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# Care work, gender inequality and technological advancement in the age of COVID-19

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COVID-19 has created a challenge and opportunity to change collective economic and care systems. While the care deficit that confronts the UK pre-dates the pandemic, contemporary events have made it clear that care is a foundational element of a safe, functioning society. Building on research that shows new technologies are being used to augment the work of paid carers in nations facing labour shortages, funding constraints and hostility to immigration, this article considers the potential for technological developments to change care practices, including during this unprecedented crisis. Using a qualitative research approach, the article opens up new questions about established systems of paid and unpaid care and evaluates the potential for technological investments to remedy the weakened care infrastructure in a post-COVID-19 environment. In doing so, it emphasizes the sensory dimensions of care, which will need to be addressed in how governments in the UK and beyond respond to technological developments.

## KEYWORDS

care work, COVID-19, gender inequality, technological advancement, unpaid care

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## 1 | INTRODUCTION

We are in the midst of a 'fourth industrial revolution' (Schwab, 2016) in which advances in robotics and artificial intelligence are improving efficiency in manufacturing environments, while automation technologies designed to augment human capabilities are reshaping service industries. Reports suggest that as well as facilitating labour savings, the 'rise of the robots' (Ford, 2015) is allowing organizations to maximize outputs by devoting greater amounts of labour power to skilled tasks (Pew Research Center, 2014; World Economic Forum, 2016). With new technologies being used for simple and monotonous operations, firms are able to assign greater amounts of labour power to jobs requiring cognitive and interpersonal sensitivities, transforming the labour market and the types and forms of available work (Daugherty & Wilson, 2018). Accelerating this trend, the current COVID-19 pandemic has led to the loss of many informal, part-time and seasonal employment opportunities, particularly low-skilled roles within the female-dominated hospitality, food and tourism sectors (Durant, 2020). There has also been a rapid change in working practices with large numbers of high-skilled workers 'going digital' as firms introduce mandatory work-from-home policies in line with the confinement measures introduced by governments to reduce the spread of the novel coronavirus (Mexi, 2020).

This reorganization of labour raises important questions about the gender implications of technological advancement. Although there is evidence that relative to men, the proportion of non-routine tasks performed by women has increased over time (a factor that has been used to explain a substantial fraction of the decline in the gender wage gap), women continue to perform more routine tasks than men when looking across all sectors and occupations (Brussevich et al., 2018). For this reason, women are suggested to be vulnerable to displacement as the machine becomes progressively more central (Schwab & Samans, 2016). In addition, women face reduced employment prospects compared to men as replacement jobs (particularly those which may be done remotely) demand different skill sets. Across the globe, women most at risk of job loss tend to work in semi-skilled occupations where opportunities for further education and development are typically limited (Brussevich et al., 2018). In the absence of countervailing regulatory efforts to restore sectors of the economy that have been heavily impacted, or to help women to adapt and upgrade their skills, they face unemployment or movement to unskilled labour market roles, consolidating feminized industries and the pay gap associated with a gender-segregated workforce.

Outside of the formal labour market, despite some promising signs of convergence between the sexes with regards to parental caregiving, women continue to assume the majority burden of care work (Boyer, Dermott, James, & MacLeavy, 2017; Henriques, 2020). Unsurprisingly, therefore, there are fears that technological advancement may impact progress towards gender equality in the domestic sphere as well (Hester, 2018). While there is undoubtedly potential for new technologies to reduce the 'second shift' (Hochschild, 1989) that women often perform, the creation of a pool of unemployed women amidst growing demand for care (in individualized domestic households as well as institutionalized settings) indicates that technological advancement may not fundamentally improve the way in which care work is performed nor the value it is attributed (World Economic Forum, 2016). In short, new employment opportunities in the care industry are being created in a wider context of rising unemployment and increased competition for low and unskilled jobs, which particularly affects women (Ferguson, 2015; Li, 2013; Sassen, 2014). In addition, any reduction in women's paid work may increase the time available for unpaid work and reduce one of the drivers for men to take up a more equal share of care within the home.

While it is not yet certain exactly what impact the COVID-19 pandemic will have on transitioning labour markets, nor the extent to which it will impact the distribution of care work in the long term, emerging trends suggest the crisis will affect men and women differently (Durant, 2020; Henriques, 2020). My own experience working in the UK higher education sector, which has undergone a sudden switch to remote digital work as a result of the pandemic, further suggests that increased digital working may intensify social and economic divides, potentially also generating new cleavages as a result of differing amounts of time spent performing caring duties, particularly if these have previously been outsourced (see also Boncori, 2020). Beyond personal narratives, assessing how race, class, income, geography, dis/ability and gender impact and inform caregiving practices in order to establish the likely

consequences of the pandemic is difficult. This is in part because a large proportion of care work occurs outside of the formal labour market and does not enter into the calculation of national statistics. There is therefore limited quantitative evidence to draw upon when predicting the direction of future change. As a result, societal expectations for women's role in the unpaid care economy are often absent from discussions of the 'future of work' and by extension the future of work in the post-COVID-19 era. The article seeks to address this lacuna by providing a more specific analysis of the impact of new technologies on paid and unpaid care work, and details how the changes brought about by the fourth industrial revolution prompt a more careful and critical spatial thinking about the impact of technology on the performance of care that may, in turn, usefully inform analysis of the potential outcomes of the COVID-19 pandemic in this sphere.

