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Health risks at work mean risks at home: Spatial aspects of COVID-19 among migrant workers in precarious jobs in England

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Abstract

During COVID-19 lockdowns in England, 'key workers' including factory workers, carers and cleaners had to continue to travel to workplaces. Those in key worker jobs were often from more marginalised communities, including migrant workers in precarious employment. Recognising space as materially and socially produced, this qualitative study explores migrant workers' experiences of navigating COVID-19 risks at work and its impacts on their home spaces. Migrant workers in precarious employment often described workplace COVID-19 protection measures as inadequate. They experienced work space COVID-19 risks as extending far beyond physical work boundaries. They developed their own protection measures to try to avoid infection and to keep the virus away from family members. Their protection measures included disinfecting uniforms, restricting leisure activities and physically separating themselves from their families. Inadequate workplace COVID-19 protection measures limited workers' ability to reduce risks. In future outbreaks, support for workers in precarious jobs should include free testing, paid sick

leave and accommodation to allow for self-isolation to help reduce risks to workers' families. Work environments should not be viewed as discrete risk spaces when planning response measures; responses and risk reduction approaches must also take into account impacts on workers' lives beyond the workplace.

KEYWORDS
COVID-19, home, migrants, self-testing, space, vaccination, work

INTRODUCTION

During the COVID-19 pandemic, key workers and other essential frontline workers (henceforth collectively referred to as 'key workers' as per UK Government definition Office for National Statistics (2020)) were required to continue going to workplaces, including throughout lockdowns in England when the government advised all non-essential workers to work from home (UK Health Security Agency, 2022). Marginalised populations, including migrants, comprise much of the precarious and low-paid key worker workforce, including cleaners, labourers, factory workers and carers (Platt & Warwick, 2020; Public Health England, 2020). The risk of COVID-19 infection to migrant and ethnic minority key workers exacerbated existing health and social inequalities (Hayward et al., 2021; Loubaba & Jones, 2020), and also posed a risk to their families and households. There has been recognition of COVID-19 risks that frontline and key workers have navigated during the pandemic but little is known about the experiences of migrant workers in frontline and precarious employment, and even less about how these risks affected their 'home' lives, families and communities. In this article we employ a spatial lens to explore migrant workers' experiences of navigating COVID-19 risk and protection in work spaces, and examine how these experiences are related to their home spaces and relationships with family members or cohabitees.

Essential and key workers

'Essential workers' and 'key workers' (ONS, 2020) were regularly brought into close proximity to members of the public, co-workers and/or potentially infected patients throughout the COVID-19 pandemic. These worker groups thus assumed a considerable and disproportionate risk of infection to themselves and their households compared with the general population (Hiironen et al., 2020; Topriceanu et al., 2021). Key workers were concerned about their exposure to COVID-19 and they regularly voiced fears about personal safety, particularly regarding shortages of personal protective equipment (PPE) in UK's 'first wave' in 2020 (Nyashanu et al., 2020). Even before the pandemic, people from low-income and marginalised communities, including migrant workers in precarious occupations, were often less able to work remotely and were also less likely to be offered paid sick leave (Quinn et al., 2011). During the first wave of COVID-19 in 2020, workers whose jobs meant they could not work from home were more likely to die from COVID-19 than people in occupations that enabled home-working (Miller et al., 2021), and in the UK, key workers were at higher risk of severe COVID-19 infection than non-key workers (Mutambudzi

et al., 2020). Similarly, U.S. essential workers in the pandemic faced higher rates of COVID-19 infection and mortality than non-essential workers (Chen et al., 2022). U.S. agriculture, emergency, facilities and manufacturing workers experienced higher rates of SARS-CoV-2 infection and excess mortality than health workers, challenging ideas around occupational risk during the pandemic and suggesting that 'increased occupational risk of COVID-19 death may have more to do with workplace safety, worker protections, and worker power than mere proximity to COVID-19' (Chen et al., 2022, p. 9). Being less likely to be able to work remotely and/or receive paid sick leave, and being more likely to work in frontline jobs requiring contact with potentially infected members of the public, all result in a considerable and disproportionate COVID-19 risk burden on key workers (and potentially their households), including already-marginalised migrant workers. This, in turn, is likely to exacerbate existing precarity.

Migrant key workers, precarity and COVID-19

The COVID-19 pandemic worsened existing health inequalities, disproportionately affecting marginalised groups including Black and minority ethnic communities and migrants (Bambra et al., 2020; Joynt Maddox et al., 2022; Nazroo & Becares, 2020). Migrant workers—an umbrella term that includes 'refugees, asylum seekers, labour migrants and undocumented migrants living temporarily or permanently in different HICs [high-income countries]' (Hayward et al., 2021)—experience severe health inequalities, and 'vulnerable migrants' are named as a priority group under Public Health England's *Inclusion Health* agenda (Public Health England, 2021). They face discrimination, poor access to health services, poor labour market access and limited educational opportunities (Agudelo-Suárez et al., 2012; Fu et al., 2022). Among migrants, Roma populations experience poor health and wellbeing compared to non-Roma populations (Cook et al., 2013) and report health inequalities and discrimination in the UK (Burrows et al., 2021; McFadden et al., 2018).

