REMOTE WORK: RESHAPING PHYSICAL SPACE IN THE POST-PANDEMIC

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Abstract: Work has always been a part of human life, evolving through economic, cultural, societal, and technological changes. In recent years, remote work or work-from-home (WFH) has become more prevalent in the broader landscape due to technological advancements. COVID-19 led to a normalization of working from home, prompting the need for further research on the physical aspects of this new work model. This paper examines the findings of a pilot study for investigating the physical aspects of home workspaces in the context of New Zealand. The study was exploratory research, as home office spaces have not been extensively examined. The research used an ethnographic approach to gather primary data using semi-structured video interviews supported by photographic evidence. The results suggest that homeowners tend to have more suitable workspaces than renters. However, this may be influenced by factors such as shared living arrangements, small home sizes, and family composition, indicating a need for further exploration of workspace suitability. The study emphasized the significance of natural lighting and the lack of attention to proper ergonomics in home workspaces. The trend of working from home appears to be more enduring than anticipated. Further research is needed to understand how individuals have adjusted their homes for work. More studies are required to encompass diverse regions, cultures, genders, and socioeconomic contexts for a comprehensive perspective of work-from-home practices.

Keywords: *COVID-19, Remote Work, Home Offices, Physical Characteristics*

1. Introduction

The history of the workplace has seen various changes and developments over time, driven by different factors (Duffy, 1992). The practice of working from home or remote work dates back to ancient times when people used to operate their businesses from their homes (Barac & Wigglesworth, 2011). However, the introduction of technology has played a significant role in facilitating remote work and making it a popular option (Hansen & Saini, 2020). Remote work is also known as "telecommuting," "teleworking," or "working from home" and has undergone many transformations. The outbreak of the COVID-19 pandemic in 2019 drastically changed the way we work (Cuerdo-Vilches et al., 2021). Remote work became the norm during the pandemic, challenging traditional office-based work practices, and has continued to be a prominent feature in the contemporary work landscape.

1.1. HISTORY OF WORKSPACE

Throughout the course of history, the nature of work has undergone significant transformations as a result of social, economic, and technological progress. From the early stages of human societies relying on hunting and gathering to the contemporary adoption of hybrid work models, the evolution of work has been profound and wide-ranging. Ancient Rome's need for administrative spaces introduced the concept of the office, derived from the Latin term "officium." Early offices, such as those in Roman forums, were multipurpose spaces for shops, offices, and government buildings (Mansson, 2022). The Middle Ages saw the development of the scriptorium in monasteries, where monks transcribed religious texts (Stones & Alison, 2014).

In pre-industrial societies, homes often served dual domestic and work functions, with shop owners living above their shops (Barac & Wigglesworth, 2011). The move to the separate office started in the 18th century with the construction of buildings like the Old Admiralty Office and East India House (Gillen, 2019). Later the Industrial Revolution centralized workspaces in urban areas. Innovations such as elevators and steel-frame construction in the 19th century led to skyscrapers, transforming urban landscapes (Gillen, 2019).

The 20th century ushered in significant changes, with scientific management principles influencing office design. Frederick Taylor's Taylorism led to large open floor spaces in offices (Prechel, 2016). The mid-20th century saw the rise of Bürolandschaft, promoting open-plan offices that allowed for more employee movement and personalization (Duffy, 1992). The introduction of cubicles in the 1960s aimed to offer privacy and interaction but eventually led to criticisms of unhealthy work environments (Hansen & Saini, 2020).

Technological advancements in the late 20th and early 21st centuries, including personal computers, mobile phones, and

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the internet, facilitated telecommuting and remote work (Hansen & Saini, 2020). The concept of coworking spaces emerged, allowing employees to work in shared environments outside traditional offices (Pendergraft, 2021). Modern office designs emphasize employee well-being, flexibility, and sustainability, as seen in examples like Apple's and Bloomberg's headquarters.

Overall, workspace history reflects the ongoing impact of economic, cultural, and technological changes on how people work and interact, with recent trends emphasizing well-being, productivity, and sustainability in the workplace.

1.2. IMPACT OF COVID-19 ON THE WORKPLACE

Industry reports and online news dominate the literature on the impact of COVID-19 on the workplace with a limited number of academic papers on the topic. The COVID-19 pandemic significantly disrupted traditional work practices, leading to a global shift from office settings to remote work. Remote work has become standard for many industries and remains popular post-pandemic, with experts predicting a hybrid future combining remote and in-office work (Cuerdo-Vilches et al., 2021).