The article draws on data from an evidence review undertaken in 2018–2019 using a number of mixed method sources. Stage 1 involved data scoping (using qualitative and quantitative UK sources—reports, fact sheets, briefings and papers from a number of research institutes, think tanks, charitable organizations and unions)<sup>1</sup> to identify patterns and progress in female labour force participation. In Stage 2, this was extended via contextual review of national and international studies examining how technological innovation changes the way in which work is organized and performed across different economic sectors, and the gender transitions this has invoked (developing in the process a view of the local and global factors affecting UK labour market trends).<sup>2</sup> Stage 3 involved directed content analysis of a selection of UK media reports to develop and extend knowledge of the impact of technological advances upon care activities.<sup>3</sup> To delineate the specific consequences of technological developments in the care industry, the aforementioned grey literature was also used to position reported developments within a wider, global context.<sup>4</sup> Attention was paid to transformations and adjustments to care work as a result of the increased use of tools that support the automation of some tasks, as well as the 'great substitution' (Autor, 2015) of human caregiving whereby whole jobs are performed by assistive robots and socially aware machines.

The data privilege a national-level analysis, which given the UK origin of sources cannot do justice to the specific political, historical, religious and cultural contexts that condition developments in other nation-states. Moreover, in seeking to provide a big-picture view that spotlights global, structural developments and uses the scale of the nation to illustrate an emergent 'technologization' of care as a means of foregrounding the role of the state and public policy in supporting new ways of working, it does not fully attend to the many and varied care practices that exist on the ground. This includes gay and non-cisgender relationships, which challenge dualistic gender conceptualizations of care within the home, as well as the broader assumption of a heteronormative, cis-gendered male breadwinner society that may impair or support gender reconfigurations of paid work and care during periods of economic growth, crisis and recovery. Further work therefore remains necessary to extend the empirical scope of debates regarding technology-driven changes in care—and the extent to which these may be positively or negatively impacted by the pandemic.

The article outlines the emergence of an acute 'care deficit' (Ehrenreich & Hochschild, 2003) in the context of a general increase in female labour force participation. At a global level, this deficit is engendering an international redistribution of care with female migration from poor to rich nations to compensate for the ongoing failure of advanced capitalist societies to culturally and numerically defeminize care work through regulation. Next, the article considers technological developments in the formal and informal care economy: digital platforms; forms of telecare that may complement and assist human caregivers; and socially aware machines that may serve as substitutes for the human caregiver. Employing a national-level analysis, the article outlines the use of these distinct care technologies in the UK, as well as a number of comparable nations facing labour shortages, funding constraints and hostility to immigration. The article notes differences between caring for the young and the old, as well as the possible loss of humanity in care as a result of the expansion of 'no touch', socially distanced arrangements. The article concludes by discussing the substitutability and complementarity of women and technologies in the care economy, reflecting on what the future may look like if COVID-19 were to serve as an impetus for further technological investment.

## 2 | WOMEN, WORK AND THE EMERGENT 'CARE CRISIS'

Over the past five decades, a steady transformation in workforce composition has occurred. In most countries, women have increased their presence in the paid labour market and now occupy positions of employment for much of their adult lives. The timing of the increase in female labour force participation varies across countries. In the Nordic nations and the United States, the increase in female labour force participation occurred first and was shortly followed by a rapid increase across Europe (Jaumotte, 2003), as well as in Latin America and the Caribbean (Ortiz-Ospina & Tzvetkova, 2017). In the Middle East and North Africa there have also been positive trends, but this remains the region where female labour force participation is lowest (International Labour Organization, ILOSTAT database). By contrast, there have recently been large reductions in female labour force participation in South and East Asia, which scholars attribute to high unemployment, a lack of growth in feminized fields and limiting social norms about acceptable work for women (Pande, Fletcher, & Ford, 2016). Not only is the 'gender revolution' (Moskos, 2019) in employment incomplete, but concerns about employment segregation, the value of women's work and uneven divisions of domestic labour remain.

At a global level, the rise in female labour force participation has not led to a wholesale transformation of the 'male breadwinner society'. Moreover, there is evidence to suggest that in nations where gains have been made, women's increased participation in the formal labour market has resulted in a care deficit, where in a growing number of households the employment of both parents outside the home has created a need for additional domestic and socially reproductive labour that is creating new inequalities between women (as gender interacts with age, class, race, place and disability to condition one's relationship to the care economy—see Acker, 2004; Ehrenreich & Hochschild, 2003). While women from working-class backgrounds have long combined care with (informal) employment, drawing on kinship networks for help and support, growing numbers of women from both working and middle-class backgrounds are now outsourcing socially reproductive tasks in order to balance paid work and domestic responsibilities. Low levels of state assistance and persistent gender inequalities in care and domestic labour necessitate this (Rubery, 2015). The process of outsourcing occurs on both national and international scales (Parreñas, 2001). It embodies social and geographical divisions with women with higher levels of education and digital literacy (who have a comparative advantage in advanced economies demanding higher levels of skill) outsourcing (part of) their care labour requirements to those (women) with lower levels of education and skill and/or those (women) drawn from low growth or declining industries within the same country or overseas (Williams, 2017). The purchase of low-wage labour as a substitute for the unpaid labour of wives and mothers maintains and strengthens systems of privilege. The purchase of labour lowers the amounts of unpaid reproductive labour available in care workers' own households, which in turn affects the rearing and socialization of their children (Romero, 2001).