Migrant workers comprise 'approximately 1 in 4 of the UK health and social care workforce and more than 40% of workers in food manufacturing' (Public Health England, 2020, p. 35). Because these workers are 'disproportionately represented in front-line public-facing jobs', they were also exposed to disproportionate COVID-19 infection risk from exposure to potentially infected customers, clients, patients and other workers (Hayward et al., 2021, p. 14). Migrant workers are also likely to work in more precarious employment (Douglas et al., 2020; Lewis et al., 2015; Zhang et al., 2022), partly due to immigration laws and the UK's 'hostile environment' policies that penalise undocumented migrants, for example by making employment conditional on identity papers and charging undocumented migrants for access to non-emergency health care (Doctors of the World, 2019).

While there is no singular definition of precarious work (Posch et al., 2020), we use the following: precarious workers are workers who are 'poorly paid, unprotected, and insecure', including workers who are 'not aware of their employment status, lack an employment contract, and have no access to basic employment rights such as paid leave or breaks' (Work Rights Centre, 2022). Workers with no recourse to public funds, including people without secure immigration status (No Recourse to Public Funds (NRPF) Network 2022) or without access to government support because of having worked informally, were more likely to become destitute during COVID-19 in England (Doctors of the World, 2020). Even before COVID-19, migrant workers in precarious employment experienced negative physical and mental health outcomes (Muoka & Lhussier, 2020). Marginalised groups with the lowest household income (including precarious

migrant workers) were three times less likely to be able to work from home and were less likely to be able to self-isolate during the COVID-19 pandemic (Atchison et al., 2021). For example, London bus drivers, including Black and minority ethnic and migrant workers, were required to work in public spaces and interact with the population at large, and were three times more likely than the general population to die of COVID-19 (Goldblatt & Morrison, 2021).

Despite the COVID-19 risks experienced by the most marginalised migrant workers, including those in precarious jobs and undocumented or 'irregular' migrants, they are often not able to access the health services needed to protect themselves because of discrimination (Douglas et al., 2020) and deportation fears (Hayward et al., 2021; Parry-Davies, 2021). Health inequalities persist even as pandemic responses have developed; for example, U.S. key workers continued to experience elevated risks of COVID-19 excess mortality even after vaccination roll-out and take-up, demonstrating that 'vaccine uptake alone has been insufficient to erase previously documented disparities in COVID-19 death' (Chen et al., 2022, p. 9).

Conceptualising work, home and risk spaces

In this article, we take a socio-material approach to analyse workplace risk, which helps us focus on how work spaces in a pandemic are materially and socially produced. Space is something that is experienced socially as well as materially (Massey, 2005): social practices in the pandemic workplace include social distancing and social norms surrounding, for example, vaccination take-up, illness absence and mask wearing. These behaviours combine with material factors, such as physical PPE provision, plastic workstation screens or isolation wards in care-homes. These numerous social and material factors mediate workers' experiences of COVID-19 infection risk in the factories, construction sites, courier centres and care homes that employ them.

We draw upon Massey's work on space (2005) to move away from understandings of work environments as discrete bounded spaces and instead conceptualise workplaces as produced via social and material practices of different actors. In the case of COVID-19 workplace risk, these practices include anything from handwashing to self-testing, and these actors not only include employers and employees but also customers, workers' families and household members and NHS and government entities. This relational approach to workplace attends to 'connections and disconnections' (Massey, 2005, p. 67) across multiple environments, relationships and times through which workplace as a risk space is constituted. The material dimensions of space are co-constituted via multiple social, cultural and political processes (Harvey, 1990; Lefebvre, 1991; Renedo & Marston, 2015); these spaces of work and home may incorporate experiences of health and illness, safety and vulnerability and risk and reward. They are linked to work practices, public health and employment policies and sociocultural norms around COVID-19 prevention measures. We use this framework to conceptualise migrant workers' experiences of navigating COVID-19 work-related risks and protections.

METHODS

This article presents findings from 'Routes: New ways to talk about COVID-19 for better health', a rapid-response research project commissioned by NHS Test and Trace/UK Government Department of Health and Social Care (DHSC). The project involved participatory qualitative research with Gypsy, Roma and Traveller communities and migrant workers in precarious jobs

to co-produce insights into their experiences of COVID-19 and health. This article reports on the result of interviews with 27 migrant workers, including but not limited to Roma migrant workers. Findings relating to wider Gypsy, Roma and Traveller communities are reported elsewhere (Kühlbrandt et al., 2023; Marston et al., 2022; Renedo et al., 2023).