According to Forbes Advisor (Haan, 2023) in 2023, the computer and IT industries led remote work, with marketing, accounting, finance, project management, and healthcare also adopting digital tools for remote operations. Online learning surged, though the home environment posed challenges. A Global Survey of Working Arrangements (G-SWA) conducted between mid-2021 and early 2022 across 27 countries found that most individuals preferred working from home 1.1 to 2.3 days per week. Many indicated they would resign if forced to return to the office full-time, valuing the time saved on commuting (Aksoy et al., 2022). The Microsoft New Future of Work Report 2022 (Teevan et al., 2022) highlighted that 47% of American workers preferred a hybrid model, with people of colour and women slightly more in favour of remote work.

WFHResearch's 2023 study (Barrero et al., 2023) revealed that 12.2% of full-time US employees work from home, with 29.3% adopting a hybrid model. A New Zealand survey (O'Kane et al., 2020) reported challenges like disconnecting from work and communicating with colleagues but highlighted benefits like eliminating commutes and better time management. This study on home workspaces in New Zealand found a gap in understanding the physical characteristics of home offices.

1.3. THE PHYSICAL ASPECTS OF HOME WORKSPACES

Limited research has been conducted to analyze the physical attributes of home offices in both New Zealand and the global context. An influential study (Cuerdo-Vilches et al., 2021), carried out during the 2020 lockdown in Spain, utilized a combination of research methods to investigate the characteristics of home working spaces. Participants completed questionnaires and submitted photographs and narratives, with 1800 responses and over 200 images. This study highlighted that good daylighting (53%), spacious rooms (48.8%), and comfortable temperatures (46.1%) were crucial for remote workspaces. Other important factors included furniture (33.8%), surface finishes (33.5%), and external views (31.6%). Before the lockdown, 42.2% of respondents lacked a designated workspace, leading many to create temporary workstations. This adaptation to working from home improved job satisfaction and work-life balance.

A survey at the University of Cincinnati in late 2020 (Davis et al., 2020) found that most faculty and staff used office chairs (58%), with some using dining chairs (27%) or non-chair options like beds or couches (15%). The majority of workers (88%) sat at desks, while a small percentage used dining tables (7%). Only a few had standing workstations or treadmill desks. The study emphasized the need for ergonomic home offices to ensure long-term employee well-being as remote work becomes more prevalent.

In New Zealand, a 2020 lockdown survey (Mayer & Boston, 2022) investigated the relationship between WFH and the built environment. It identified three groups: those preferring full-time work-from-home (WFH), part-time WFH, and those preferring no WFH. Among full-time WFH respondents, 38.2% had an office, compared to 26.9% of part-time WFH respondents and 12.3% of those against WFH. Many used alternative locations like bedrooms and lounges, which lacked ergonomic furniture and privacy. Group 3 respondents (those against WFH) mentioned that having a dedicated workspace would make WFH more desirable.

The above-mentioned studies emphasize the significance of well-planned homework environments and the integration of ergonomic elements to improve the remote work experience and enhance employee satisfaction. Further research is imperative to delve into aspects such as home office layout, furniture, ergonomics, and indoor environmental variables, including lighting, acoustics, and ventilation.

2. Methodology and Study Design

This study was exploratory and inductive, with the goal of understanding how remote work affected physical spaces in the post-pandemic era. Exploratory research is intended to make new discoveries with minimal or no prior knowledge of the particular field (Stebbins, 2001). It used an ethnographic approach to gather data at a single point in time using a non-probability sampling strategy. Ethnographic studies have highlighted the importance of approaching the study of a particular group or culture with an open mind but without a lack of thoroughness or structure to the study (Fetterman, 2020). This study has used qualitative methods, such as semi-structured interviews and photographic evidence. This cross-

sectional study aimed to provide new insights into how remote work had changed physical spaces in New Zealand homes, considering both personal experiences and objective changes to home workspaces.

Primary data collection involved semi-structured interviews and photographic evidence. Various methods, including questionnaires, interviews, focus groups, and participant observations, were considered. Two approaches were thoroughly examined before selecting semi-structured video interviews as the primary method. Initially, a questionnaire was distributed among friends and family to gather information about their home working spaces, including demographics, work environment, communication, collaboration, and experiences. Participants were also asked to sketch their workspaces. Subsequently, semi-structured video interviews were conducted with some participants, who also provided photos of their home working spaces. These exercises revealed that semi-structured video interviews yielded richer qualitative data, offering a more realistic depiction of home workspaces. Photographs were found to be more accurate than sketches. Given the exploratory nature of the study and its aim to generate insights and hypotheses, semi-structured interviews provided the necessary flexibility and depth of understanding.

