

This electronic thesis or dissertation has been downloaded from the King's Research Portal at <https://kclpure.kcl.ac.uk/portal/>



Understanding the health-related behaviours and wellbeing of typically office-based employees working from home

Keightley, Samuel

Awarding institution:
King's College London

The copyright of this thesis rests with the author and no quotation from it or information derived from it may be published without proper acknowledgement.

END USER LICENCE AGREEMENT



Unless another licence is stated on the immediately following page this work is licensed

under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International

licence. <https://creativecommons.org/licenses/by-nc-nd/4.0/>

You are free to copy, distribute and transmit the work

Under the following conditions:

- Attribution: You must attribute the work in the manner specified by the author (but not in any way that suggests that they endorse you or your use of the work).
- Non Commercial: You may not use this work for commercial purposes.
- No Derivative Works - You may not alter, transform, or build upon this work.

Any of these conditions can be waived if you receive permission from the author. Your fair dealings and other rights are in no way affected by the above.

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

Understanding the health-related behaviours and wellbeing of typically office-based employees working from home

Samuel Harry Adrian Keightley

Doctor of Philosophy (PhD), Psychology

Institute of Psychiatry, Psychology & Neuroscience

King's College London

December 2023

Acknowledgments

With thanks to...

Myanna, for consistently centring my focus and providing a solid foundation to push forward, even during times of adversity. Ben, for the unwavering commitment, enthusiasm, and encouragement. Your investment was invaluable and especially supportive during times of uncertainty. It has been a privilege to have the support of such dedicated, fluent, and engaged supervisors.

To all my friends who have provided words of encouragement and support along the way, and especially to Alex and Monty who put a roof over my head during uncertain living situations.

To my family, for all the motivational pep talks and for providing a place to stay and study during troubled times, and especially to my Uncle Richard, who provided the final safe and stable place to live in my final months of write up.

To Ayla and Astrid for providing invaluable resources and knowledge on Network Analysis.

To the staff at the Exchange Café, University of Birmingham, for providing a consistent and friendly place for the final months of write up.

Abstract

The combined impact of the COVID-19 pandemic alongside technological advancements in digital communications, signifies that home-working at least some days per week is likely to become the 'new normal' for most normally-office-based workers. Although there has been research on the impact of working on-site on health behaviour and wellbeing, the possibility that health-related behaviour might be impacted by working from home has not yet been fully explored. This thesis therefore aimed to investigate the potential impact of working from home on health-related behaviour and associated wellbeing consequences among normally-office-based workers. Although thesis work began in September 2019, the empirical studies coincided with and were heavily shaped by the COVID-19 pandemic (March 2020 – April 2021).

Investigations were initiated in March 2020. Study 1 (n=27) used qualitative methods to describe normally-office-based workers' experiences of the working from home during the first UK COVID-19 pandemic. Results not only indicated the absence of health wellbeing conducive behaviours from on-site working, but also suggested that that the way in which workers adapted their working practices to the home environment incidentally impacted health-related behaviours and wellbeing. Toward statistically modelling indicated relationships, Study 2 (March 2021) used systematic, psychometric methods to translate concepts extracted from Study 1 into robust, Likert style quantitative measures. Online survey response data from 240 home-workers informed exploratory factor analyses and composite reliability testing which led to a refined set of 25 items, together capturing 10 psychological responses to home-working practice variables. Study 3 (n=491; April 2021) used a Network Analysis cross-sectional design to model relationships between variables developed in Study 2, validated subjective measures of health-related behaviours and indicators of wellbeing. Data was investigated via network modelling, centrality indices, exploratory graph analysis, bridge-node analysis, and shortest path analysis. Results highlighted four key clusters of psychological responses to home-working practices, and variables within these clusters that were especially linked to indicators of health-behaviour and wellbeing.

Study 4 (January – February 2021) is presented herein as a logical progression from Studies 2-3, but was undertaken immediately following Study 1, in response to a time-sensitive,

pandemic-related funding opportunity to develop an online intervention. Toward assessing potential intervention acceptability and feasibility, Study 4 involved designing a short 'e-module' to educate employees on how to adopt health and wellbeing conducive home-working practices and routines. Acceptability and feasibility of this intervention was assessed via mixed methods: expressions of interest, attrition, think-aloud and follow-up semi structured interviews, and indicators of apparent detrimental effects to health behaviours and wellbeing. Whilst feedback from home-workers suggested the guidance to lack novelty, practicality, and to be potentially ineffective at changing behaviour, participants generally viewed the intervention positively, and so supported the need for such behavioural support.

Overall, Studies 1 – 3 suggest that the impact of home-working on health-behaviour results not only from the absence of health and wellbeing conducive behaviours when working onsite, but also from psychological responses to work practices and settings unique to the home environment. Study 4 highlighted the important of providing guidance on how to work from home in ways which support worker's health and wellbeing, whilst preserving work-related productivity. However, more sophisticated interventions are needed to achieve the intended behaviour change. Together, the four conducted studies contribute toward an understanding of how home-working may impact worker's health-related behaviours and wellbeing, informing the development and application of potential behaviour change interventions.