Added to this, there is evidence of increased demand for care workers in institutionalized settings, such as hospitals and nursing homes, as well as private homes as a result of population ageing and the associated increase in illness and disease (Folbre, 2006; Glucksmann & Lyon, 2006; Saraswati, 2017). Growing demand for health and eldercare, reductions in public provision and the expansion of private services support the reproduction of labour market conditions in which disparities develop (Palmer & Eveline, 2012). For many employees, poor levels of pay are an adjunct to casualization as productivity gains are yielded by driving down pay and benefits. Increasingly, remuneration for care work is not enough to cover the cost of paid domestic help or the use of professional care facilities such as a private nursery for one's own children if required for both adults to work outside the home (Charlesworth, Baines, & Cunningham, 2015). Without family care (such as grandparents), care workers can find themselves unable to sustain full-time employment, with the more affluent dropping out of employee roles to start their own private business relationships (Clarke, 2015). Such individual remedies do not eliminate work–life conflict but merely shift the deficit of care created by government underfunding to less privileged groups.

Whereas occupations in health and social care were once considered stable and relatively attractive sources of employment (even for women from middle-class backgrounds), they are now much less desired as alternative forms of employment tend to pay more and proffer greater levels of autonomy. Rather than challenge the structures of

care work that result in low pay and inflexible work schedules, those from wealthy backgrounds socialize their children to find other forms of work, leaving the offspring of the working poor and lower middle class (who continue to occupy jobs in the care sector) to fulfil the expanding range of posts. Compared to service industry jobs where technologically driven increases in pay (owing to an increased demand for skilled labour) and improvements in working conditions (particularly increased flexibility that is facilitated by technological progress) are yielding positive benefits, employment in 'high touch' care services remains characterized by low wages, long working hours and stressful working environments, reproducing class trends (Romero, 2001; see also MacLeavy & Manley, 2018).

In some countries, migration is helping to reduce native women's burden of care work, deepening the intersecting hierarchies of race and class, as well as citizenship. Recent decades have seen the establishment of global 'care chains' that involve the transfer of care labour and resources from low- and middle-income countries located in Asia, Africa, Latin America and the Caribbean to nations such as Canada, the United States, most Western European nations and developed parts of Asia (Hochschild, 2000). For sending nations, the migration of care workers yields benefits in the form of remittances, but also sees the crisis of care in the global North displaced to the domestic household level in the global South when women leave their families to pursue opportunities for work abroad (Amuedo-Dorantes & Pozo, 2006). For receiving countries, the international recruitment of care workers provides a new source of highly motivated (and often skilled) labour, which keeps social reproduction costs low, but risks overcommodification that can lower the quality of care provision, particularly if one accepts the argument that market-based payments undermine the caring motives essential to care (Folbre, 2006). With political resistance to international migration on the rise, questions have also been raised about the sustainability of this response to the care deficit over the long term (Marsden, 2018).

Given its historical economic and political ties, the UK has long relied on migrant care workers from Commonwealth nations to staff its hospitals, care homes and other care facilities (England & Henry, 2013). Augmenting this, there has been a growth in migrant workers using European Union mobility rights to fulfil low-paid care roles within the home as nannies, au pairs, cleaners and domestic workers (Williams, 2017). However, post-Brexit restrictions on migration are expected to lead to a shortfall of care workers, and once the COVID-19 pandemic is over commentators have gone so far as to predict that the underfunding of health and social care services it has exposed will be placed at the feet of migrants leading to further restrictions that will in turn see (greater numbers of) women having to give up work in order to perform unpaid caring roles (Malik, 2020). As care and socially reproductive labour have historically been performed by feminized and non-native workers, or unpaid family members, it has been suggested that privileged middle-class women will experience a reversal in gains made in gender equality in recent decades, as the rising demand for care intersects with a decline in migration (Andrews, 2016). In spite of outsourcing, women as a group continue to shoulder the burden of unpaid domestic labour and are therefore more likely to work part-time or flexibly than men. This means that they tend to earn less than men so that it makes 'economic sense' for them to be the ones to reduce or cease paid employment when care responsibilities rise (ONS, 2016).

Technological advancement offers an alternative to migration, but again some have suggested limits to this response (Hester, 2017, 2018). In particular, the deployment of 'intelligent machines' in the care sector is said to be limited by an ongoing need for *human* care of bodies. Against narratives of individual autonomy, a feminist ethics of care asserts the need for human connection and the difficulties of living in its absence (Sevenhuijsen, 2003; Tronto, 1993). This implies that tasks that combine physical and affective elements cannot usually be broken down in ways that permit full job replacement (or rather in breaking down care work in this way we lose some of its core properties such as the fulfilment of desire and pleasure). For example, tasks like washing, lifting and dressing are usually intended to produce or modify an emotional response, whether that be a sense of security, a reduction of fear or the satisfaction of sensualities, in addition to meeting simple survival needs (Federici, 2014). Although care work may be facilitated by technological measures that are activated or guided to work within a specific environment by humans, such measures cannot be construed as caregiving beyond a very limited, objectified, rational, detached, depersonalized perception of what care is and means. Moreover, futuristic pronouncements that imply technology is a means through which personal autonomy and self-care can be achieved do not often consider care as a social

relationship that perpetuates inequalities (MacLeavy & Lapworth, 2019). In favouring a disembodied, disembedded imaginary, they circumscribe cultural expectations of women's affective care and dexterity, as well as the manner in which this patterns labour markets (Celentano, 2019).

