not well understood. Amazon's Echo was originally designed as a voice controlled smart speaker, having since evolved

to be an 'intelligent personal assistant' and core to the Amazon smart home management hub. It was not explicitly designed for caring purposes yet eWOM (electronic word of mouth) in the form of Amazon reviews, suggest that consumers are buying these devices to enable informal care at home and care from afar. Moreover, how such consumer devices relate to caring networks and how they impact on caring aspirations and practices in the home have yet to be investigated. The use of consumer devices to supplement or replace in-person caring visits requires urgent investigation.

This paper reports on a study exploring the purchase and use of consumer smart domestic devices to support care at home. Amazon reviews of 5 smart domestic devices by 135 unique contributors were analysed to identify motivations for the purchase of devices and experiences during use. This revealed how such devices are part of a tapestry of caring, conceptualised by Wegleitner et al. (2018) as a 'caring web'. In so doing, this paper extends scholarship on the caring web; "the web of relationships or "care web" should not be understood as centred upon a single person, whether the ill or dying person or the family carer, but rather upon their relationship, to one another and with others" (Wegleitner et al., 2018a:7), to consider the involvement of devices as one example of a 'care artifact'. In addition, the paper considers the 'ratcheting' (Shove 2002) of devices and expectations around caring, to represent "the impossibility of backward movement and the locking in of technologies and practices as they move along a path dependent trajectory of sociotechnical" (Shove 2002:4). The paper is methodologically exploratory in nature, highlighting a gap in the existing literature about the role that consumer in-home smart devices may play in informal care. Although the data relies on Amazon reviews and 5 specific devices, this paper concludes by reflecting on the broader

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implications about the use of smart domestic devices for informal caring purposes, and what that may mean for the future of health and care at home.

2. Literature review

2.1. The smart home

Although the smart home is a diverse entity, in principle it promises comfort, convenience, and efficiency (Strengers 2013) to improve the quality of life of its inhabitants. Commonly understood as a home where internet-enabled appliances and devices can be controlled using a networked device to automate tasks normally undertaken by inhabitants (e.g., remote controlled vacuum, switching off lights, opening windows), it appears to be growing in popularity with estimates suggesting that the global smart home market will grow at a rate of 14.8% annually between 2022 and 2030 (MarketWatch 2022).

The role of smart homes in reducing time spent in hospital, allowing ageing-(well)-in-place, and to improve indoor environments, have been the focus of research (Creaney et al., 2021). Much of this research has focused on technologies designed to aid diagnosis (e.g., hypertension (Cloutier et al., 2015), surgical pathology (Rao et al., 2021)), the monitoring of a clinical condition (e.g., epilepsy (Bruno et al., 2018), osteoarthritis (Ravalli et al., 2022)), health information (Sayeed et al., 2020) and/or prevention of further disease (e.g., cardiovascular disease (Islam et al., 2021)). There is also a growing literature about how to upscale innovations, and the conceptual basis for such understandings (cf. Greenhalgh et al., 2019). However, much of such literature concerns devices purposively developed with health in mind, and/or are devices tested, evaluated and safeguarded for use by public services (Reid 2021).

In contrast, limited attention has been awarded to the use, or appropriation, of everyday smart domestic devices (e.g., voice assistants, thermostats, appliances, sensors) for caring purposes. Indeed, there is much that can be learnt from studies on smart homes in other areas of science and technology studies to help understand the desirability and use of consumer devices, everyday domestic practices with energy demand being one such example (Shove and Walker 2014; Strengers 2013). For instance, research on comfort has demonstrated how the norms for comfort have changed over time (Ellsworth-Krebs et al., 2019; Hitchings and Lee 2008) and in combination with the availability of innovative technology and standards for building fabric (Gram-Hanssen et al., 2017) resulting in new and increased energy demands: new devices has led to greater demand for such devices and demand for energy services. By investigating the robotic vacuum cleaner, Nichols and Strengers (2019), found that the vacuum was not only a simple substitute for a conventional vacuum, rather that it encouraged more frequent vacuuming, more opportunistic vacuuming and resulted in default daily cleaning (due to auto settings on the device), acting to increase energy demand, where less frequent cleaning had been the case prior to getting the vacuum. What such scholarship emphasises is the difference between how these devices are designed and how they are used, as well as the importance of understanding what devices and data make possible for people in their everyday lives. It also demonstrates that sophisticated understandings of the expectations that surround devices are required to inform policy development and delivery, and this is as important for the care sector as it is for energy.