Contents

Contents

1	Chapter 1: Thesis Introduction	9
1.1	Background	9
1.2	Impacts of home-working	10
1.2.1	Energy consumption and carbon emissions	11
1.2.2	Financial costs	11
1.2.3	Global connectivity.....	11
1.2.4	Employee-employer trust	12
1.2.5	Productivity	13
1.3	Home-working and wellbeing.....	14
1.3.1	Job satisfaction.....	15
1.3.2	Autonomy.....	16
1.3.3	Work-life balance	17
1.3.4	Stress	19
1.3.5	Burnout	20
1.3.6	Home-worker social interactions.....	20
1.4	Working at home, working in the workplace, and health-related behaviours.....	22
1.4.1	Health-behaviour impacts of office-based work: physical activity.....	23
1.4.2	Sedentary behaviours	24
1.4.3	Dietary behaviours	25
1.4.4	Sleep.....	25
1.5	How home-working practices may affect health-related behaviour: Theoretical explanation 26	
1.6	How to change home-workers' behaviour: Behaviour Change Intervention Frameworks .	29
1.7	Overview and aims of thesis.....	30
1.7.1	Aims.....	30
1.7.2	Context, positionality, and philosophical assumptions	31
1.8	Thesis Overview.....	33
1.8.1	Study 1.....	33
1.8.2	Study 2.....	33
1.8.3	Study 3.....	34
1.8.4	Study 4.....	34
2	Chapter 2: Study 1 - Working from home: Experiences of home-working, health behaviour and wellbeing during the 2020 UK Covid-19 lockdown	35
2.1	Study 1: Why this study was needed.....	36
2.2	Abstract.....	37
2.2.1	Objective	37
2.2.2	Methods	37
2.2.3	Results	37
2.2.4	Conclusions	37
2.3	Introduction	38

2.4	Method	41
2.4.1	Participants and Procedure	41
2.4.2	Interview schedule	42
2.4.3	Analysis	42
2.4.4	Researcher positionality	43
2.5	Results	43
2.5.1	Changes to the work interface	44
2.5.2	Adaptations to a new workspace	45
2.5.3	Changes to work-life balance	47
2.5.4	Adjustments to a new social context	49
2.6	Discussion	50
2.6.1	Limitations	53
3	Chapter 3: Study 2 - Developing measures of psychological responses to home-working practices	55
3.1	Study 2: Why this study was needed	56
3.2	Abstract	57
3.2.1	Objective	57
3.2.2	Methods	57
3.2.3	Results	57
3.2.4	Conclusions	58
3.3	Introduction	59
3.4	Method and Results	61
3.4.1	Summary	61
3.4.2	Step 1: Quantitative item generation	63
3.4.3	Step 2: Collection of empirical data	64
3.4.4	Step 3: Testing the assumptions of Exploratory Factor Analysis	67
3.4.5	Step 4: Conducting Exploratory Factor Analyses	78
3.4.6	Step 5: Inspecting reliability, inter item correlation and item refinement	88
3.4.7	Step 6: Factor consistency, interpretation, and labelling	94
3.5	Discussion	97
3.5.1	Strengths and future direction	99
3.5.2	Limitations	99
3.5.3	Conclusion	101
4	Chapter 4: Study 3 - Psychological responses to home-working practices: A network analysis of relationships with health behaviour and wellbeing	102
4.1	Study 3: Why this study was needed	103
4.2	Abstract	104
4.3	Introduction	105
4.4	Method	106
4.4.1	Design, Participants & Procedure	107
4.4.2	Measures	107
4.4.3	Data Analysis	113
4.5	Results	116
4.5.1	Network accuracy and centrality stability	117
4.5.2	Identifying clusters of psychological responses to home-working practices	117
4.5.3	Estimated relationships among psychological responses to home-working practices and indicators of health, health behaviour, and wellbeing.	117
4.5.4	Influential variables within the network.	118

4.5.5	Assessing relationships between clusters in the network.....	118
4.5.6	Shortest route of associations between psychological responses to home-working practices and health behaviour and wellbeing clusters.	120
4.6	Discussion.....	123
4.6.1	Limitations.....	126
4.6.2	Conclusion.....	127
5	<i>Chapter 5: Study 4 - An intervention to promote positive homeworker health and wellbeing through effective home-working practices: A feasibility and acceptability study</i>	128
5.1	Study 4: Why this study was needed.....	129
5.2	Abstract.....	130
5.2.1	Background.....	130
5.2.2	Methods.....	130
5.2.3	Results.....	131
5.2.4	Conclusions.....	131
5.3	Introduction.....	132
5.4	Method.....	135
5.4.1	Participants & Procedure.....	135
5.4.2	Intervention.....	135
5.4.3	Data collection.....	138
5.5	Results.....	143
5.5.1	Quantitative.....	143
5.5.2	Qualitative data.....	147
5.6	Discussion.....	154
5.6.1	Limitations.....	156
5.6.2	Conclusions.....	157
6	<i>General Discussion.....</i>	158
6.1	Thesis summary & key findings.....	158
6.2	Does home-working impact on health behaviour and wellbeing?.....	163
6.3	How should we intervene to improve home-workers' health behaviour and wellbeing?.....	166
6.4	Limitations and Future Research.....	168
6.5	Conclusion.....	173
7	<i>References.....</i>	174
8	<i>Appendices.....</i>	208
8.1	Appendix A: Study 1 – Interview schedule.....	208
8.2	Appendix B: Study 1 – Preliminary 'code book'.....	213
8.3	Appendix C: Study 1 – Excerpt theme (Changes to the work interface) breakdown from final thematic 'code book' alongside exemplary quotation.....	219
8.4	Appendix D: Study 3 – Partial correlation matrix for all observed variables prior to regularisation.....	224
8.5	Appendix E: Study 3 – Bivariate correlation matrix for all observed variables prior to regularisation.....	226
8.6	Appendix F: Study 3 – Supplementary materials.....	228