Using a participatory approach is crucial to co-produce inclusive solutions for emergency preparedness, response and recovery to meet the full range of health security needs among diverse communities (Marston et al., 2020). We used a five-stage 'DEPTH' participatory approach to the research: mapping, dialogues, data generation and preliminary analysis, follow up dialogues and finally 'research into action'. We involved community members and other stakeholders throughout.

In our mapping phase, we identified key individuals, organisations and literature. We then engaged in 25 mapping conversations about the research, in English, with 32 individuals including non-participant migrant workers, advocates, NGO and civil society representatives, researchers and employers. These involved conversations to refine the research questions, understand more about the context and ensure acceptability of the research. Later dialogue sessions were conducted in English and Romani language (via an interpreter). The data generation phase from October 2021 to February 2022 involved qualitative interviews with migrant workers in five geographical locations across England (East, North, South East Coast, South West and West Midlands). We worked with co-researchers from Gypsy, Roma and Traveller and migrant worker communities and conducted nearly all our interviews in person, in locations convenient to participants, following COVID-19 safety protocols. We interviewed 27 migrant workers aged 20–60 years old (15 men and 12 women) from 11 countries (13 from Slovakia, five from Romania and one each from Algeria, Bulgaria, Gambia, India, Jamaica, Latvia, Lithuania, Moldova and Zimbabwe). Participants were employed in children's and elderly care-homes, hospitals, construction sites, food factories and as cleaners, delivery drivers and taxi drivers. Fifteen of the 27 migrant workers we interviewed identified as Roma. Participants experienced varied home environments, including living with a partner, parents, children, extended family, flatmates or a house of multiple occupancy (HMO). Participants may have been unhoused or have lived in temporary accommodation, but this was not recorded.

Interviews were conducted by members of the research team in English and Romanian, and in some cases, we employed interpreters to increase participation (interpreters were members of the community who were compensated for their time). Some conversations in group interviews involved occasional *ad hoc* interpreting into and out of other languages by participants to assist others who spoke less English. Interviews explored participants' views and experiences of COVID-19 (including at work), government and healthcare responses and barriers to effective COVID-19 protection and response. Participants gave written informed consent, via translation and/or interpreter where needed, and participation was confidential and voluntary. Participants were compensated £40 for their time and travel costs. We informed participants about Doctors of the World, a civil society organisation that helps migrants access health care in case they required their services.

We audio recorded the interviews, and an external agency transcribed them. Analysis was conducted in the recorded transcription language—23 in English and four in Romanian. A professional translator, Alina Huzui, transcribed interviews in Romanian and then translated them into English; this work was checked by author CK who had conducted these interviews.

We analysed the data by combining several deductive *a priori* areas of interest (specifically COVID-19 testing, contact tracing and vaccination and determined by the research priorities of the funder) with inductive thematic coding (Braun & Clarke, 2006). Our approach recognised that thematic analysis is a 'family of methods, not a singular method' (Braun & Clarke, 2023, p. 1)

and involved analysing transcripts and developing emerging themes over time. Applying *a priori* topic areas proved helpful in contextualising broad themes of interest when researching migrant workers' experiences of COVID-19, such as workplace protections or vaccination. Complementing *a priori* coding with inductive thematic coding allowed us to draw out more latent, emergent or unexpected participant experiences of COVID-19, such as negotiating risk in specific spaces or how to enact personal agency. This was particularly true for spatial themes, with an *a priori* interest in work space developing interconnections with home spaces for participants that emerged inductively from the data. Researchers took a 'team-based' (Cascio et al., 2019) theoretical approach to inform analysis by collectively developing deductive and inductive codes together, and these discussions proved to be a richly generative experience, with new codes added and in some cases, revised, extended or amalgamated. We attended to participants' own reflections and viewpoints as a way of 'thematising' meanings in ways that centred participants' experiences (Holloway & Todres, 2003, p. 347). Later stages of our analysis were informed by our theoretical framework; that is, treating work spaces as socio-materially produced and co-constituted. Several theme codes are used as subheadings in the Findings section that follows.

FINDINGS

Participants experienced work space COVID-19 risks as extending far past physical 'work' boundaries to affect individual workers' families, friends or cohabitants outside of the work 'risk space'. Below, we describe socio-material aspects of workplaces that affected risk, then how participants navigated risk via worker self-testing as an effort to protect home spaces, and self-isolation to protect others undertaken in response to workplace risk.