In the UK, several healthcare and charitable organisations provide advice on digital consumer devices to support informal caring. One example is NHS Digital which offers advice on products such as smart plugs, Ring doorbell, smart hydration reminder, Nest Thermostat, Flic Button (NHS England 2022). Likewise, 'ADAM' (About Digital and Me) is a free platform provided by Alzheimer Scotland and the Scottish Government to support people with long term conditions such as dementia, Parkinson's disease, vision impairment and hearing loss (Alzheimer Scotland, 2022). ADAM helps people and their families to identify helpful technologies (predominantly consumer devices such as

sensors, ipads, Nest hub, smartwatches) to support care via recommendations from people with lived experience of long-term conditions. The benefits and consequences of a move towards smart domestic devices, for instance the creation of caring legacy-effects, of new reliance on technology, on new routines of observation, changed relationships between carers/sharers (Goulden et al., 2018) are, however, still to be fully understood (Reid 2021). Although the democratisation of health-care, particularly the diversity of online information has been noted in the literature (Hardey 2010; Thompson 2021). Set against the backdrop of "shifting landscapes of care provision" (Power and Hall 2018:308), and underpinned by neoliberalism and individualism, the drive towards digital care is perhaps the latest manifestation of the commodification of care (Hall 2011), typified in consumer reviews.

2.2. The value of consumer reviews

The phenomenon of patient-consumer, linked to the rise of consumer culture (Nettleton 2020) is relevant to these debates, and scholars have sought to theorise how such consumerism is one form of governmentality (Lee 2015:138). This scholarship suggests that user-generated reviews may have a profound impact on the nature of health systems, and on patients themselves, creating new obligations related to the expectation that consumers are responsible for making the 'right' choice of medical services (Hardey 2010). Examining user-generated reviews therefore provides the opportunity to understand the new ways health and care is being produced and consumed across space and place (Thompson 2021), including at home.

The use of online information, specifically user-generated content such as consumer reviews, is growing. Global surveys show that 91% of shoppers trusted reviews as much as personal recommendations (BrightLocal, 2018) (cited in Lee 2015:137) and that "nearly a quarter of all internet users consult online reviews prior to purchasing a product or service (Zhu and Zhang, 2010)" (Robson et al., 2013). Indeed, "the choices of others and the reviews that they attach to them may increase the sense of trust in a potential medical encounter" (Hardey 2010:144); this means that product reviews may be powerful in encouraging uptake of devices for technology-enabled-care at home. Yet, it has been recognised that "empirical research around user-generated-content for online health information is still in its infancy", surprisingly so given doubts over the credibility of reviews and levels of risk perception related to health concerns (Ma and Atkin 2017:484). What does exist are studies investigating user-generated reviews of clinicians and health professionals (Hardey 2010). However, at the time of writing this paper, no studies could be found that have explored user-generated reviews of smart domestic consumer devices used to enable care at home.

Research on consumer reviews more generally is predominantly concerned with reviewer-related features (e.g., credibility, expertise), review-level features, and valance (see Zheng 2021 for a meta-review). A consistent finding of such research is that "a positive bias has been found in consumer reviews" (Robson et al., 2013:543) such that reviews preferentially reflect positive experiences with a product or service. Typically, much of this research is quantitative in nature, but there are opportunities for qualitative research as consumer reviews enable access to a vast volume and breadth of data beyond what could be delivered via primary data collection. Moreover, the spread of reviews across different devices enables comparison and, the longitudinal nature, for instance, use of reviews over many years, also offers the opportunity to explore temporal and spatial patterns. This means there are potential benefits for participants and society in general if these data can be harnessed to create evidence around the value of consumer devices to assist care, and the spatial, temporal, distributive and felt consequences of this. For example, these data may show that some devices are better than others, that different devices fulfil different tasks, that devices supplement and/or extend traditional care interventions (and in which ways). Indeed, and as Wegleitner et al., (2020:995) suggest "to create supportive webs of caring relationships, it is necessary to rediscover 'lay

knowledge' (Popay et al., 1998) in many senses beyond the dominance of expert knowledge". The use of reviews may be one way to access 'lay knowledge' about the use of devices in support of care. Such evidence would be useful for users and in shaping policy and regulation of these devices. Moreover, this allows access to data which are insightful, without creating a research burden for participants.