Similarly, the proliferation of digital platforms that mediate relations of care seem unlikely to overcome the labour market inequalities that stem from the ongoing understandings of care as a form of love which normalizes—that is, confirms, treats as natural and simultaneously obscures—associated injustices (Cooper, 2007). While platform technologies may help to formalize care work and thus boost women's paid employment rates, they also have the potential to (re)produce existing labour market disparities (Ash, Kitchin, & Leszczynski, 2018; Elwood & Leszczynski, 2018). Indeed, there is evidence to suggest that digital platforms may reduce opportunity and income for the working poor and lower middle class by providing additional earning opportunities for those who are already relatively well-off. By supporting non-standard (atypical, contingent, precarious) carework arrangements, digital platforms enable those with full-time jobs to take on extra work as independent contractors, with the discourse of the 'sharing' economy helping to destigmatize manual work (like cleaning) so that it is increasingly being taken up by young, white and highly educated platform users (Schor, 2017). The consequence of a relatively more privileged middle class using technological innovation to expand opportunities for itself is a reduction of demand for less advantaged, lower educational attainment workers both on and off the platform. What remains is often more demanding and difficult forms of care work, and the obligation for women to provide this for family and friends when there is no one else willing to do so.

### 3 | ASSESSING CARE TECHNOLOGIES AS POTENTIAL 'ENGINES OF LIBERATION'

In the UK, the care workforce is largely comprised of women, with Black and Minority Ethnic (BAME) and migrant groups overrepresented (WBG, 2020). While this has long been the case, the implementation of a series of austerity measures over the past decade has led to a situation where many care workers are agency staff, and often employed on a zero-hours contract basis. In tracing how technological advancements have impacted women's workforce participation, the use of the globally reverberating financial crisis to (de)limit care as a commodity is noted (Hayes & Moore, 2017). Post-crisis reforms reframing governance and reinvigorating discourses of personal responsibility have helped to demarcate care as a product for sale, with questions of affordability being used to limit its public provision. As a consequence, providers can now 'care without caring' or care by contracting others (Green & Lawson, 2011). Where and when public care is deemed inaccessible, the re-categorization of care as a normative dimension of human relations serves to re-situate care within the frames of family and gender (Howcroft & Rubery, 2018). The paradoxical emphasis on the emotional dimensions of care in such moments is the product of pre-existing distinctions and socioeconomic forms that impact women within the care sector, and the labour market generally. It is not the sole outcome of technological developments, which are not inherently neutral, but tend to reinforce development trajectories.

#### 3.1 | Platform technologies

Digital platforms connect caregivers and care-recipients and facilitate information flow between them and their wider support networks. In the UK, as well as notably Australia, Canada, the United States and New Zealand, the emergence of digital platforms coincides with a move to reduce the role of the state in the provision of care and encourage the growth of private (for-profit and not-for-profit) services (Gallagher, 2018). The intention is not only to drive down costs, but also to create systems that better consider the motivation of all parties involved in delivering and receiving care (Bennett, Honeyman, & Bottery, 2018). Through digital platforms, those with care needs can

exercise their 'consumer choice' when searching for a caregiver, using funds provided to them by the local authority (for healthcare and disability support), childcare vouchers or subsidies (including tax credits for parents), in addition to private funds. In turn, caregivers are able to compete for contracts on the basis of cost or quality of provision (and may need to fulfil certain regulatory requirements in order to do so).<sup>5</sup> In this respect, digital platforms may be categorized as 'work on demand' systems that involve 'real-world tasks' (Stewart & Stanford, 2017, p. 422) managed through an intermediary—as opposed to 'crowdwork' systems involving jobs that are carried out remotely (de Stefano, 2016). Examples in the UK include Supercarers, which provides a personal 'matchmaking service' where families can find vetted carers for people with disabilities and older dependent relatives, and Care.com, which additionally covers childcare, pet care and cleaning tasks.

The proliferation of digital platforms supports a complex reconfiguration of market, state and civil society relations across the care industry. By helping to draw a wide range of actors into public care arrangements, platforms give legitimacy to the neoliberal imaginary of care, simultaneously undermining notions of care as a 'public good' (Daly, 2002). As individuals are made singularly responsible for the establishment of care arrangements, and entrepreneurial workers and businesses compete for jobs on a rate per hour basis, exclusions can arise. The form and content of the platform may limit access to specific groups (e.g., those with low digital literacy or lacking the cognitive and social skills necessary to gain and negotiate care in this way). There may also be limitations on usage (e.g., one transaction may reduce the availability of a given service for others, particularly if that service cannot be provided simultaneously to more than one person). More subtly, platforms may constitute and reinforce classed and gendered cultures of care. Indeed, there is a body of work suggesting that for childcare the creation of a market tends to perpetuate differences in parenting cultures as strategies and choices regarding care are made with reference to place-based networks (see Holloway, 1998; Vincent & Ball, 2001; Vincent, Braun, & Ball, 2008). This has led to questions about the viability of a 'care market' given the relational work at the heart of caregiving and the extent to which this is locally contingent (Folbre & Nelson, 2000; McDowell, Ray, Perrons, Fagan, & Ward, 2005; Raghuram, 2016). The emotions and connection involved mean that it is difficult to approach care as a standard commodity. Hence decisions around care and socially reproductive work are seldom made on the basis of economic cost and the reality of marketized care may not conform to standard economic assumptions.