Socio-material aspects of work spaces

Material *and* social elements constitute a work space, and participants highlighted examples from both elements to describe COVID-19 protection, or conversely, transmission. Material aspects included factory assembly lines (socially distanced or not), workrooms (cramped or spacious) and ventilation (insufficient or sufficient), and these aspects were mediated by material workplace protections (e.g. air purifiers and floor markings) as well as social practices and norms (e.g. hand-washing, mask-wearing and social distancing). Workplace protections were both materially produced (e.g. Perspex dividing screens) and socially produced (e.g. maintaining interpersonal space and adhering/not adhering to safety protocols), but in either form were often absent. While many participants, particularly in health and care sectors, told us about comprehensive workplace protections, others identified a 'business-as-usual' workplace norm. They reported inadequate PPE distribution, lack of social distancing and non-existent sick pay provision. Several participants told us they felt their workplace protections were insufficient but that they needed to work anyway because they needed the money. As one social care worker summarised: '*people were going to work because they felt that you know, if I don't go out to work, I starve*'.

Personal sacrifices in navigating workplace risk

Stress was reflected in participants' accounts of socio-material aspects of work spaces. Health and care employees working closely with people infected with COVID-19 reported more stringent workplace protections, but that did not necessarily remove all stress. A care worker described how stressful

his job became because so many of the care-home residents became sick and died of COVID-19. He described navigating a separate ward in the building for COVID-19-infected residents, a particularly 'risky' space. He volunteered to take on more shifts so that pregnant colleagues and colleagues with young children could stay at home and avoid working in these risk spaces: *'care was natural to me, and I was doing it because I, I'm in the job, and if I don't do it, no one else is going to help them. So it was more of my own decision'.* Yet these collective protective social practices could not solve problems created by understaffing due to COVID-19 infection and isolation: *'it was difficult, because most of the residents were not having proper care at that time. We were short of staffs [sic], people phoning in sick'.*

Some participants told us that their colleagues did not adhere to COVID-19 protection measures, and these workers worried about social interactions with colleagues. One construction worker told us *'if someone was ill, I wouldn't go near them [...] coughing everywhere'* but he noted that his avoidance was only possible because they worked outdoors. For others, the physical confines of a factory, office floor, or care home risked infection regardless because there was no room to maintain social distance.

Even within workplaces, participants reported contradictory protection experiences based on social and material aspects of work spaces. For example, a floor manager of a factory told us that COVID-19 protocols at his work were extensive, from hand-washing and social distancing to equipment to allow for COVID-19 safety such as free masks, visors, sanitation spray and plastic dividers for employees on the factory line. However, another participant from the same workplace contradicted this, telling us that in practice, protocols operated differently, with poor COVID-19 protection practices. She summarised managing to avoid COVID-19 at work as '*only God keeping us, because at the factory we do not have space*'. She described working at the start of the pandemic in the same room as all other workers without any dividers or social distancing. She emphasised that months into the pandemic, conditions remained cramped, with *'everyone passing, touching you'*. She was also never sent home to self-isolate after possible contact with infected co-workers. As she puts it: *'you still work. People in the factory have it, but you still come into work. Nobody stay home'.* Her account of work policies, material space constraints and social elements of space (in this scenario, social norms that regulate peer behaviours) highlights individual employees' lack of agency in making their own conditions safer.

Navigating workplace risk and protecting home spaces: Personal strategies

For participants, a safe home space was one without the virus and this sometimes entailed considerable sacrifices as they tried to navigate risks from their workplaces. Participants took personal action by wearing masks (and in some cases, also gloves), maintaining social distance (i.e. avoiding physical proximity to others) and often showering at home immediately after each shift to avoid the potential 'spill' of COVID-19 into home spaces. Some performed these self-protections as part of recommended work measures, while others acted on their own initiative to try to create a personal safe space. A care worker spoke of the *'risk that I can spread this condition to my children, that I can spread this condition to my partner'*. He felt particularly uncomfortable because his partner worked from home, while he entered a high-risk space (i.e. where COVID-19 transmission risk was high) every shift. He took steps to reduce transmission risk to his family such as removing his work clothes in his garage and bagging them. With COVID-19 transmission routes unclear during the first lockdown, he took additional steps: *'I sanitised myself, bath[ed] myself with the Dettol, and it was all sort of things, before I came into contact with [my wife]'*. His actions were an attempt to neutralise the effects of his job for his *'safe'* (i.e. free from infection) home space: *'I was so fearful that I could, I could be having COVID and I would spread it to my, to my wife, you know?'* Similarly, a factory worker

who resigned from her job because she felt unsafe at work and unsupported by management in her worries about COVID-19 reflected that the guilt she would feel if she *'brought back'* COVID-19 to her family home outweighed the stress she felt afterwards because of her financial insecurity.