Yet, the rise of consumer reviews points to new forms of consumerism such that "health becomes the responsibility of the citizen as a productive consumer, whereby they become primarily responsible for their own health." (Rich and Miahb, 2017:87). The same might be said for processes of informal caring across caring webs as people and families increasingly turn to consumer digital devices, particularly to create data shared with others (e.g., data about household temperatures, appliance use, video data from doorbells to enable care from afar) because of pressures on state care systems creating delays in support. Indeed, Rich and Miahb (2017) warn about futures of 'communal self-tracking' that are increasingly automated and invasive. Similarly, a recent article in *The Lancet* called for greater regulation of 'direct-to-consumer' products that bypass the typical filters and safeguards of state health and care systems (Cohen et al., 2020). The use of digital devices to support care at home, or informal caring, could have consequences for individuals, their caring web and for wider society as movement towards the increasing commodification of care. Understanding the extent to which consumer devices are therefore purchased for such uses is one step towards exploring these potential consequences.

3. Methodology

The study aimed to explore purchasing and use of domestic devices for caring purposes, and was technology-agnostic, meaning there was no preferred device in mind. Instead, a design was developed to explore a range of different devices from Amazon.co.uk, the UK version of Amazon.com which is "one of the most influential economic and cultural forces in the world", as well as the world's most valuable brand (CISION PR Newswire, 2019), which relies upon consumer reviews to sell products. Amazon.co.uk has a category called 'smart home' which highlights several devices for smart living: lightbulbs; speakers/voice activation; thermostats; smart plugs. Using these categories, one device from each category was selected (Table 1), because it was marked as by Amazon as a 'top seller'.

The following paragraphs set out the process of analysis across 2 phases. Phase 1: having identified 5 devices each of which had thousands of individual reviews (179,243 in total), to reduce sample size and generate relevant data, a deductive coding approach was employed. Only those reviews which contained one or more of the following 10 keywords were selected for further analysis: care; healthcare; caring; companionship; reminder; monitoring; unwell; elderly; disabled; vulnerable. It was expected that this purposive range of keywords would bring out reviews where care motivations influenced purchasing decisions, and that reviews would explicitly mention the experience of using these devices for caring purposes. The use of these keywords resulted in 135 reviews for analysis: 61 for Alexa, 7 for Smart Lightbulb, 8 for Smart Thermostat, 31 for Smart Plug, 28 for Ring Doorbell. It is worth highlighting that discussions of care are by no means central to reviews of smart devices on Amazon, which instead typically reflect product functionality, whether the product was as expected, ease of use,

Table 1
Devices selected for analysis from Amazon (correct as of 3.3.21).

Devices	Cost	Number of Reviews
Echo Show 5	£39.99	95,095
Alexa WiFi Smart Light Led Bulbs Bayonet	£11.04	6,721
Google Nest Learning Thermostat	£180.27	5,023
Amazon Smart Plug	£24.99	50,330
All new Ring Doorbell	£89.00	22,074

reliability, and cost.