For workers, the emergence of digital platforms brings with it the expectation that caregivers take on particular jobs without any guarantee of further employment. In essence they are classified and treated as independent contractors, rather than employees.<sup>6</sup> The flexible work arrangements offered on platforms are claimed to help women (in particular) undertake paid work, but there is usually a trade-off between flexibility and earnings. For example, platforms may use 'surge pricing' to provide financial incentives for workers to make themselves available at certain (peak) times, disadvantaging those with restrictive domestic and care responsibilities (Hunt & Samman, 2019). In addition, the growth of digital platforms and the associated increase in portfolios of jobs sees self-employed caregivers denied the employment conditions and benefits associated with employee status, with reduced access to labour and social protection including compliance with minimum wage laws, employer social security contributions, anti-discrimination regulation, sick pay and holiday entitlements, as well as the ability to associate freely and bargain collectively (de Stefano, 2016). The culture of arranging care in short units of time is said to promote fragmented and task-oriented working practices, rather than a more person-centred approach that may deliver better outcomes for those in receipt of care, as well as improving the work experience (Bennett et al., 2018). Perhaps unsurprisingly, there is recent evidence of a large 'churn' of care workers, accepting and then quickly dropping jobs, leading to concerns about care consistency (Care Quality Commission, 2017).

### 3.2 | Data management tools

Data management tools are used to analyse and share information about individuals and so facilitate the work of both paid and unpaid carers. They range from digital systems that encode, store and manipulate data



provided by a human carer (e.g., the results of routine medical testing or scheduled observations) in order to determine the next steps in a person's care plan to novel sensing devices that enable continuous, automatic and remote monitoring that reduces or removes the requirement for caregivers to be continually physically present (thereby transforming the embodied dimensions of care with physical distancing). For those in receipt of care, the use of data management tools is reported to yield positive physical and mental health benefits (Carretero Gomez, 2014). Digital systems can provide reassurance that medical needs are rendered visible, while sensing devices provide independence by supporting people in their day-to-day lives. In so doing they (re)establish norms about what constitutes care, who requires it and who does not, granting agency and power to specific actors while suppressing the agency of others (Oudshoorn, 2011). For example, Scotland's National Telecare Development Programme was launched in 2006 to help elderly people remain in their own homes with telecare and telehealth support. It uses sensing devices to track users and generate information about their activity patterns, with changes outside of normal activity patterns acting as triggers for an automated or human response. This could range from a computer-generated reminder to take medicine, through to a telephone or video contact, to an emergency home visit. Similar systems have been employed in the care of children and people with disabilities: in Staffordshire, England home sensors that focus on rooms (rather than the body) have been employed to monitor movements through space, and warn if a person with developmental disabilities has been in a high-risk area of the home for too long (Bennett et al., 2018).

For those with care responsibilities, the use of digital systems and telecare devices can ease concerns about the safety and security of those in their charge. For family caregivers, this can yield improvements in quality of life as the caregiving burden is alleviated by medicine and task reminders, or the increased freedom to go out knowing that there is digital monitoring in place in the home (ensuring those within it conform to a set of prescribed rules and behaviours, including any visiting caregivers). However, there are also reports that some feel an increased responsibility to care for family members for as long as possible, postponing a move to a medical or professional care setting and lengthening the obligations of familial caregiving (e.g., Mehrabian et al., 2014). In relieving some of the escalating burden on the social and health services, telecare and telehealth may further necessitate (women's) unpaid labour by allowing hospitals and other public agencies to discharge individuals that would have previously been cared for by doctors and professional nurses and expecting any additional costs of this care to be privately borne (Federici, 2014). In the UK, nearly three-fifths of unpaid carers are women, and they are more likely than men to be caring for someone living in another household (WBG, 2020). Notwithstanding the variation in access to foundational services (such as mobile or fixed line broadband services), the cost of setting up such technologies in the home and need for digital literacy, concerns have been expressed about the utilization of home sensors and monitoring devices reducing the sensory and embodied experience of care as personal needs are represented as uncomplicated, objective and rational—and their fulfilment independent from socio-political, geographical, cultural, emotional and temporal context.

For care professionals, the greater deployment of technology risks increasing labour market asymmetries. The increased control over and monitoring of care strengthens tendencies towards homogenization, uniformity and conformity in caregiving practice, leading workers to feel there is little space to bring in personal aspects given the dominance of certain norms of interaction and a decreased tolerance for difference. Digital care is linked with a wider tendency of increased cultural normativity/normalization and disciplining to an instrumental view of care, such that those that take 'too much' time may be perceived as problematic. The development and implementation of new technologies in care is also associated with specific ideas regarding who is suited to provide such care and what they look or sound like (Hester, 2017). This may have the effect of obscuring or explaining away social divisions and inequalities based on identity factors such as gender, race or social class (Leyerzapf, Verdonk, Ghorashi, & Abma, 2018). More generally, pre-existing hierarchies of labour within the care industry that see white men dominating the higher management positions and women of colour being concentrated in jobs that centre around the care of bodies imprint patterns of development, with the increased number of high-tech roles generated through investments in telecare and telehealth tending to benefit men as they prevail in information technology and

communication sectors (Hester, 2018). Mirroring earlier utopian and critical discussions of the Internet, it is clear the impact of telecare and telehealth largely depends on economic, legal and policy decisions, which shape how new technologies become institutionalized (Fisher & Wright, 2001). The same technological device can do and mean different things in different places (the home, the community, the professional care setting), varying in accordance with the dominant social relations that prevail in a given space (Oudshoorn, 2011).