8.6.1	Supplementary table 1 (ST1).....	228
8.6.2	Supplementary table 2 (ST2).....	229
8.6.3	Supplementary figure 1 (SF1).....	231
8.6.4	Supplementary figure 2 (SF2).....	231
8.6.5	Supplementary figure 3 (SF3).....	232
8.6.6	Supplementary figure 4 (SF4).....	233
8.6.7	Supplementary figure 5 (SF5).....	233
8.6.8	Supplementary Methods	234
8.6.9	Supplementary method references	236
8.6.10	Hyperparameter iterations	237
8.7	Appendix G: Study 4 –Intervention content breakdown: description and component behaviour change techniques (BCTs)	239
8.8	Appendix H: Study 4 - Intervention Screen shot examples	248
8.9	Appendix I - Study 4 - Think aloud instructions	251
8.10	Appendix J – Study 4 - Follow-up interview schedule	252

Figures

Figure 1	62
Figure 2	79
Figure 3	82
Figure 4	116
Figure 5	121
Figure 6	145

Tables

Table 1.....	66
Table 2.....	68
Table 3.....	81
Table 4.....	84
Table 5.....	89
Table 6.....	93
Table 7.....	96
Table 8.....	109
Table 9.....	146
Table 10.....	152

1 Chapter 1: Thesis Introduction

1.1 Background

Over the past 50 years, advancements in technology and globalisation have led to greater uptake of home-working (Kingma, 2019). A particularly impactful phase was the commercialisation of the internet in the 90s which greatly enhanced the speed of digital communication, collaboration, and users' ability to transfer information (Weis, 2010). Greater use of information and communication technologies (ICTs), including instant messaging, cloud computing, mobile phones, and video conferencing, allowed organisations to operate without the need for workers to be physically or geographically present (Berawi et al., 2020; Messenger, 2017). This resulted in a rise in formal remote-working arrangements, whereby employees made agreements with their employers to work away from the office (Messenger, 2017; ter Hoeven & van Zoonen, 2015). Conventional office-based desk workers engaging in these home-working agreements are typically among those identified as 'knowledge workers', characterised by work focussed on the acquisition, generation, and utilization of abstract information (Davenport et al., 1996; Pyöriä, 2005). The act of home-working typically involves work-related tasks being completed at home via personal or company supplied laptops or computers. Tasks are attended to locally or online via computer-based systems, and work-day communications are achieved through email (e.g. Outlook), instant messaging (e.g. Teams), and video conferencing (e.g. Zoom).

Predictions made around the turn of the century regarding widespread adoption of home-working have not been fully realised (Illegems et al., 2001), due to some resistance to home-working among employers. For example, in the UK, working away from the office at least one day a week displayed an increase from 13.3% in 1997 to 17.1% in 2014 (Felstead & Henseke, 2017). Yet, some organisations abandoned home-working arrangements. For example, in 2013, the CEO of a major digital communications company (Yahoo) halted remote working and mandated that workers work in the office, on the assumption that onsite working was needed to ensure face-to-face interactions among colleagues and so promote a greater collaborative culture (Miller & Rampell, 2013). Rejection of home-based working arrangements can also be attributed to the assumption that employees out of sight decrease their efforts and productivity (Felstead, 2022; Messenger, 2017). However, in early 2020, as the COVID-19

pandemic developed, employers' caution around remote working had to be cast aside. Many organisations were forced to adjust to lockdown regulations, leading to a mass adoption of home-working. This sudden shift in working practices is likely to have caused immediate and lasting effects on the perception and adoption of remote working practices (Lodovici, 2021; Office of National Statistics, 2022).

The COVID-19 pandemic led to the enforcement of government-mandated lockdown regulations in March 2020, with stay-at-home orders and social distancing measures that resulted in the closure of office buildings and a transition to company-wide home-based working (Institute for Government, 2021). This led to a dramatic increase in the prevalence of home-working: the proportion of UK workers working from home rose from 5.7% in January 2020, prior to the pandemic, to 43.1% in April 2020 (Felstead & Reuschke, 2020). For organisations to survive the pandemic period, it was crucial that these distributed workforces continued to function at an almost business as usual level. Work-related transactions became fully digitised, and employees had to autonomously adapt to conducting their work-related tasks from home full time. This adaptation led to a recognition among both employers and employees that home-working can be as productive as when in the office (Lodovici, 2021). Consequently, the sentiment and intention to advocate and engage in home-working shifted, with as many as 84% of UK post-pandemic home-workers reportedly planning to adopt some mix of home and office-based (hybrid) working in the future (Office of National Statistics, 2022). In early April 2022, over 50% of information and communication businesses in the UK were using or intended to use partial home-working as a permanent business model (Office of National Statistics, 2022). Similarly, 50 of the largest UK companies claimed to have no plans to return all staff back to the office in the near future (R. Cooper et al., 2021). Consequently, in May 2023, 39% of UK workers reported having worked from home at some point during the past 7 days (Froud et al., 2023).

1.2 Impacts of home-working

Given the dramatic shift in the trajectory and prevalence of home-working brought about by the COVID-19 pandemic, it is important to understand the positive and negative impacts that home-working may have, at societal, organisational, and individual levels.

1.2.1 Energy consumption and carbon emissions

Home-working has been hailed as a potential means of reducing energy consumption. In particular, the lack of need for private or public travel for commuting purposes can significantly reduce per-person daily carbon emissions (Sutton-Parker, 2021). Furthermore, home-working reduces the energy required for the use of office buildings, though this may be at least partially offset by greater and less efficient energy consumption at home (Horner et al., 2016). Although home-working demands energy consumption for the operation of ICTs, this is outweighed by the typical emission reductions achieved by no longer having to commute to the office (Hook et al., 2020; Horner et al., 2016). Home-working arrangements offer organisations the possibility of operating with a reduced need for office space, therefore potential reducing energy costs (Pennington & Stanford, 2020). However, comparisons between exclusively home- versus office-based working may be misleading because, with the exception of organisations seeking to go fully digital, many organisations wish to retain a level of in-person operation, so prefer a mixture of both office and home-based work (hybrid working; Office of National Statistics, 2022).