Phase 2: these 135 reviews, from unique contributors, were explored to identify "patterns in the enacted social processes, rather than the patterns of the individual person" (Halkier and Jensen 2011:113). Themes investigated through the analysis were the relationships between the type of device and: a) motivations for purchase; b) use once purchased; c) extent to which either a or b were related to care purposes/services; and, d) reviewer's evaluation about effectiveness of the device. This process involved the close multiple reading of 135 reviews, guided by Saldana (2009:6), specifically looking for similarity (e.g., mentioned in several reviews), difference, frequency, correspondence (purchasing or use happened in relation to other activities or events), and causation (one appears to cause another). This approach informed by Grounded Theory (Crang 2008) enabled themes to emerge through iteration by identifying patterns (Knigge and Cope 2006) around the purchase and use of devices over time and between different people who gave/received informal care at home. Indeed, this analysis highlighted how devices were often only one part of a wider tapestry of caring (involving other people, knowledge, wifi connection, transfer of data, rooms or material artifacts within homes such as stairs, doors, furniture). This recognition led the authors to engage with existing scholarship on the caring web informed by the work of Wegleitner et al., (2018, 2018b, 2020) as will be discussed in section 4.1. The analysis in phase 2 also revealed how the use of one device often related to others (e.g., prior knowledge of smartphones, wifi connection/stability, adoption of complementary devices, intention to purchase additional devices) and changes in patterns of use – more frequent use of devices, more devices, to support a wider variety of tasks. To situate this analysis conceptually, and through a process of literature review, the idea of 'ratcheting' (cf. Shove 2002) was arrived upon, with discussion to follow in section 4.2.

People who provide reviews on Amazon do so knowing that their review can be viewed publicly. Some may post using an alias or be fully attributable. Others may provide information (e.g., in form of special characteristics) which may make them identifiable, although this is unlikely given that 197 million people globally use Amazon. No attempt was made to contact those people who provided reviews, nor did the authors of this paper add to the discussion boards. Pseudonyms could not be used as reviews could be linked back to their author via simple web searches, so data are presented as attributable in this paper. All quotes are verbatim (with minor adjustments to aid understanding) and identified by the poster's original name and device purchased. Ethical approval was provided by the University.

4. Results and discussion

In reporting findings, the discussion is organised into two parts according to themes derived from the analysis. Section 4.1 'the caring web' explores the complexity of relations between devices and users whilst section 4.2: 'ratcheting' relates to the use of specific devices for different purposes, expectations related to these, and implications for the future.

4.1. The caring web

Wegleitner et al. (2020), identified (i) forms of care-knowledge and discourses (with its power relations); (ii) care-acting (e.g. care roles, values, competencies); and (iii) 'care-artifacts' (material environment, meaningful objects) as 'ingredients' of caring webs. This is a helpful typology and has informed the development of the approach in this section which weaves together insights gained about 1) care-actors and 2) care through time. Although the value of the caring web approach is in de-centering the individual to explore the relations within the caring web, there is a risk that 1) 'care-actors' undermines this. However, the purpose of such a term in this paper is to draw attention to the relations between people and how they are involved, rather than those individuals themselves; keeping to the spirit of Wegleitner et al. (2020). Moreover, 'care-actors' reflects that the devices themselves also have

agency within the caring web, that they *do* something and reflects a rich scholarship in health sociology around new materialisms (cf. Hine (2019), Lupton (2018), Nettleton (2020), Rich and Miahb (2017)), hence unlike Wegleitner et al. (2020) there is not separation out of 'care-artifacts'.

Across all device reviews, who devices were bought for, by whom and for what purpose was well articulated. It is important to acknowledge that the reviews were written by two groups of people: 1) those who purchased the devices for their own use (e.g., those who mentioned personal disability) and 2) those who purchased the devices to support the informal care of another person that they either shared their home with (e.g., a child), or who lived in a separate home (care-from-afar e.g., parent). That there were two groups of purchasers highlighted not only that devices were being involved in different ways across the caring web, but also draws attention to who is implicated in the caring web and how that is facilitated by devices. Indeed, and although Rich and Miahb (2017) do not use the term caring web, their discussion around the self- and communal- responsibility for care, and how the digital gives rise to new modes of organisation tied to a 'digital data economy' (cf. Lupton 2013), alludes to changing relations within caring webs due to the presence of digital devices. This section therefore explores these changing relations, but unlike Rich and Miahb (2017), relates to consumer digital devices, to remark upon who and how people and devices are related.