### 3.3 | Artificial intelligence and socially aware machines

Intelligent technologies differ from data-driven efforts to direct interactions between caregivers and care-recipients. In particular, they employ algorithms in order to become accomplished at particular tasks, with the most advanced systems adapting continuously to new circumstances rather than executing actions in the same manner repeatedly. Within the home, these novel technologies are most commonly used to fulfil care needs through the regulation and control of physical space (Milligan, 2009). For instance, home automation packages can ensure a light path comes on when someone steps out of bed to reduce the likelihood of falls, or employ environmental sensors that adjust heating, ventilation and air conditioning systems when detecting a human presence (Carretero Gomez, 2014). As such, they signal the potential for innovation to contribute more than data-driven insights—in home automation systems sensors, motors and actuators are directly engaged in work that supports the maintenance and reproduction of life.

Enabled by advances in robotics, artificial intelligence applications have recently been encased within mobile robotic assistants that have the shape and synthetic quality of being human. Programmed to mimic the emotional feedback of human caregivers, these technologies extend care interactions beyond the interpersonal. Examples include companion robots for children and elderly family members (Kite-Powell, 2015), 'nursebots' or 'care-o-bots' designed to provide health and eldercare (Folbre, 2006), and 'sexbots' that provide new possibilities for sex, sexuality and intimacy (Cockayne, Leszczynski, & Zook, 2018). Although there is limited evidence of such robots being used in the UK context, media reports suggest the possibilities for machines to transform the nature of care are being actively explored within comparable nation states. As well as anticipating an increase in domestic care demands, outward-oriented economies such as Japan are working to establish an exports industry supplying care robots to countries facing the demographic challenge of a declining and ageing population (Decker, 2008), as well as to perform tasks that a person could not do (as a result of increased workload) or do safely in a pandemic (Murphy, Adams, & Gandudi, 2020).

With worldwide ageing trends, the global market for nursing care and disabled-aid robots—which stood at £15.4 million in 2016—is expected to grow significantly. In Japan alone it is estimated the next five years will see a shortfall of 380,000 care workers despite steps to increase the number of migrant caregivers (Foster, 2018). Obstacles to employment in the care sector, particularly the need for Japanese language competency, are proving difficult to overcome and so government and business are investing heavily in machines equipped with perception and social intelligence in order to meet the repetitive and/or chronic care needs of the nation's elderly. In Tokyo's Shin-tomi nursing home, for example, 20 robots have been engaged in delivering eldercare (Parks, 2010). SoftBank Corp. Group's Pepper robot, a humanoid, is perhaps the best known of these, particularly in the UK given his recent appearance in Parliament (during a committee hearing on artificial intelligence and the fourth industrial revolution).

Pepper stands at 1.22 metres tall and is designed to read emotions through voice tone and facial expressions and react accordingly. He performs a range of functions in the nursing home, including running residents through their daily exercise routines and entertaining them with song. On a one-to-one basis he can also provide mobility assistance, act as a communication tool (by virtue of his camera system and videophone), take vital signs and signal for emergency aid if necessary. His purchase (or lease) allows some of the most time-consuming and labour-intensive care needs to be addressed so human caregivers can focus on other tasks. In

Japan, the use of Pepper has been justified on cultural grounds, with qualitative research suggesting that Japanese citizens are more comfortable with having their needs met by the use of socially aware machines than human labour, particularly if those providing that labour might be unfamiliar with the customs of proper behaviour in Japanese society (Parks, 2010).

In the UK, however, the risk of intelligent technologies reducing the human contact of elderly and otherwise dependent individuals is more commonly noted (e.g., Dakers, 2015). In some instances, the use of 'junk' artificial intelligence is seen to provide a cheap alternative to state care provisions (and might therefore be favoured in certain sectors of the population or certain places as a means of containing costs). However, the manner in which intelligent technologies change the experience of care, endangering the trust and acceptance of users is recognized. Those in receipt of care may feel isolated or abandoned if robots are left to make decisions autonomously, or if the decisions that are made are not easily interpreted (Dolic, Castro, & Moarcas, 2019). For care professionals, this creates an additional burden to manage feelings and expectations, including communicating decisions based on cost-effectiveness rather than individual wellbeing. It also fuels fears that the use of machines and robots constitutes a threat to professional roles, leading to job loss alongside the redefinition of technical, moral and professional duties, which alters the caregiving relationship (Sparrow & Sparrow, 2006). For family caregivers the increased use of artificial intelligence may change how they identify their caregiving responsibilities, and the specific gender dynamics at work in the sphere of the home. For instance, it is often female family members and friends that step in to help care-recipients manage emotions related to the technologization of care, while male family members provide assistance with user-technology interactions (Oudshoorn, 2012).