Self-employed workers had to grapple with workplace risk issues alone, particularly in the absence of government guidance throughout early weeks of the pandemic and during national lockdowns. Freelance workers had to create their own safe work spaces, especially in contexts where colleagues or customers did not adhere to COVID-19 protocols. Workers initiated protective measures, for example wearing a mask when no one else did, or donning disposable gloves to touch door handles, bus exit buttons or when couriering parcels and removing gloves only when entering their 'home' spaces. A self-employed taxi driver told us about the social and material practices through which he tried to manage workplace risk to keep his home space safe. He drew on social interactions with healthcare staff he was taxiing to local hospitals to seek their advice on COVID-19 prevention, and based on this advice he developed his own measures to minimise infection risk while working. He credits the advice of health-care staff customers to keep his cab windows open, regardless of weather, with avoiding COVID-19 infection for the first nine months of the pandemic. Yet creating safer work spaces was made difficult by the socio-material dimensions of work space: another migrant worker taxi driver told us that so many clients refused to wear facemasks in his small cab that he became concerned about taking COVID-19 back home to his pregnant wife, so he left his job to protect her. These accounts typify the judgement calls that individuals were forced to make when negotiating how best to maintain frontline jobs while trying to protect themselves and others from COVID-19.

Social and material elements of work (and home) spaces also mediated workers' vaccination experiences and how they sought to carve out safe spaces for themselves, either via getting vaccinated or conversely avoiding vaccination in rare cases as a perceived strategy to keep themselves safe. Some participants arranged to be vaccinated against COVID-19 because they were required to by their employer. Others sought vaccination as an additional protection against workplace risk for themselves and their household. Some participants told us that compulsory workplace vaccination (e.g. for care-home workers) felt unfair and spoke about feeling pressured by managers or colleagues to get vaccinated.

One carer reported feeling *'forced into'* vaccination by his employer. He viewed the vaccine as a risk to his health and refused to comply. Paradoxically, the employer's policy of mandatory vaccination aimed to address workplace COVID-19 risk, but was simultaneously experienced *as* a risk by this worker. He removed himself from the space where vaccinations were happening to exercise his resistance and create what for him constituted a safe space: *'I was the only person that didn't want it. I actually went and sat in the lounge with the residents and I said no, I'm not getting it'.* He resigned from his job soon after, reasoning that the vaccine risk to his health outweighed the risk of potential unemployment. Another health worker told us he felt that he was under pressure to be vaccinated because he would potentially lose his job if he did not, which would affect his financial support to family members in his country of origin. This mirrors the previously discussed participants' perceptions of feeling pressured to work in care home and construction sites under circumstances experienced as risky.

Testing for COVID-19 in work spaces to protect home spaces

Self-testing for SARS-CoV-2 infection mediated participants' access to work spaces, with a negative result allowing entry, and involved home spaces, with many workers conducting tests before

travelling to work. While testing requirements were not universal across workplaces, participants who worked in health and care settings described rigorous testing protocols in their place of employment, with regular testing both at home and at workplaces. One children's care-home worker in his 60s told us that he would self-test before leaving for work and again when returning home. He also encouraged his wife to self-test despite her staying at home, out of concern that he might bring COVID-19 back from work. While testing increased his confidence as a worker in a high-risk space, the NHS Test and Trace app—a nationwide test-reporting and contact-tracing system operated via mobile phone—caused frustration, with colleagues frequently being 'pinged' (i.e. alerted that they had been in close contact with an infected person) and told to self-isolate. 'Pinged' colleagues stayed home from work, meaning others had to cover their shifts in addition to their own:

> I'd end up working double shifts, or my manager would come to relieve me, because my colleague who is supposed to replace me you know, has received a message on his Test and Trace [...] then they're found to be negative, you know? So there was a lot of technical hitches, which ended up affecting us as workers, negatively.

This exemplifies the complexity of workplace protections: some measures to protect the workforce were experienced as posing a risk to the individual; he had to work more and expose himself to more risk as a consequence of protection measures.

Testing also offered a route to protecting home spaces. Some participants told us that they self-tested specifically to protect their families at home. Others emphasised the value they saw in testing at their workplace, where their infection risk was often high due to the nature of their work, to avoid spreading a potential COVID-19 infection not just among their immediate families but also a wider set of undefined 'others'. Several participants said they were relieved when nationwide rapid testing was introduced; its availability, its fast turnaround and it being free meant that they felt more confident in balancing their need to work with their desire to protect families. Conversely, some worried they would be excluded from work spaces as a result. One migrant worker caring for her young child was reluctant to engage with Test and Trace in case she lost wages because of having to self-isolate. A construction worker explained to us that when he tested COVID-positive on an LFD (rapid antigen lateral flow device) test, he explicitly asked his employer not to follow up with a PCR (polymerase chain reaction) test as it would increase the length of his quarantine period by three days, which would mean three extra days without salary. Another explained that his colleagues' reluctance to use Test and Trace, and reluctance to self-isolate when ill with COVID-19, was primarily economic, with every day off work meaning lower wages. As he reflected*: 'you can't judge them because you don't know what happens with their earnings'*.