Most reviews from our sample, particularly for Echo and Ring Doorbell were written by those who had purchased the device to aid informal care or connection from afar, for instance children with ageing parents or those whose parents have long term conditions. This reflects a pattern in the data that specific devices were purchased for informal caring by particular people; the devices were differently appropriated within the caring web. The following quotes provide accounts of Echo and Ring Doorbell to show why and how they were used to enable care from afar by offspring:

"I bought two echo shows, one for me and one for my elderly parents. I connected them both to my account so we can just "drop in" on each other. I'm so glad I did as for peace of mind I can check in throughout the day that they're ok and if they need anything they can speak to me easily on the echo show" (Kay, Alexa)

"We bought this for my mother's front door as she has been scammed twice by cold callers. Then as her dementia progressed we could see who was calling and later on in her illness we were alerted by the doorbell when she left late at night 'to go to school'. Invaluable and you can change the setting to pick up more or less motion (eventually we had it set to pick up all motion)" (Jo, Ring Doorbell)

"This is excellent, I use it as a care aid for my mother (Dementia sufferer). The camera is better than the Spot and I'm seriously considering replacing her existing Spot with one. It gives me full visual access to her home and has already helped me identify a fall and summon help" (Mimmi, Alexa)

These accounts also reveal not just relations between care-actors (e.g., people and devices) but also suggest temporal dimensions to these relations. For instance, Jo reflects on change in use of the device over time from partial to full motion detection and in purpose from monitoring visitors to monitoring her mum, which Jo ties to illness progression. In this instance, a single device facilitated different types of caring practice within a caring web. Relatedly, Kay also infers temporal dimensions (as is repeated in other quotes through this paper) about the frequency of interaction possible because of the availability of devices.

Getting back to the 'who' is implicated in the web; whilst the above quotes related to care between the purchaser of the device and recipient of care, the following quotes alluded to the devices being used by and between multiple members of the family, such as the purchaser's siblings and relatives. These raises questions about extension of the caring web and about the organisation of care.

"Bought 4 of these so my brother and I could see our parents while we are unable to visit due to Covid19. Two delivered to Bro for him to set one up for Dad and one delivered to each Mum and me. Bro has set up 2 on his home wifi and can make video calls between them." (Fenny, Alexa)

"Got one for my elderly mother, after several scam calls she was frightened some body will call around, so fitted the ring door bell, now I can see and also my three brothers so anybody we don't know we get there in minutes very good bit of kit" (Paul, Ring Doorbell)

"Paired it with Alexa. We can keep an eye on our parents and rest knowing they can monitor who visits. Makes them feel safer in their home. Easy to put up and to register the app and give access to relatives." (Jo, Ring Doorbell).

Whilst the data do not allow conclusions to be made about the extent to which the caring web stretched between siblings and relatives because of digital devices, it does suggest this may be a possibility. In Fenny's quote, Alexa allowed him and his brother to connect with their parents in a way that they did not prior to the COVID 19 pandemic; without the device the care would not have been possible. Christine Hine (2019) wrote an autoethnography about her experiences of informal care which changed due to a smart thermostat in her mother's home being remotely controlled by one of her siblings. As the reviews from Amazon show, Hine's (2019) experiences may be even more widespread across many informal caring webs than she expected. Indeed, she argued that research needed to be more attuned to the family relations in the context of smart devices, particularly the challenges (Hine, 2019), and this work further strengthens such calls.

Specifically, there would be value in work to understand how the organisation of the caring web may change. Jo's quote, for instance, raises questions about who 'gives access to relatives' is it Jo themselves, or Jo's parents. Of interest here is how the use and access to these devices and their data is negotiated between the purchaser and recipient of care and/or between the purchaser and other family members. Indeed, who retains control over the device and data? Such questions have been raised in recent work by Creaney et al. (2021), exploring the relational wellbeing of residents and their wider caring networks in healthcare smart homes. Because of the ubiquity, availability and affordability of such devices, care givers can become remote inhabitants of the household, 'in' and 'about' the home.

Moreover, and like the first set of quotes, the second set also reflects some temporal dimensions. The quote from Paul demonstrates how the Ring Doorbell provides alerts so that he and his brothers can get to their mother's house 'in minutes', suggesting, perhaps a change in the frequency of visits because of the extra data from the doorbell. Whether this resulted in increased visits (because an alert was created), or reduced visits (because without an alert Paul and his brothers were reassured all was well), was unclear from the reviews and such phenomena should be the focus of future research. Indeed, whilst the preceding quotes suggest such devices typically supplement rather than replace in person visits to another's home, the brevity of reviews means that only partial insights into the use of smart domestic products and how they interact with caring practices could be gained. Nonetheless, they do indicate that in home consumer devices are being purchased and used to support informal caring of family members, and this is a novel contribution to scholarship which has thus far focused on digital devices designed with healthcare in mind.