Differences between caring for the young and old also matter in relationships among people and between people and technological devices. In addition to the economic barriers limiting the extent to which intelligent technologies are being used to facilitate and mediate caring relations,<sup>7</sup> the complexities of bodily forms of care enable and constrain technology use. Calling for attention to kinship and relatedness, which are at issue in pregnancy, birth and mothering, scholars have noted the anatomical link between mother and child and how this makes the delegation of maternal tasks to machines and robots relatively taboo. Pregnancy and birth continue to be romanticized as a broader cultural dynamic that shapes women's parenting responsibilities and makes difficult the refusal of a primary caregiving role (Lewis, 2018). Indicative of this, discussions of assistive reproductive technologies (*in vitro* fertilization, gamete donation and surrogacy) draw on a narrative of gifting to and caring for others that affirms rather than denies gendered understandings of care and of women's 'responsibility' towards others (Kent, Fannin, & Dowling, 2019). This means that even in instances where women donors are positioned as workers in the global fertility market, notions of love and self-sacrifice afford a low value to their bodily labour, preserving long-standing inequalities based in gender, class, race and global status (Schurr, 2018).

#### 4 | TECHNOLOGICAL ADVANCEMENT IN AN AGE OF COVID-19

Care technologies may be heralded for their democratic potential. Yet old patterns of privilege and disadvantage persist as technological tools are not autonomous independent variables, but social artefacts that are rooted in and enacted through norms, social relations and structures of inequality. As the pre-COVID-19 evidence review makes clear, reservations about technological advancements pivot around the loss of jobs, deteriorating job quality, infringements on data privacy and monitoring at work. There are also concerns about the reinforcement of biases owing to a lack of regulation to overcome shortcomings in worker coverage within a broader context of underinvestment in healthcare, community and social work, and childcare. New forms of flexible work are seen to be subject to the whims of employers, and coupled with inadequate social protections particularly for those at the lower parts of the income distribution, precipitating the loss of access to employment-related benefits, including maternity pay and associated protections over the period of childbirth and childrearing for many women (Howcroft & Rubery, 2018).

Not only does this place women at greater risk of work–life conflict as they seek to juggle paid and unpaid forms of care, but it helps to entrench gender, class and racial disparities by enhancing the structures and processes which produce and reproduce unequal outcomes and segregated lives. The increased use of platforms, monitoring systems and non-human others in caregiving is also seen to cause sensory deprivation with forms of remote and robotic assistance deemed poor substitutes for the feelings engendered by caregivers and receivers being in close proximity to one another. Given the inadequate financing of the public care infrastructure, efforts to combat this are found to originate within the family, with research showing that women often feel compelled to replace the affective and embodied aspects of care by assuming responsibility for this in addition to their paid employment duties (Oudshoorn, 2012).

Some of these worries about the technologization of care may have been set aside since the onset of the pandemic as a premium is now placed upon physical distancing as a means of moderating the spread of the virus. Videotelephony and online chat services have been widely embraced and there is a notable transformation in the perceived value in robots and intelligence technologies that allow humans to stay at home and help to establish 'COVID-secure' workplaces and households. Not only do robots not breathe in a way that expels coronavirus, but they do not need to travel between sites, thereby eliminating the risk of transmission that pertains to those travelling between spatial locations, such as domestic homes or residential care settings. This gives reason to suspect that in the wake of the coronavirus lockdown, the level of hygiene offered by robots and socially aware machines may yield greater levels of technological investment and the normalization of automation, particularly in the care of clinically vulnerable persons. With care homes accounting for a large proportion of COVID-19 deaths in the UK, some companies are proactively seeking to address the care deficit through the adoption of robots and intelligent technologies (Howard & Borenstein, 2020). Yet depending on state subsidies this may reinforce the need for women's unpaid caregiving as greater commodification means access to non-familial care becomes more dependent upon ability to pay. Moreover, the concerns about physical distancing leading to sensory deprivation remain.

In the short term, emergent practices that reduce the amount of contact that people and their children, elderly parents, the disabled and infirm have with non-family members may exacerbate the flaws and inequalities of a political–economic model, which permits care to be feminized and devalued. Although the vocabulary of care has been mobilized to encourage solidarity and hopefulness that 'we can get through this together', the COVID-19 pandemic has seen the majority of care work done outside the household assumed by women on an unpaid basis (WBG, 2020). Household isolation transfers work in the paid economy (nurseries, schools, babysitters) into the unpaid one, magnifying existing class inequalities—not least because working from home is easier in a 'white collar' role and employees with salaries and benefits are better protected financially (Lewis, 2020). This may yield long-lasting effects on the household distribution of care if the ability for both members of a dual-earner couple to work continues to be compromised for some time. With practical arrangements most often made in accordance with who is paid less or has more flexibility, the pandemic may serve to institutionalize labour market inequalities and prevailing gender norms, values and practices—particularly for large parts of the middle class who have come to benefit from a care model that relies on transnational wage differentials and precarious working conditions. In the instance that travel restrictions continue to limit the number of care workers that come to the UK from overseas, the pandemic may also prohibit the return (or future entry) of native, middle-class women into the labour market owing to the ongoing expectation for individuals to solve the societal problem with regards to care.