Self-isolating to protect work and home spaces

Self-isolating in risky jobs in consideration of family members at home as well as self-isolating because of COVID-19 sickness itself were both taken seriously by participants. Some participants in risky work spaces elected to isolate from their families to protect them, telling us how they endured long-term separation from home in order to reduce risks while continuing to work. One care worker was advised by his employers to live apart from his wife and young daughter to reduce transmission risk to his home. During self-isolation, *'we were advised not to even let*

our families around us [...] to stop us socialising with families because of you[r] work at the care home'. He reflected that the separation he and his colleagues had to endure from their families was stressful: *'that was one of the difficult parts as well, not [being] able to see her like when I needed to'*. Several of his colleagues quit their jobs as a result of this pressure, making work even more difficult for those who remained because of staff shortages in addition to family separation. Nevertheless, self-imposed family separation felt like the *'right thing to do'*. Another care worker in an older-person's home told us that in the first lockdown he felt pressured by his employer to give up anything that was not work or travelling between work and home:

> They told us at work, because we worked with older vulnerable people, adults, when lockdown came, we were not allowed really to do anything apart from work and going home. That's the only places that I could really go because I had to think about the people that I could potentially put in danger by me being selfish and going out socialising, and me not wearing a mask, not wearing PPE.

He explains that he felt monitored by his workplace, with his boss 'getting funny' if they saw employees socialising: *'they would be like, oh, well, you're being selfish, you're putting people at risk etc. So the thing that we'd been recommended to do was like literally just do the important things, just like go to work'*. His employer's encouragement to behave in a certain way blurred boundaries between his work and home spaces, with work taking precedence. Living near his workplace and cooperating with their suggestion meant that during the first COVID-19 wave *'really all I did was go to work and go home'*.

A construction worker experienced more overt surveillance from his workplace, receiving a reprimand from his manager after the manager saw a photo on social media of the worker socialising with colleagues after work: *'he told us not to meet outside and that okay, there were two guys working for the same company, but they were from a different job'*. The participant reasons that 'different job' means little in reality, given that the friend worked on the right side of the street and he directly opposite on the left side, and that they met on work-breaks anyway. He was unsurprised by the surveillance; it was the arbitrary division of socialising with colleagues outside of, rather than within, the workplace that frustrated him.

There were limits to self-isolation. During our engagement with stakeholders as part of our participatory work, we heard that some workers went to second jobs when they were told to self-isolate because of a COVID-19 case in their first workplace. Some participants were unclear about how statutory sick pay provision and Test and Trace self-isolation bursaries operated and/or how to access them; informal or undocumented workers were not able to access them at all. One construction worker requested self-isolation absence because of the risks at home (his son had suspected COVID-19). He did not receive self-isolation pay from his employer despite this provision:

> I didn't found [sic] very fair because my employer said, listen, we're having to cover you, what we can do is take five days, we're going to pay you five days, and then the other five days we have to take it from your holiday [...] I returned back to site [early]. Definitely the measure wasn't what they should be.

This worker navigated COVID-19 risk in reverse from what other narratives identified as safe home spaces to his workplace, because of his son's potential infection. This reversal echoes the care-home context where management pressured workers not to socialise in their home life. Both situate the private sphere of workers' lives as a risk to their work spaces.

For workers combining employment outside of the home with caring responsibilities for vulnerable family members at home, self-isolation was often desirable but impossible: workplaces did not offer accommodation for self-isolation, nor alternative provision for workers in frontline positions. For those anxious about bringing COVID-19 back to clinically vulnerable family members, the inflexibility of employers in terms of offering choices beyond continued work or unpaid leave (or termination) was frustrating.

DISCUSSION

We have examined how migrant workers in precarious jobs used workarounds to try to create safe spaces for themselves and their families and co-residents at home in the face of inadequate COVID-19 protection measures at work. 'Work' is something articulated by participants as spatially experienced and 'risky'. Our findings demonstrate that instead of conceptualising work environments as discrete risk spaces it is helpful to understand them as interconnected to private home spaces. Our analysis conveys complexity in migrant workers' experiences of navigating work-related COVID-19 risks through and against socio-material relations mediating their home lives and work spaces, including workplace policies, worker autonomy, social norms, physical environment and self-isolation.

Work as a 'risk' space

Social dimensions of work spaces can both shape and be shaped by the material dimensions of that space (Massey, 2005). Both social and material contexts bear risk for participants and their households, exemplified in our findings by the difficulty participants experienced in practising social distancing in cramped care homes, factories or taxis. The 'frontline' environment for key workers was articulated as encapsulating a range of unknowns, from virus transmissibility to self-isolation guidance. These unknowns disadvantaged workers who had to continue to go into work when the general population were either locked-down, or later were instructed to work from home. Additionally, participant narratives reveal workers' efforts to try to keep 'clean' home spaces from the risk spaces of work, whether via personal cleaning and disinfecting routines or self-organised quarantines.