Whilst the above discussions surround reviews where device had been purchased to aid care-from-afar, there were reviews from 'sharers'; those who shared a home with a child, parent, or partner with disabilities. In addition, there, and reviews were also written by the user themselves, though these reviews were most often found for smart plugs, smart lightbulbs and smart thermostats.

"Wow what a gadget how did i live with out it .i have a disabled child who can control Nest [smart heating thermostat] with his voice with an

Amazon echo connected and i can also keep an eye on thing with the phone app even when im out. its brill” (Micky, Thermostat)

As all the quotes in this section show, and Micky’s in particular, it appears that in-home consumer devices are being widely used to support informal caring. This is significant in potentially reconfiguring relations between people and their carers over time and through the supplementation of in person visits. The caring web, and involvement of in-home consumer devices as one element therefore offers an opportunity to better conceptualise how and whether new patterns of care emerge, and the extent to which these may be legacy of historic, of existing or entirely new patterns of care. Indeed, [Wegleitner et al., \(2018:991\)](#) use the term caring web to represent “a hybrid formation that integrates individual and collective, as well as cultural (in the sense of shared values, understandings and practices) and structural dimensions of care” which incorporates ‘care artifacts’. This is a productive approach to consider how such changing relations both influence and are influenced by wider landscapes of care ([Power and Hall 2018](#)), including the move to democratisation ([Hardey 2010](#); [Thompson 2021](#)) and self- or communal- ([Rich and Miahb, 2017](#)) responsibility for care. Whilst explanations of these shifts was only partially visible in the reviews, the reviews do demonstrate that people are procuring and using consumer devices in this way and indicates a phenomenon that requires greater investigation.

4.2. Ratcheting

In addition to revealing how devices are differently implicated in the caring web, exploring reviews of different devices illuminates how ‘seeing via devices’ (monitoring another’s behaviour within their home, gaining a ‘fuller’ view) is a novel way to demonstrate, enact and observe changes in care. It provides initial insight into how such phenomena may evolve, particularly in relation to societal expectations. As was clear from the quotes presented thus far, there were instances when purchasers extended their use of a device beyond how we might imagine such a device being used (i.e., as a doorbell). [Shove \(2002\)](#) uses the ratchet and ratcheting metaphor to draw attention to the sociotechnical or the co-evolution of society and technology, rather than treating them as independent entities. It suggests a progressive and irreversible process. Whilst the core aim of this paper is to show the new ways in which in-home consumer devices are being used for informal caring, in doing so, it raises questions about the future of these relations; might the use of some devices lead to others being adopted and so begin a ‘treadmill’ of accumulation? Such ratcheting could unfold in several ways, beyond just the accumulation of devices. It could raise expectations that are not met, engendering a sense of disappointment with the devices, and/or frustration with a person’s inability to use them (e.g., voice assistance software not capturing voices of people with dementia etc). It could result in the supplementation of caring services and/or may grow demand for others devices and services (undermining the rationale for smart homes according to the logic of cost-efficiency). In addition, it may require involvement of other services for support using such devices (e.g., installation, wifi, upgrades), as well as now well reported concerns around dataveillance and datacapitalism ([Maalsen et al., 2019](#); [Sadowski 2020](#)).

In the data for this paper, two types of ratcheting were detected: 1) extension of use and 2) device creep, which are now explored in turn. Extension of use captures how devices were used in different or more ways than originally anticipated. For instance, where the reviewer uses the Ring Doorbell not to track people outside/visiting the home, but to track their elderly relative’s movement within the home and for use as an alarm (essentially a consumer version of a telecare wearable or in-home alarm which is commonly provided by Social Services):

“I’ve put this doorbell on the inside as a camera looking up the stairs in the hall as a notification for an elderly relative so we can see I the climb the stairs. The only problem is the slow detection or no detection and response

time is a little slow otherwise it does the job well. Also allows the person to ring the door bell if necessary to indicate they may need help” (dumps, Ring Doorbell)