After analyzing the benefits and drawbacks of each technique by conducting and studying previous research done in the same study area (Cuerdo-Vilches et al., 2021) (Davis et al., 2020), semi-structured video interviews were chosen as the primary data collection method due to their flexibility and ability to gather in-depth information and insights. These interviews provided a contextual understanding by capturing participants' facial expressions, body language, and tone of voice. Additionally, video interviews offered a view of participants' work-from-home setups, providing valuable insights into their work environments, including lighting, noise levels, and overall organization. Following the interview, participants were asked to submit photographs of their home office spaces to support a more detailed analysis of the physical characteristics of these setups. This combination of video and photographic data enabled a comprehensive understanding of the home workspace.

This study considered three primary economic sectors - primary, secondary/manufacturing, and tertiary/service. The tertiary/service sector was selected for locating participants, as it formed the largest share of the economy and contributed significantly to GDP growth in New Zealand (Stats NZ, 2022). The study's scope and limitations were considered while making this selection of a sample.

Sampling and Data Collection: For the pilot study, participants were selected using a snowballing technique, leveraging personal contacts and social media platforms like LinkedIn and Facebook to reach a sufficient sample size quickly. A broad range of questions was asked to understand the physical workspace of home offices, supported by photographic evidence.

Ethics Approval: Ethics approval was obtained for the pilot study (Victoria University of Wellington Human Ethics Committee; reference 31450).

Interview Structure: The interviews were designed to be in-depth and semi-structured, with an expected duration of 45-60 minutes each. Conducted via Zoom, the interviews provided flexibility and convenience for participants working remotely. Video recordings were made, with participants' consent, to capture insights accurately.

Table 1 presents an overview of the questionnaire sections, outlining the key topics explored in each category.

Table 1: Summary Table of Questionnaire Sections

Category	Questionnaire Section
1. Demographic Information	General information about the participant, including details of their work role, household structure, and other relevant demographics.
2. Workspace	Questions about the participant's current work-from-home setup and overall environment.
2.1 Lighting, Acoustics, and Privacy	Assessment of the quality and comfort of lighting, acoustics, and privacy levels in their home workspace.
2.2 Furniture	Details of the types of furniture used in their workspace, such as desks, chairs, and any ergonomic adjustments made by participants.
2.3 Storage	Availability and adequacy of storage space for work-related materials and equipment.
3. Natural Elements	Questions about natural elements in the workspace, such as access to natural lighting, and the presence of plants or pets nearby.
4. Productivity	Comparison of personal productivity levels at home versus in the office.
5. Future of Work	Perspectives on the future of work, including opinions on the likelihood of continuing remote work and personal preferences for future work arrangements.

3. Results and Analysis

The pilot study involved six hybrid workers who work from home at least one day per week. Data was collected through 45–60-minute Zoom video interviews, which were recorded for thorough analysis. Participants shared their experiences with remote work, focusing specifically on their home office setup and work environment. Following the interviews, participants submitted photographs of their home offices, providing visual confirmation of the information discussed and offering a deeper understanding of their workspace configurations.

3.1. DEMOGRAPHIC INFORMATION

Table 2 gives the demographic profile of the pilot study participants.

Table 2: Demographic Information of the Participants

Demographic Categories	Frequency (out of 6 participants)	Valid percentage (%)
Current WFH status		
Yes	6	100%
No	0	0%
Number of days working from home per week		
0 days	0	
1 day	1	16.66%
2 days	2	33.33%
3 days or more	3	50%
Other household members currently working from home		
Yes	1	16.66%
No	3	50%
Occasionally	2	33.33%
Presence of children		
Yes	2	33.33%
No	4	66.66%
Personal history of WFH		
Prior experience	2	33.33%
No prior experience	4	66.66%

Table 2 reveals that all participants are engaged in hybrid work, with most working from home three or more days per week. While most participants were the sole home workers, two had partners who occasionally worked from home, and one had a partner who worked from home full-time. Only two participants had children. Most were not new to remote work; one had been working remotely since 2010, and another had experience working from home once a week overseas years ago.

3.2.WORKSPACE

Table 3 looks at the type of housing of the pilot study participants.