Many of the sites that migrant workers enter constitute 'epidemic engines' (Reinhart, 2021): settings such as prisons and nursing homes where risk is higher than the average workplace, proximity to others is obligatory and 'stranger encounter' (Koch & Miles, 2021) is routinised. The stress of working in these jobs was clearly articulated by our participants, not only those in direct contact with COVID-19 patients in health-care settings, but also those in factory and construction jobs. These are all places where risk is spatially expressed: wards, toilets, assembly lines and cabins. Workers faced interpersonal and physical challenges posed by the interaction of social and physical dimensions of such spaces: the crowdedness of the food factory, the colleagues who did not or could not adhere to safety protocols, or the taxi drivers who could not distance from strangers while working and therefore had to rely on those strangers' compliance with safety measures.

Migrant workers were almost uniformly aware of the risks of entering daily into these 'epidemic engines', visibilised in work spaces where PPE, social distancing, test and trace systems and sickness pay were not in place, or where they were used, were not sufficient (Ng et al., 2020;

Nyashanu et al., 2022). Even where COVID-19 protections were ostensibly enacted, measures were not always implemented, or were implemented inadequately. The conflicting accounts of COVID-19 protection in our study from a frontline worker and manager in the same factory suggest that space and risk may be experienced, interpreted and/or narrated differently by different actors. Frontline workers were exposed to risk while at the same time being denied power to mitigate that risk. Long-standing hostilities towards migrant communities (Hayward et al., 2021) may also have exacerbated some of the difficulties our participants experienced in negotiating work and home spaces to reduce risk. Taken together, it is unsurprising that COVID-19 health outcomes for frontline migrant workers were markedly poorer than for the general population (Hayward et al., 2021).

Work risk spaces and home risk spaces are mutually constituted

Transitions between work and home life became fraught for many of our participants, as it did for pandemic key workers more generally (Hibel et al., 2021; Toh et al., 2021; Topriceanu et al., 2021). Space shapes people's embodied experiences and social processes and is simultaneously constituted by these processes (Soja, 1989). In turn, work spaces and home spaces can be conceptualised as mutually co-constituted, with participants crossing between these domains and engaging in socio-material practices to protect home spaces, including washing their bodies and changing their clothes after a shift, procuring self-test kits for family members at home, and even staying away from the family home for long periods while working in risky work environments. Yet migrant workers, often low-paid and navigating precarious job contracts or zero-hour contracts, had little power to negotiate flexible working conditions to keep home spaces 'safe' and 'clean': that is, virus free. Negotiating practices that would protect participants and their home spaces and help them navigate the connections between home and risky workplaces proved difficult. Participants also had limited financial security to be able to leave for safer jobs elsewhere to 'disconnect' the risk of work spaces from home spaces.

Space can be understood not as inert, but 'organic and alive' (Merrifield, 2006, p. 104), and this aliveness was exemplified in how participants articulated home spaces. Homes were imagined as spaces *of* protection as much as spaces to *be* protected, in many cases encompassing and shielding vulnerable family members whose health was potentially compromised by workers' employment. Many migrant workers we spoke to were informally caring for someone in their family in addition to their jobs; for these participants, protecting home spaces carried even greater urgency. The COVID-19 mitigation procedures that workers in our sample regularly initiated typified the ways in which work spaces spilled over into private spaces. Tactics ranged from mild inconveniences—handwashing and mask-wearing—to more extreme measures, from the example of stripping off clothing from the shift in the garage immediately after returning home and washing with disinfectant, to living in a different accommodation from the worker's own family for months at a time or resigning from jobs altogether despite precarity.

Participants' narratives of being discouraged from undertaking activities between travelling to and from work, and in several cases from doing any activities other than work, meant home spaces became 'disconnected' from workers' social lives in order to maintain workers' COVID-19 'hygiene' in work spaces, or conversely amalgamated *into* work life via increasingly blurred boundaries. The example of workers forbidden from socialising between 'different' work spaces in breaktimes, despite the factory buildings being on the left- and right-hand side of the same street, demonstrates how the workplace is not a discrete space but an entity that spills into other

facets of workers' lives. Added to this were participant narratives of self-isolation that were not required (or not only required) by workplaces but were self-imposed, including the example of living for extended periods outside of the family home in order not to 'bring back' COVID-19 to vulnerable family members. Participants' nervousness about 'passing on' COVID-19 to household members after a shift, or in some cases even a reluctance to *exist in* the same physical space as them after a shift, meant that their work space impinged into their home space, with a concomitant moral expectation, driven by oneself and by employers, not to be 'selfish'. The reality was far from selfish: for workers, safety concerns radiated out in two directions simultaneously, protecting themselves and their immediate families or cohabitees, but also wider communities. This can be seen in the experience of the care-home worker who is careful to try and keep patients safe from inbound COVID-19 infection transmitted by workers journeying into the risk space, while also operationalising strategies to try and keep family members safe from outbound COVID-19 infection brought from work to others in her home space.