This was also apparent in the first set of quotes from section 4.2 where Jo and Mimi also mentioned use of the Ring Doorbell and Alexa in similar ways. Whilst the quotes provided so far paint a positive picture of experience, the challenges or legacies arising from the use of such devices to enable care are less clear, particularly how they may create future expectations around increased device use. This was alluded to towards the end of 4.2 when discussing the organisation of the caring web, but taking this further, for instance, [Jathan Sadowski, 2020](#) uses the term ‘feature creep’ to describe when more buttons, settings and functionality are added to a single device, and we may borrow that logic to consider ‘device creep’ where more and different devices are added to the caring web.

Device creep was a phenomenon observed across reviews, where the purchase of one device led to the purchase of additional devices either to undertake a specific task, or to extend the range of tasks. This results in the purchase of a greater range of devices and their supporting infrastructure. Whilst this may be seen as measure of the success of such devices (e.g., people have positive experiences and hence seek more devices), reviews show this may not always the case, particularly in relation to the Ring Doorbell where reviews revealed some frustration about the necessity for a subscription along with the device:

“When they say it works with the Amazon Echo Show, and is easy to install and set up, you might assume it will ‘just work’ - it’s not trying to do anything complicated, after all. But no - you can’t actually set it up with just the Echo Show, you have to install their app: And that will only work on an expensive new mobile phone, or one of the latest iPads. No point trying to get one to help your elderly Parents, they can’t use this if they don’t have this year’s smartphone” (Parkeay, Ring Doorbell)

“Now the downside. When your free monthly subscription runs out be prepared, the door bell picks up everything, the people only mode is taken away, this to me would have been a deal breaker, but I didn’t know. So be warned, if you buy a ring doorbell then you really have to take out and pay monthly for the backup and enjoy the extra people only mode. And yes it is a sort of blackmail. To be honest I do feel pressured in doing something I don’t really want to do. The alternative is to have an expensive doorbell in the drawer and I’ll have to buy another one” (Mart, Ring Doorbell)

“Excellent view. nothing bad to say about it other than I was not aware of annual charge when I bought it and that could have been made clearer” (Amazon customer, Ring Doorbell)

Whilst there was frustration around how one device required greater infrastructure (wifi) or other devices (smartphone), the following quotes go further to show how the experience of one device led to the expansion of devices, evidence of ‘device creep’ in action. Both the above and following sets of quotes also demonstrate the interdependence of devices, with the final quote showing how just one device can be part of a wider system of a home-wide smart automation system to support people at home.

“I real nifty piece of kit. I’m an older disabled man and use this plug to control my sitting room lamp - saves me having to get up. I’ve ordered more Alexa stuff to help round the house” (J, Smart Plug)

“Another brilliant product by Amazon bought two easy to set up ideal for me as I have disability problems so get things turned on and off is amazing will add more in time” (Helen P, Smart Plug)

“This unit was purchased as part of my home automation system it integrates well with the smart switches, ring doorbell and cameras. having the screen allows me to view who’s at my front gate before I answer them. both the voice control and the touch screen makes this easier to use as i am physically disabled” (Peter Ensinger)

Admittedly, the use of these reviews is methodologically experimental and provide only partial accounts to aid understanding. Nevertheless, it is possible to argue that they capture a degree of ratcheting, a concept worth considering to appreciate the possible future relations between consumer devices and informal care. Although only two types of ratcheting were detected; extension of use and device creep, as was highlighted at the beginning of this section, there may be others which are yet to be explored. Shove used the idea of the ratchet and ratcheting to represent “the impossibility of backward movement and the locking in of technologies and practices as they move along a path dependent trajectory of sociotechnical” (Shove, 2002:4), echoing the relational nature of the ‘caring web’. Thus together the ‘ratchet’ and ‘caring web’ provide a conceptual basis for discussions about how devices and caring are co-constitutive, and that the changed relations within the caring web (e.g., via supplementation of informal caring) may also have a trajectory. Indeed, ratcheting could ultimately change the nature of informal care itself, how care is ‘done’ (e.g., remotely, online, in person), when care is ‘done’ (e.g., 24 h a day, at specific moments in the routine), where care is ‘done’ (e.g., between homes, via virtual spaces), and what care is ‘done’ (e.g., monitoring, connection, management).