Table 3: Type of housing

	Frequency (out of 6 participants)	Valid percentage (%)
Tenure regime of housing		
Owned	2	33.33%
Rented	4	66.66%
Type of housing		
Single-family	5	83.33%
Multi-family	1	16.66%
Type of property		
House	3	50%
Apartment	3	50%
Number of floors		
Single floor	6	100%
Double or more floors	0	0%

Table 3 shows that 33.33% of surveyed individuals are homeowners, while 66.67% rent. Although single-family homes are common in New Zealand, the participants' properties are evenly split between houses and apartments. All six participants live in single-story dwellings.

Table 4 provides additional details about their workspaces.

Table 4: Workspace characteristics

		Participant
Working Room Type	Dedicated office Room	1
	Office/ Guest Room	2
	Bedroom	2
	Living Room	1
Size of the Room	Small (3sqm ≤)	1
	Medium (3sqm - 15sqm)	4
	Large (15 sqm ≥)	1
Designated workspace	Yes	5
	No	1
Alternative Spaces for Work	Living Room	1
	Bedroom	0
	Dining Room	1
	Family Room	1
	Outdoor Deck	1

Table 4 looks at the home workplace characteristics of the participants. The pilot study reveals that participants used a variety of home locations as workstations. One participant had a designated office space, while two used guest bedrooms for both work and hosting guests. Others utilized parts of bedrooms or living rooms, with varying room sizes. Five out of six participants had dedicated workspaces, in contrast with one who used a living room couch. All participants used spaces exclusively for work-related activities. Alternative workspaces included living rooms, dining rooms, family rooms, and outdoor decks, chosen to combat boredom or adapt to weather. Several participants changed workspaces at least once during remote work, experimenting to find the most suitable setup.

3.3. LIGHTING, ACOUSTICS, AND PRIVACY

Based on the gathered data, most participants prefer using natural light when working from home, except during overcast or rainy conditions. They are satisfied with their current work environment in terms of acoustics and privacy, although one participant had challenges working in the same space as their partner. Some participants have made efforts to set up favorable lighting and acoustic conditions in their individual workspaces, with one person specifically concerned about light source placement and microphone positioning (Figure 1).

Figure 1: Table set up with Studio microphone with desktop stand

3.4. FURNITURE

Table 5 summarizes the chairs and workstations used.

Table 5: Types of Chairs and workstation

Type of Chair		**Type of Workstation**	
Office Chair	4	Standard height desk	3
Dining Chair	1	Height Adjustable desk	2
Sitting on a couch	1		

The initial investigation reveals that the majority of the participants utilize office chairs, although not all of them are of good quality. Additionally, one participant uses a typical dining chair, and another uses a couch. Among those working at desks, two have height-adjustable workstations. One participant reported predominantly working in a standing position.

Figure 2: Work desk – small size

Upon review of the workstation photographs, among the six participants, three individuals were observed to have small work desks (as depicted in Figure 2). Two of these individuals had both a laptop and a monitor on their desks; however, due to the limited size of the desks, accommodating both devices comfortably posed a challenge.

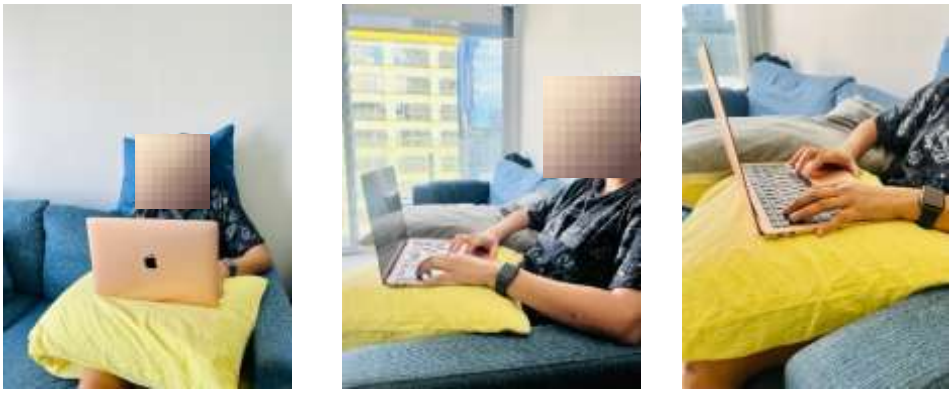

Figure 3: A participant using a couch to WFH

All participants except one reported that their furniture was comfortable. This particular participant used a couch as a workspace and experienced physical discomfort (refer to Figure 3). The issues highlighted by the participant were back pain and discomfort in the wrist. To elevate the laptop and address the lack of ergonomic design in the home workspace, the participant added two pillows. The participant specifically mentioned that couches are not suitable for working. In the photographic study, it is evident that the participant added two additional pillows behind her neck for support. One participant stated that their company requested all employees submit photos of their home office spaces to ensure a suitable working environment. However, the participant was unaware of the outcomes for employees without proper home office setups, including whether the company provided any funding or support to address this issue.