Limits to exercising agency

Our findings also suggest that personal agency is key to migrant workers' ability to create safe spaces for oneself and protect home spaces. Yet for workers to feel empowered to prevent infection and protect themselves and others, personal agency is not enough. As we have seen from participants' narratives, workers requesting to shield for their own or vulnerable relatives' health were not always accommodated, and workers who voiced concerns about COVID-19 compliance in their workplace were sometimes ignored by managers. In the same way that the 'agency to transform space [is] constrained by the nature of space itself' (Renedo & Marston, 2015, p. 500) and the social and material practices of those with more power to control the organisation of space, workers in this study were limited in what they could or could not do by the nature of the space in which they worked and who had agential control over that space: a wide range of actors, but rarely, if ever, the migrant worker. Compounding this was the tendency for employers to individualise responsibility, as demonstrated by participant accounts of social media surveillance of co-worker socialisation and by managerial directives to limit workers' movements to work and home only.

Far from a coming together of workers to attend to (often critically important) frontline work, our findings suggest an atomised and stressed workforce trying to exercise their personal agency in making their work and home spaces safer. Workers without agency are not able to move to another job easily if they feel pressured to work in unsafe conditions. Thus, even when able to identify what constituted work risk spaces, and able to articulate how they try to operationalise personal safety in these spaces to mitigate personal risk, workers were still limited in their ability to exercise agency in traversing these spaces to protect their interconnected home spaces.

CONCLUSION

Attending to how workers navigate space(s) of risk and safety is crucial to be able to understand relationships between infection risk, work and precarity in future health crises, across the UK and elsewhere. Our focus on the experiences of migrant workers in precarious employment in particular is pertinent given that COVID-19 has exacerbated the structural inequalities and exclusions that underpin poorer health outcomes for migrant workers (Mukumbang, 2021). Safety

interventions and workplace protections should be multi-level, including community-based and bottom-up initiatives (as per Marston et al., 2020). Given that essential and key workers are more likely to be exposed to future infections due to their requirement to be physically present at a workplace, worker protections—for example, supporting workers when they report unsafe working conditions and providing access to sick pay and furlough schemes—will be key to lessening these workers' physical and mental health burdens, in turn reducing health inequalities in line with an Inclusion Health Agenda (Public Health England, 2021). Easy access to virus testing provided vital support for individuals and communities to avoid virus spread; ensuring easy, cheap or free access to tests will be essential when virus prevalence is high.

Taking a socio-material approach to space helps demonstrate the ways that risk is manifested socially and materially in workplaces for key workers in disease outbreaks. Work environments should not be seen as discrete risk spaces, but instead interconnected socially and materially with private home spaces. Therefore, we suggest that Government and public health measures should not conceptualise protection as something confined to work spaces, but as co-constituted with workers' home lives. A wider, more holistic view of damage limitation in health emergencies that takes into account the porous boundaries of work and home spaces, and considers workers' lives *outside*, as well as within, work spaces, will improve workplace mitigations in future emergencies.

AUTHOR CONTRIBUTIONS

Sam Miles: Conceptualisation (ideas); Data Curation; Formal Analysis; Investigation (data collection); Project Administration; Writing – original draft; Writing – review and editing. **Alicia Renedo**: Conceptualisation (ideas; formulation of overarching research goals and aims); Formal Analysis; Funding acquisition; Investigation; Project Administration; Supervision; Writing (review and editing). **Charlotte Kühlbrandt**: Conceptualisation (ideas); Formal analysis; Investigation (data collection); Writing (review and editing). **Catherine McGowan**: Conceptualisation (ideas); Data curation; Formal analysis; Project administration; Investigation (data collection); Writing (review and editing). **Rachel Stuart**: Conceptualisation (ideas); Data curation; Formal analysis; Investigation (data collection). **Pippa Grenfell**: Conceptualisation (ideas); Data curation; Formal analysis; Investigation; Writing (review and editing). **Cicely Marston**: Conceptualisation (ideas; formulation of overarching research goals and aims); Data curation; Formal analysis; Funding acquisition; Investigation; Project administration; Supervision; Writing (review and editing).

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CONFLICT OF INTEREST STATEMENT

The authors report no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

The study was approved by the London School of Hygiene & Tropical Medicine Research Ethics Committee (No. 26440).

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