1.2.2 Financial costs

Home-working may save organisations money: a reduced need for office space should in theory mean lower rents. However, the adoption of hybrid working may minimise cost savings, as office space remains needed to house on-site workers, even if such space is not so frequently used by employees (Barrero et al., 2020; Morawski, 2022). Demand for hybrid working may explain why office rent and vacancy rates have surprisingly been stable, and in some cases have risen, contrary to the expected drop post pandemic (Morawski, 2022). Therefore, the financial savings of a distributed workforce may not be as significant as once predicted.

1.2.3 Global connectivity

Organisations comfortable with employing individuals that engage primarily via methods of digital communication are likely to gain a competitive advantage by having access to a wider

prospective talent pool when recruiting for job roles (Marcinkowski & Brandmeier, 2023). This also applies to accessing talent that would usually be geographically unavailable, as well as offering a wider inclusivity to talent pools that may not be comfortable or able to work in office spaces and require the reasonable adjustment of home-working (R. Cooper et al., 2021). While this may not be a direct consequence of home-working per se, organisations with the capacity to support home-working, via greater use of digital interfacing, may have greater opportunity for global connectivity.

1.2.4 *Employee-employer trust*

The loss of face-to-face contact between management and home-working employees has led to concerns among employers about the extent to which employees engage with work when working from home. This raises issues of employers' trust of employees, which in turn can affect employees' sense of independence and self-determination at work. Research emphasises the importance of leadership styles for perceptions of trust, control, and autonomy (Dimitrova, 2003). Work-related autonomy can be defined as workers' perceived independence and control over work-related decisions and activities (Hackman & Oldham, 1980), such as work methods, work schedules, timing, and place of work (De Spiegelaere et al., 2016). High autonomous home-workers appear to perform optimally when managed through transformational leadership styles, instilling a level of self-control, whereas low autonomous home-workers require a more transactional approach based on reward and punishment (Barsness et al., 2005; Pianese et al., 2022). A breakdown or ignorance of the importance of managing home-workers in the appropriate style may lead to undesirable unproductive outcomes for both home-worker and employer (Pianese et al., 2022). Similarly, human resource practices in home-working arrangements appear to be crucial toward increasing worker performance, where effective management of remote workers is needed to ensure appropriate levels of trust, control, autonomy, and communication (Martínez-Sánchez et al., 2007). Trust and control are particularly important factors when it comes to establishing work conducive cultures around home-working (Abgeller et al., 2022). For example, distrustful supervision may lead to micromanaging which often interferes with worker's productivity and wellbeing (H. Lee, 2021; Parker et al., 2020). Equally, from a practical perspective, it is crucial for organisations to ensure that those working from home have a sufficient set up and

capability to conduct their work. Such home-working infrastructure and support is critical for maintaining and facilitating employee productivity (Day et al., 2012; Kitagawa et al., 2021). In sum, the literature suggests that home-working can have both advantages and disadvantages for employer-employee relations, depending on employers' management style and employees' perceptions of their autonomy.

1.2.5 *Productivity*

Although distrusting employers may worry about home-workers' engagement and productivity, home-working can on the contrary enhance performance and engagement (Allen et al., 2015; Baruch, 2000; Illegems et al., 2001). Working from home can be more productive compared to the office due to a reduction in distraction, greater opportunity to make better use of high productivity moments, and the freedom to plan and schedule the working day (Tavares, 2017). Home-working can allow an increase in focused time and energy for work, enhancing intrinsic work motivation, and giving workers the freedom to structure their workday (Ahmed et al., 2014; Nakrošienė et al., 2019; Rupietta & Beckmann, 2018). A study of 16,000 Chinese employees participating in a work from home experiment documented increases in work performance and job satisfaction compared to on-site working, which could be attributed to fewer breaks taken, fewer sick days, and less distracting and more convenient work environments (Bloom et al., 2015). Whilst enhanced work performance appears to be possible, not all work-related tasks necessarily benefit from a remote separation from colleagues or the office-space. Evidence shows that productivity towards creative work-related tasks can increase, whereas productivity related to repetitive work-related administrative tasks can decrease among those working away from the office (Glenn Dutcher, 2012). Overall however, evidence regarding home-workers' productivity and engagement has been mixed, with home-work arrangements not showing uniform benefits or harms for work performance. This may perhaps arise in part from individual-level factors. Work performance ultimately stems from the individual, so a focus is needed on understanding how individuals experience and respond to home-working arrangements.

1.3 Home-working and wellbeing

Multiple, potentially competing definitions and operationalisations of 'wellbeing' exist. Within the psychological tradition, wellbeing has been portrayed as the combined subjective evaluation and satisfaction with one's life, along with a self-perceived sense of competency and purpose. It is commonly conceptualised as a multi-dimensional construct, comprising both hedonic and eudaimonic aspects (Deci & Ryan, 2008). Hedonic wellbeing, which some have termed 'subjective wellbeing' (e.g., Carruthers & Hood, 2004), emphasizes subjective experiences, encompassing emotional (affective) and evaluative (cognitive) aspects of life satisfaction. Positive emotional wellbeing, characterized by high levels of pleasure, joy, happiness, contentment, and pride, contrasts with negative emotional wellbeing, marked by shame, guilt, sadness, fear, anger, stress, and worry. The cognitive element of hedonic wellbeing includes an evaluative judgment of one's overall life satisfaction and satisfaction across multiple domains, such as work and home life (Diener et al., 2017; Diener & Ryan, 2009). In contrast, eudaimonic wellbeing, which some have termed 'psychological wellbeing' (Carruthers & Hood, 2004), captures the pursuit of meaning and fulfilling one's potential. Whereas hedonic wellbeing may be enhanced by decreasing negative and increasing positive experiences, eudaimonic wellbeing focuses on personal growth, and is promoted by factors such as autonomy, environmental mastery, purpose in life, and self-acceptance (Ryff, 2013; Ryff et al., 2021). Hedonic and eudaimonic wellbeing are distinct in their focus on subjective experiences and psychological growth (Giuntoli et al., 2021; Henderson & Knight, 2012).