Although, given their brevity, there is a limit to explanation gained from Amazon reviews, they do enable questions to be asked about the changing relations between informal caring, caring artifacts (in this case consumer devices), the expectations around these, and how they figure within the shifting landscape of care. Such questions support calls to recognise that digital “interventions tend not to work in isolation. Instead, multiple devices and systems work together to facilitate the delivery and consumption of health. Research can only understand specific interventions within an appreciation of their inter-connected nature” (Thompson 2021:6).

5. Conclusions

As yet, there is little published work on the use of consumer devices used to support informal caring. This investigation of Amazon reviews draws attention to this gap, delivering the key finding that people are purchasing and appropriating consumer devices to support care in their own homes, or in the homes of family members for connection, monitoring, and independence. Whilst this paper outlines some of these implications such as undermining/consolidating the caring web, supplementing in person caring, extending the use of devices and device creep, this is just a start. The value of this paper lies in showing the acceleration of these in-home consumer devices and their appropriation for caring practices and caring webs. It provides evidence that these patterns exist and require investigation, important because these trends seem set to continue as charities and health organisations encourage the use of such devices.

However, some caution is required given the methodological novelty of this study, even with the perspective that what happens online is an extension of everyday life (Pink et al., 2016). Whilst eWOM, of which Amazon reviews are one example, play an important role in purchasing decisions, typically such recommendations are short and provide only partial explanations of phenomena. For instance, it is often not possible to follow-up, in depth, about why a device was purchased and the experience such devices. Moreover, the selection of keywords to identify appropriate reviews could have been done in a more expansive way, to yield a greater volume and variety of perspectives. This reflection should be used to inform future work, some directions for which are set out in the following paragraphs.

This paper only captured the perspectives of device purchasers, and this needs to be extended to also understand the experiences of the users (recognising that the purchasers were not always ‘just’ users), and how such experiences feed into procedures and systems across the caring web. It is vitally important to understand and better represent both the diversity of people who use these devices, and the diversity of experience when using them. To this end, Amazon reviews are limited by their

depth of information, and spending time in people’s homes observing how devices are used and contribute to the caring web would provide richer understandings of such phenomena. Purchasers may not want to ‘publicly’ reflect the downsides of use, or, if in the case of a purchaser who has bought the device to monitor a family member from afar, may not want to position themselves as policing someone’s activities. Indeed, whilst the Amazon reviews give us some insight about motivation to use consumer devices (e.g. safety, monitoring, protecting, empowering) and where that motivation comes from (e.g. from other family members, inability to access the home because of COVID-19), greater depth of understanding on this is required. Doing so would reveal the relationship between carers/sharers as mediated by in-home consumer devices, rather than a focus on the device (as the Amazon reviews tend to do).

In addition, the research only captured the reviews surrounding 5 consumer devices and how they were (re)appropriated for caring purposes. Work is required to extend beyond these 5 devices and explore others used to support different types of caring practices. Such work may reveal further differences in use and in the types of practices supported, as well as implications for people, their needs, and their homes. Relatedly, the purchase of such devices points towards greater democratisation of care and patient-led care. However, it also raises questions about the increasing privatisation of care (at least in the UK) and the changing role of the state in this. There will inevitably be differences in access to and the ability to use such devices as mediated by existing inequalities in, for instance, digital literacy, income (related to the cost of purchase and thereafter running of devices), quality of existing infrastructure (wifi to allow uploads and downloads of data) and many others. Such inequalities will also impact on the experience of such democratisation, potentially shaping care outcomes.

Finally, as these devices are intended for use in homes, scholarship ought to also consider what the use of such devices means for places and spaces: what does this mean for homes as one space within the landscape of care? How do these devices connect homes (e.g. in both inter and intra dimensions: home of the person being monitored with one other or a wider networks of homes doing the monitoring), change the experience of home, and connect home with other spaces within caring webs such as hospitals and clinics.

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Data availability

The authors do not have permission to share data.

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