3.5. STORAGE

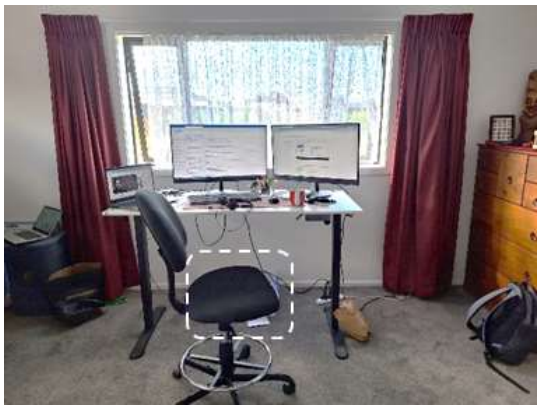

Figure 4: Use of temporary box as a storage and footrest

The interview data revealed that participants utilize various storage solutions, such as individual cabinets, working desks, or even temporary boxes. Many participants noted a shift towards fewer physical documents and more digital storage, reflecting technological advancements.

3.6. NATURAL ELEMENTS

Table 6 looks at how natural elements were included in the home workspace.

Table 6: Natural elements in the home office spaces

Types of natural elements	Frequency (out of 6 participants)	Valid percentage (%)
Natural light	6	100%
Views of nature	4	66.66%
Plants	1	16.66%
Water features	0	0%
Pets	1	16.66%

All participants had natural lights in their home workspaces, while 66% had a view of nature. Only one participant had plants, and one participant had a cat in the home workspace. No participants had water features in their home workspaces. While discussing this with the participants, they all agreed that having natural lighting in their home workspaces is crucial.

3.7. PRODUCTIVITY

According to the pilot survey, there are varied opinions on the productivity of working from home. Some participants preferred WFH due to increased productivity and comfort, while others highlighted the importance of social aspects and the ease of communication in a typical office setting. There is general agreement that a hybrid work model that provides a more balanced work-life.

Respondents mentioned strategies such as taking breaks, setting boundaries, and engaging in other activities when asked how they combat lost focus while working from home. One participant even shared that sometimes she lies down or plays with her cat to improve her focus.

3.8. FUTURE OF WORK

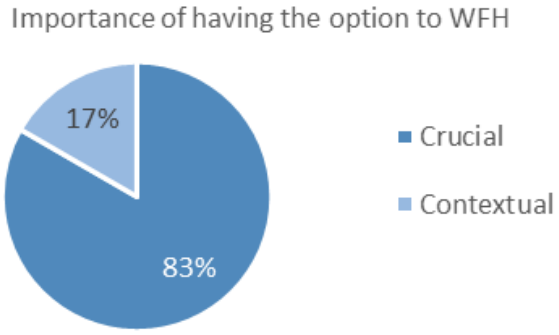

Figure 5: Importance of having the option to WFH when seeking job opportunities in the future

Participants were queried about their perspectives on the future of work. The pilot study reveals a prevalent inclination towards a hybrid work model. This tendency is primarily motivated by the benefits of working from home. When participants were asked about how important it would be to have the WFH option when they are looking for job opportunities in the future (Figure 5), 83.33% said that it would be really important to have that option, and only 16.66% said that its importance would depend on the situation or circumstances.

4. Discussion

The pilot study primarily aimed to test the tools for a comprehensive study examining home office spaces in New Zealand and exploring how remote work fits into the broader workplace context. It sought to analyze physical attributes and address the knowledge gap on the evolving nature of work. The findings could be valuable for researchers, businesses, industry professionals, and policymakers in creating best-practice home office spaces. Although the primary purpose was tool testing, the pilot study generated useful data, which is reported and discussed here. This data should be seen as indicative of what the rest of the study might produce.

The demographic data from interviews shows the significant impact of the COVID-19 pandemic on remote work (WFH) patterns, generally viewed as positive. Participants highlighted the time and energy saved from eliminating the commute as a key benefit of WFH. Additionally, WFH is now more widely accepted post-pandemic.

During the video interviews, participants responded to various inquiries regarding their home workspace. These interviews were conducted within the participants' residences, allowing them to showcase their individual work environments. Following the interviews, the photos submitted by the participants and the video recordings played a crucial role in corroborating the information they had provided. Both photographs and videos possess the capacity for narrating a compelling story and communicating a lot of information.