While psychological perspectives on wellbeing predominantly focus on the individual and the self, social psychologists have focused on the concept of 'social wellbeing' (e.g., Keyes, 1998; Keyes & Lopez, 2023). Keyes (1998) has portrayed social wellbeing as the product of five dimensions: social integration (i.e., feeling part of a group, or society more broadly), social contribution (i.e., perceiving oneself as offering a valid contribution to a group), social coherence (i.e., a sense of understanding of the social world), social actualisation (i.e., a perception of the potential for a group to develop and grow), and social acceptance (i.e., accepting others as they are). The presence, or optimisation, of each of these five dimensions, is reflective of optimal social wellbeing. The social bases of wellbeing can be integrated with inputs based on personal experiences and personal growth. Perceived social integration, for example, can be a source of positive affect, provide a sense of purpose, and enhance

perceived personal growth, thereby enhancing emotional and evaluative hedonic wellbeing and eudaimonic wellbeing (e.g., Haslam et al., 2009; Novelli et al., 2013).

Regardless of whether underpinned by more individualistic or social experiences, hedonic and eudaimonic wellbeing are both thought to be essential for optimal wellbeing. This is exemplified by Keyes's 'Complete Mental Health Model,' which identifies 'flourishing' as indicative of positive emotional wellbeing and positive functioning, encompassing key elements of psychological and social wellbeing (Keyes, 2007).

The term 'work-related wellbeing' and related concepts tend to be used as expressions of hedonic and eudaemonic wellbeing within the work domain (Schulte & Vainio, 2010). Hedonic concepts that capture positive feelings about one's work are captured by job satisfaction, while negative feelings are captured by stress and burnout. Eudaimonic and social wellbeing elements in the work domain include autonomy, work-life balance, social connectivity, and opportunities for growth (Ryff et al., 2021)). The coverage of each of these concepts is crucial for understanding how home-working impacts workers' wellbeing.

1.3.1 Job satisfaction

Whilst there is no consensus on the definition of job satisfaction, this concept is generally interpreted as a person's attitude and feeling towards their work (Armstrong & Taylor, 2014), whereby the presence of job satisfaction is a positive feeling about a job, resulting from assessing and evaluating its characteristics (Judge & Robbins, 2013, p. 62). Job satisfaction consistently demonstrates a strong potential to contribute toward worker's subjective wellbeing (Hünefeld et al., 2020; Kaffashpoor & Sadeghian, 2020; Rothmann, 2008; Scanlan & Hazelton, 2019), and home-working can greatly contribute toward job satisfaction (Bloom et al., 2015; Kröll & Nüesch, 2019; Vega et al., 2015; Viorel et al., 2018).

It is often claimed that people who work from home derive job satisfaction from not having to commute to the workplace, greater trust and autonomy, and a reduction in daily work-related distractions and consequently more productive flow of work (Fonner & Roloff, 2010; Gajendran & Harrison, 2007; Manoochehri & Pinkerton, 2003). Nonetheless, evidence suggests the relation between working from home and job satisfaction is curvilinear, whereby the job satisfaction benefits of home-working are proposed to plateau among people working at

home for 15 hours per week (Golden & Veiga, 2005). Several disadvantages of working from home become pronounced as home-working hours rise above 15 hours: a reduced quality in colleague communication (Kakkar et al., 2022), a lack of face-to-face interactions that can interfere with career progression prospects (Bloom et al., 2015; Cañibano & Avgoustaki, 2022), and social isolation (Toscano & Zappalà, 2020). Nonetheless, positive features of homeworking such as flexibility and autonomy may outweigh the drawbacks, such as wanting more face to face work interactions (Virick et al., 2010).

1.3.2 Autonomy

Conducting work away from the office-base introduces an altered sense of autonomy, which represents the extent to which workers perceive freedom, independence, and an agency to decide on how, where and when work-related tasks are completed (De Spiegelaere et al., 2016; Hackman & Oldham, 1976). Autonomy can be an empowering feature of home-working that can not only help enhance work performance (Parker et al., 2006), but also facilitate worker's navigation of work-life balance (Fotiadis et al., 2019). Specifically, effectively managing the intersection of work and home life necessitates boundary management strategies that involve creating a physical, temporal, and behavioural separation between work and home life (Basile & Beauregard, 2016). Workers who perceive a higher degree of autonomy tend to be more successful in taking control to implement strategies that achieve a balance between work and home-life (Basile & Beauregard, 2016). This suggests that home-workers who have more agency over deciding how, when, and where their work is conducted, are better able to integrate the physical blurring of home and work boundaries. Furthermore, those who have a greater perception of work-related autonomy display lower degrees of emotional exhaustion and cognitive stress and, consequently, greater work engagement (Vander Elst et al., 2017).