Although the problem has been building for some time, the COVID-19 outbreak has exposed the fragility of a system that fixes women in a sphere of performed and expected care labour, owing to the belief that care is a 'labour of love' (Lynch, 2007; Parks, 2010) and the assumption that women are best placed to perform this labour as they possess 'natural' caregiving abilities (Maher, 2004). While UK politicians extol the importance of care work and joined in with the weekly 'clap for carers' during the lockdown period, there has been little effort to denaturalize care and redefine it as a collective responsibility. Denaturalization requires financial compensation for the income lost through

caregiving and a recognition that women's primary caregiving should no longer be the norm. In the main, employee furlough payments (available through the UK Coronavirus Job Retention Scheme) are conditioned by business needs, specifically when employers require their staff to take unpaid leave of absence. Familial caregivers are largely unable to set limits to their responsibilities or avail of institutional support as the government has assumed that child and eldercare can simply be absorbed by private citizens. Exemplifying this, the closure of schools and nurseries has meant families have had to look after children around the clock for weeks on end, on top of which some visiting eldercare services have been put on hold for fear of spreading the virus. As relatives are called on to provide essential care, the precarious working conditions of those employed within the care industry have become more obvious, with the COVID-19 pandemic leading to the disappearance of jobs disproportionately held by women, people of colour, migrant workers and the poor.

## 5 | CONCLUSION

There is currently an unprecedented awareness that good care for all is a foundational element of our social, economic and political infrastructure. Neoliberal entrenchment over the past several decades has allowed little conceptual space to consider care as a public resource, instead allocating it to the private sphere to be carried out (either unpaid or poorly paid) by women. Now the COVID-19 pandemic has brought a new sense of urgency to the already strained and grossly inequitably care infrastructure (or lack thereof). This is in part because the emergency measures that have been taken have not only impacted the care workforce—with abrupt changes in working practices, contract terminations and reduced job security—but everyone with caregiving needs, who cannot work without support provided by family members, or employment of overwhelmingly low-paid feminized and racialized care workers. It is also because the act of physical distancing has brought to the fore the potential limitations of technology in resolving the emergent 'care crisis', wherein a number of advanced countries there are no longer enough care workers to meet essential care needs. Care technologies, particularly those that utilize robotics and artificial intelligence, may do the job of humans that are required to stay at home or who have been redeployed within the workplace, but bring forth a potential loss of humanity in caregiving that may further the demands placed on family caregivers. Hence it is not enough to change collective economic and care systems to ensure the practical aspects of care are spread around equitably: we must also consider how to meet the affective aspects of caring beyond the family. In tracing the series of measures that have been introduced to bolster the systems through which paid and unpaid care operate, this article distinguishes the role of affect that is at the heart of care. Yet further research remains necessary to provide greater insights into the experiences of using care technologies and what capacities these technologies have for generating sensory and affective responses in human bodies. It is only by fully understanding the feelings that technologies create that their potential relevance for policy and services moving forward can be made manifest, and in turn inform analysis of the different means by which the now escalating care deficit can be addressed.

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## DECLARATION OF CONFLICTING INTERESTS

There are no conflicts of interest to declare.

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## ENDNOTES

- <sup>1</sup> Namely Autonomy (an independent progressive think tank), Institute for Fiscal Studies (an independent research institute), Office of National Statistics (the recognized national statistical institute of the UK) and The King's Fund (an independent charitable organization), UNISON (the public sector union) and Women's Budget Group (an independent not-for-profit organization).
- <sup>2</sup> This included research and analysis from the Care Quality Commission in the UK, as well as a number of international organizations concerned with the economy, employment and labour, for example, International Labour Organization, International Monetary Fund, Organisation for Economic Co-operation and Development (OECD), Overseas Development Institute, Social Europe and World Economic Forum.
- <sup>3</sup> These were gathered through Lexus-Nexus, a subscription-based database that collects news articles and allows users to search article content and headlines for specific words and phrases. The search terms 'care', 'technology', 'women' and 'work' were used to identify 1914 articles published in the local and national press between January 1, 2018 and June 30, 2019 which were then reduced to a corpus of 90 articles through manual selection based on article headlines (with those appearing less relevant to the research interest being discarded). The content analysis of these articles was entirely qualitative in nature. The corpus was small enough (90) that they were simply read to get a sense for common themes and perspectives.
- <sup>4</sup> In addition to the sources already listed, this included outputs from the Asian Development Bank and the publication office of the European Union that were identified through citation chaining.
- <sup>5</sup> Childcare providers, for example, need to be registered with or approved by the appropriate body. In England, childcare registration and approval is organized through Ofsted (the Office for Standards in Education, Children's Services and Skills).
- <sup>6</sup> Indicative of this individual care workers often need to register themselves with regulatory bodies (such as the Care Quality Commission) and ensure they adhere to minimum quality standards. Introductory platforms (such as Supercarers) do provide services directly and so are not subject to the same level of regulatory oversight.
- <sup>7</sup> Although it is true that robots are becoming increasingly affordable, they remain out of the reach of individual consumers limiting their potential as 'engines of liberation' (Greenwood, Seshadri, & Yorukoglu, 2005). Pepper, for instance, costs £19,995 plus a sum for regular maintenance, and so will likely form part of the strategy for addressing the care deficit in institutionalized settings (such as nursing homes) only, with women, often with a migrant background, remaining a more affordable (and desirable) option in most other instances.

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