Individuals have dedicated considerable effort to establishing functional workspaces tailored to their specific requirements. Adequate workspace is of main importance, and it is evident that homeowners generally have greater space to arrange comfortable work areas within their residences than renters. Many had modified their workspaces several times since transitioning to remote work. They have tried out different rooms or locations in order to find the most suitable setup. This demonstrates a high level of adaptability among remote workers, as they seek to create the best environment for themselves compared to the pre-designed workspaces in traditional office settings.

The data indicates that all participants prefer natural light when working from home, except on overcast or rainy days. Participants generally expressed satisfaction with their current work environment in terms of privacy and acoustics. However, challenges arose when multiple people worked from home, requiring adjustments, especially during video calls. These findings highlight the importance of a well-designed workspace that balances natural light, acoustics, and privacy to enhance productivity and comfort while working from home.

One of the main concerns about the findings was the compatibility of the furniture. The majority of participants use office chairs, but the quality varies, with some not being of good quality. One participant uses a dining chair, and another uses a couch, highlighting a lack of ergonomic support for some individuals. Among those using desks, two participants have height-adjustable workstations, and one participant predominantly works in a standing position. Three out of six participants have small work desks, creating challenges in accommodating both a laptop and a monitor comfortably. All participants, except one, reported their furniture to be comfortable. The participant using a couch experienced significant discomfort, including back pain and wrist issues, due to the lack of ergonomic design. These findings underscore the importance of ergonomic furniture and well-designed workstations for remote work. The variability in chair quality and desk size suggests that some participants might benefit from improvements to their home office setups.

Upon examining the storage solutions used by the participants, it is clear that they employ various methods, such as cabinets, work desks, and even temporary boxes. A noteworthy trend observed among the participants was the transition from physical storage to digital storage, highlighting the influence of technological advancements on physical spaces.

Additionally, companies' efforts to assess and potentially support home work environments are crucial for enhancing employee comfort and productivity, and this is an area that needs further study on how companies support their employees with their home workspace set-up. During the discussion with the participants, the importance of natural lighting was emphasized.

The pilot study revealed mixed productivity outcomes among hybrid workers in remote work setups. Some participants experienced enhanced productivity due to the ability to personalize their workspaces and the flexibility of a commute-free day. However, challenges such as home distractions and limited social interaction impacted others' productivity. To manage these issues, participants implemented strategies like setting boundaries and taking short breaks to sustain focus.

The data collection concluded by highlighting a strong preference for a hybrid work model. Participants value the benefits of flexibility, cost savings, and improved work-life balance. They also recognize the importance of some level of in-person interaction. Companies are formalizing work-from-home policies, indicating a growing trend towards structured remote work arrangements and a shift in long-term work culture.

5. Conclusions

The pilot study aimed to test methods for a larger analysis of home work environments in New Zealand, focusing on workspace customization, lighting, privacy, furniture, and the future of work. Key preliminary findings showed that homeowners tend to have more suitable workspaces than renters, indicating limited space provisions for home working within rental properties. The pilot study emphasized the importance of natural lighting and highlighted the lack of attention to proper ergonomics in home workspaces, which can lead to long-term physical issues. While remote work can boost productivity through flexibility and personalized workspaces, it also requires strategies to overcome challenges like distractions and isolation, emphasizing the need for a well-structured remote work environment.

The second stage of the study will involve a larger sample of thirty employees, including full-time work-from-home (WFH) workers, within the context of New Zealand. In this expanded phase, the interview process will be refined based on initial findings, with more focused questions to capture detailed information about home workspace characteristics. Home addresses will be requested to utilize publicly available documents, such as Google Street View and city council records, to

gather further details about the houses or apartments, including the age of the buildings. This comprehensive approach aims to better understand the current home workspaces and their characteristics. This data could be critical in shaping future research on work practices. By comprehensively analyzing the physical characteristics of home office spaces, the study hopes to contribute to filling the gap in knowledge about the changing nature of work.

The shift towards working from home appears to be more long-lasting than anticipated, and many believe that the option to work remotely will be a key factor in considering future job opportunities. Therefore, it is crucial to emphasize the need for further research and data to better understand remote work practices. It is important to recognize that the findings may not be universally applicable. More research is required on home office environments in different regions, cultures, genders, and socioeconomic contexts to gain a more comprehensive understanding of remote work practices and identify commonalities and differences across various contexts.

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