Whilst home-working may generally enhance worker's flexibility and perceptions of autonomy (Gajendran et al., 2015), the literature also suggests that such changes may also result in more intensified and longer working (Dimitrova, 2003; Popovici & Popovici, 2020). This problem is captured by the concept of the 'autonomy paradox' (Mazmanian et al., 2013): those who feel more autonomous due to their home-working arrangements, who would thereby be expected to have greater wellbeing, often struggle to manage the work-home boundary, resulting in

feeling pressured to be constantly online, accessible, and responsive, in turn resulting in overwork and greater stress (Kelliher & Anderson, 2010; Matusik & Mickel, 2011; Mazmanian et al., 2013). Moreover, evidence highlights the challenges of excessive work flexibility (Kubicek et al., 2017), whereby the effort needed to plan and structure one's workday, as well as the decision making required to autonomously navigate working tasks can become a burden as opposed to a favourable feature of home-working (Kubicek et al., 2017). The wellbeing benefits of greater work autonomy may thereby be undermined by enhanced work-related stress.

1.3.3 Work-life balance

The concept of work-life balance has not been uniformly defined in the literature (Sirgy & Lee, 2018), though definitions tend to acknowledge that the demands stemming from individual's work and non-work roles bidirectionally influence one another (Greenhaus et al., 2003; Kalliath & Brough, 2008). Work-life balance has variously been conceptualised as a perceived equity of engagement in work and non-work demands (Greenhaus et al., 2003), a satisfactory level of achievement across multiple roles (Clark, 2000; Kirchmeyer, 2000), a degree of conflict between roles (Frone, 2003; Grzywacz & Bass, 2003), and a perception of control over salient demands across each life domain (Fleetwood, 2007; Sirgy & Lee, 2018). Kossek et al. (2014) appropriately capture these facets by defining work-life balance as 'a satisfaction and perception of success in meeting work and nonwork role demands, low levels of conflict among roles, and opportunity for inter-role enrichment, meaning that experiences in one role can improve performance and satisfaction in other roles as well' (p. 301).

Whilst work-life balance is relevant for all individuals engaged in work and non-work roles, home-workers experience a direct amalgamation between both the physical and psychological demands of work and home-life, creating prominent opportunities and challenges to individuals' sense of work-life balance. Work-life conflict – i.e., where demands associated with one role interfere with adequate and satisfactory participation in the other role – has been shown to be associated with greater worker stress and poorer wellbeing (Bell et al., 2012; Jang, 2009). The absence of work-life conflict and a balance between work and home-life can contribute toward the condition of home-workers' wellbeing (Wong et al., 2021;

Zheng et al., 2016). Home-working offers the potential to enhance work-life balance by working in a familiar and comfortable home environment, a freedom to dictate when and how work commitments are attended to, an ability to move swiftly from work tasks and leisure time, and more time to spend with family, or engaging in physical activity and hobbies (Golden et al., 2006; Healy et al., 2016; Hill et al., 2003; Sullivan & Lewis, 2001). Working at home can thereby reducing work-life conflict (Beauregard & Henry, 2009).

The flexibility associated with home-working has been accompanied by an 'always on' culture, whereby workers perceive an expectation to be responsive and ready to engage with work-related matters at all times, potentially to assuage managers' concerns that they are not being productive at home (Greenhill & Wilson, 2006; Kelliher & Anderson, 2010; Leonardi et al., 2010). This can result in work intensification which may subsequently induce work-to-life conflicts through increased rumination and worry about work-related matters during non-work hours and feeling unable to psychologically detach from work (Kossek et al., 2009; Sarbu, 2018). This 'always on' culture among home-workers may also result in longer working hours and work-related matters being attended to during non-work hours (Felstead & Henseke, 2017; Grant et al., 2013). This may create an unwanted overlap between work and home life, therefore detracting away from time spent on non-work activities or time spent with family or friends (Mahmood, 2002). Home-workers also experience the particular challenge of combining physical work and home-life, whereby non-work responsibilities and contexts can directly interfere with one's working capacity and output, and may result in home-to-work conflict (Allen et al., 2015; Gajendran & Harrison, 2007). The choice of home-based workspace when working from home can expose workers to home-life demands, offering distractions that can impede worker productivity (Donnelly & Proctor-Thomson, 2015; Toniolo-Barrios & Pitt, 2021). In turn, this distraction away from work-related productivity can produce time management issues and stress (Wheatley, 2012), subsequently resulting in home-worker exhaustion (Golden, 2012; Vander Elst et al., 2017), and negatively impacting home-worker's wellbeing (Wong et al., 2021). It is possible that the experience of home-to-work conflict also interferes with day-time work-related productivity to such a degree that home-workers then work for longer hours to compensate for unproductive ('lost') time, which further fosters work-to-home conflicts, creating a negative feedback loop (Gibbs et al., 2023). Overall, evidence indicates that working from home can both enable and challenge work-life balance (Delanoeije

& Verbruggen, 2019). Working from home may afford home-workers with additional time, but there is insufficient evidence on how this time is commonly spent.

1.3.4 *Stress*

The physical and perceived demands that occur in home-worker's environments represent potential stressors, and workers' responses to these stressors are typically known as strains (Griffin & Clarke, 2011). While the body of literature concerning stress among workers is extensive and encompasses diverse definitions (Cox & Griffiths, 2010; Kinman & Jones, 2005; Stranks, 2005), in this context, home-worker stress is characterized as the mechanism through which the psychological experiences and demands (stressors) of work and home life give rise to both short-term (strains) and long-term alterations in mental and physical health (Ganster & Rosen, 2013). Significant and continual stress responses can result in negative physiological and mental health outcomes (Adam et al., 2017; Campbell & Ehlert, 2012; Kivimäki & Kawachi, 2015; Kopp et al., 2008; Nilsen et al., 2016; Rice, 2002; Virtanen et al., 2007), as well as maladaptive behavioural reactions (Holton et al., 2016). Stress is therefore a significant potential determinant of home-workers' health and wellbeing (Griffin & Clarke, 2011).

Whilst home-workers experience the work-related stressors that all workers confront, such as work tasks, job demands, deadlines, supervisory relationships, and job control (Konradt et al., 2003; Lang et al., 2012), the routines and arrangements of working from home can introduce and alleviate a range of work and non-work-related stressors (Beauregard et al., 2019; Weinert et al., 2015). The enhanced freedom and control that many home-workers experience regarding when and how their work is completed can reduce stress in the circumstances of enriched work-life balance. However, it can also be a source of stress through role ambiguity (Sardeshmukh et al., 2012), and through the presence of work-life conflict (Bell et al., 2012; Yang et al., 2023). Home-working also requires the need to engage with digital interfaces to complete all work-related tasks, and consequently may result in 'technostress' (i.e., application multi-tasking, information overload, and connectivity issues (Tarafdar et al., 2010, 2019). Home-workers often experience technostress and subsequent decreases in wellbeing when adequate technological resources to meet work-related goals are not in place (Fuglseth & Sjørebø, 2014). Furthermore, an absence of face-to-face interactions with colleagues and

supervisors can result in psychological distress (Van Der Molen et al., 2020), due to diminished social support for work-related demands (Bentley et al., 2016).

1.3.5 Burnout

The concept of burnout can be identified as a chronic-stress induced syndrome characterised by a persistent fatigue and loss of energy, that leads to demotivation, decreased productivity, and emotional exhaustion (Jeung et al., 2018). More recently, a synthesised definition captured burnout as ‘In a worker, occupational burnout or occupational physical AND emotional exhaustion state is an exhaustion due to prolonged exposure to work-related problems’ (Guseva Canu et al., 2021, p. 102). Burnout can occur in circumstances where home-working stress becomes pronounced and chronic, and where adequate recovery is difficult (Rodriguez et al., 2018). Burnout can occur among home-workers in the prolonged presence of overworking, work and home conflicts, and difficulties switching off from work as a result of blurred psychological and physical home and work boundaries (Edwards & Ramirez, 2016; Kelliher & Anderson, 2010; Palumbo, 2020; Tahavori, 2015). Burnout is also predicted by a hampered ability to recover from home-working stressors (Golden, 2012). Home-workers are subject to an accumulation of digital communications throughout each working day (Perlow, 2012; Thomas et al., 2006), causing technostress, depleting energy and increasing exhaustion during non-work time (Chesley, 2014; Derks & Bakker, 2014; Fonner & Roloff, 2012; Murray & Rostis, 2007). Additionally, work-related communications can encroach into non-work hours (Cavazotte et al., 2014; Evans, 2018), interfering with worker recovery, and causing conflict between work and home life (Srivastava et al., 2015). Burnout can also have a knock-on impact on health-related behaviour: burnout can interfere with sleep (Toker & Melamed, 2017), and ability to initiate physical activity (Naczenski et al., 2017).

1.3.6 Home-worker social interactions

Home-working necessitates a shift away from office-based cultures and face-to-face colleague and supervisory interactions, which can have consequences for perceived organisational and social support (Bentley et al., 2016), both of which are predictors of worker wellbeing (Hager, 2018; Roemer & Harris, 2018). For example, a reliance on email, instant messaging, and video

calling to connect with colleagues creates a loss of informal ad-hoc support whilst working and may decrease the quality of home-worker's coworker connections, supervisory guidance (Kakkar et al., 2022). As highlighted by the job demands resource model, this support is often crucial for workers to maintain work-related productivity and meet work-related demands (Bakker & Demerouti, 2017; Golden et al., 2008). Homeworkers may experience feelings of 'professional isolation' when there is a limitation or reduction in the quality of work-related social interactions (Beauregard et al., 2019). This can subsequently diminish wellbeing through increased stress (Bentley et al., 2016), decreased job engagement (Cooper & Kurland, 2002) and satisfaction (Green & Roberts, 2010; Hoch & Kozlowski, 2014), and role ambiguity (Sardeshmukh et al., 2012). Additionally, the physical distance created by home-working and the lack of social presence among workers and colleagues can detrimentally impact career development, which may further impact worker wellbeing (Bosua et al., 2019; Maruyama & Tietze, 2012).

As well as a felt disconnect from organisational resources, working from home may introduce physical and social isolation for those who live alone, whilst others may have to adapt to working in the presence of family members or housemates (De Macêdo et al., 2020). These contextual differences can have various outcomes for worker wellbeing (Fonner & Stache, 2012; Tavares, 2017). Workers may benefit from increased social contact with household members, contributing to enhanced work-life balance, but non-work social interactions during working hours can be stressful, causing workers to feel they are not being adequately productive (Allen et al., 2015; Gajendran & Harrison, 2007). For those that live alone however, working from home may contribute towards feelings of loneliness, which is known to be detrimental for worker's wellbeing (Beutel et al., 2017; Mann & Holdsworth, 2003). However, feelings of loneliness are not directly associated to being physically alone, and perceptions of loneliness may depend on worker preferences. For example, working from home alone reduces the chances for home-to-work conflicts, therefore facilitating a fluid transition between work and home roles, resulting in greater work-life balance (Fonner & Stache, 2012).

Overall, the literature identifies pertinent characteristics of working from home that have the potential to variably impact home-workers' wellbeing. These characteristics can be distilled down to the particular changes that home-workers experience as a result of no longer having to work in the office and the practices required to operate at a business-as-usual level from the confines of the home. That is, home-working involves a removal of office-based cultures,

facilities, support, and face-to-face social settings, all of which are displaced by the digital interface required to remotely interact and transact with colleagues and supervisors. Additionally, home-working causes problems for physical and psychological cross-over between home and work-related boundaries, whereby work demands enter non-work spheres and adaptations are required to navigate and maintain separation between work and life demands.

1.4 Working at home, working in the workplace, and health-related behaviours

Although there is extensive literature relating to home-working and psychological wellbeing outcomes, relatively little is known about whether and how working from home might affect workers' health. From a population perspective, health serves as a critical outcome and has been defined as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity' (Schramme, 2023, p.1; WHO, 1995), and more recently as 'a structural, functional and emotional state that is compatible with effective life as an individual and as a member of society' (McCartney et al., 2019, p. 24). Within the framework of this thesis, worker's health particularly relates to the physical facets of wellbeing, determined by the extent to which individuals fulfil minimal and optimal standards of physical activity, dietary intake, and sleep (Oftedal et al., 2019). Health may thereby be at least partly defined as an ability to engage in health-related behaviours - that is, behaviours that have the potential to improve, protect or worsen physical health – such as sedentary behaviour, physical activity, consumption of a good quality diet, and sleep.

Physical activity is identified as any bodily movement generated by the contraction of muscles that raises energy expenditure above a resting metabolic rate, usually characterised by modality, frequency, intensity, and duration. Furthermore, exercise is defined as a subset of physical activity that is planned, structured, repetitive, and conducive to the maintenance or enhancement of physical fitness (Caspersen et al., 1985). Sedentary behaviour on the other hand is defined as any waking behaviour that has an energy expenditure of ≤ 1.5 metabolic equivalent (MET), usually characterised by sitting, reclining, or lying down. (Thivel et al., 2018; Tremblay et al., 2017). From a health outcome perspective, physical inactivity and sedentary behaviours are widely recognised as a cause for health problems and an increased risk of

mortality (González et al., 2017; P. Kelly et al., 2014). Concurrently, engaging in physical activity and spending less time sedentary not only indicates an absence of health issues, but can also actively promote health (Y. A. Park et al., 2020; Warburton & Bredin, 2017). Similarly, dietary intake and behaviours are acknowledged to be consequential to health, whereby poor nutritional food intake and unhealthy dietary behaviours, such as frequent unhealthy snacking, can lead to detrimental health outcomes (Ezzati & Riboli, 2013; Tapsell, 2017). A final health-related behavioural indicator is sleep. Playing a significant role for rest, recovery, and recuperation, sleep quality and duration is a significant predictor of health, whereby achieving optimum sleep can promote health, and reduce risk of mortality (Baranwal et al., 2023; Chaput et al., 2020). These health outcomes are extensively discussed in the occupational health literature, indicating a recognition that health outcomes can not only impact work, but work practices and environments can also be a prominent determinant of health consequential behaviours (Crain et al., 2018; Geaney et al., 2013; Howarth et al., 2018; Ljungblad et al., 2014; L. Smith et al., 2016; Thivel et al., 2018).

There has been considerable research surrounding the health-related behaviour of office workers in the workplace. This work has frequently highlighted the potential influence of the working environment and work practices on actions such as physical activity, sedentary behaviours, dietary behaviours, and sleep (Clohessy et al., 2019; Linton et al., 2015; Macdonald et al., 2018; Prince et al., 2019). However, prior to the pandemic, and during the inception of this thesis, there was minimal empirical evidence regarding working *at home* and health behaviours (Allen et al., 2015; Charalampous et al., 2019; Crawford et al., 2011; Steward, 2001). It might reasonably be expected that any health-related impacts of the workplace environment, or travelling to the workplace environment, might be lost when working from home. To some extent then, the impact of home-working on health behaviour may be revealed by considering the impact of onsite working on health behaviour.

1.4.1 *Health-behaviour impacts of office-based work: physical activity*

Office-based work has the potential to impact the amount of physical activity workers engage in during the day (Candido et al., 2019). Onsite workers must commute to the office, which often necessitates physical activity. For example, data from an accelerometer study of London

workers showed greater levels of physical activity during the morning and evening, as well as during lunch time (L. Smith et al., 2015). This suggests that commuting, and taking a lunch break, are conducive to physical activity. Additionally, the layout of offices, in terms of working areas, meeting rooms, toilet, water, and canteen facilities can incidentally influence how much physical activity is accrued during the working day (Candido et al., 2019; Wahlström et al., 2019). Workplaces that have functionality spread across multiple floors, centralised facilities, and accessible staircases, can produce more daily physical movement among workers compared to traditional office set ups (Engelen et al., 2016; Gorman et al., 2013; Jancey et al., 2016). Office-based cultures can also impact physical activity (Creagh et al., 2017): irrespective of whether a workspace is explicitly 'activity-permissive', expectations to uphold a quiet office atmosphere, as well as a tendency to use digital forms of communication, can limit how often workers move away from their desk to interact with colleagues (Creagh et al., 2017). Similarly, social norms favouring productivity and dedication to work within office settings may dissuade workers from breaking extended periods of desk-based sitting and can hinder them from moving freely within the office space (Hall et al., 2019; Mansfield et al., 2018). Evidence underlines work practices, routines, and work settings to variably impact how physically active workers are when engaging with work.

1.4.2 *Sedentary behaviours*

Sedentary behaviours are pervasive among office-based workers due to the primary working practice of being seated at one's desk in order to engage with digital work interfaces (Parry & Straker, 2013; Pate et al., 2008; ten Broeke et al., 2022). This is supported by evidence pointing strongly to greater sitting time during office-based work hours compared to non-work hours (Clemes et al., 2014; Keown et al., 2018; Pate et al., 2008; Thorp et al., 2012). Whilst it is widely acknowledged that desk-based set ups for work are conducive to sedentary behaviours, attempts to reduce prolonged sitting among office workers have also uncovered ways in which the social environment of the office can influence sedentary behaviours (Nooijen et al., 2018). Social norms for projecting productivity and organisational cultures can lead workers to perceived it to be unacceptable to interrupt their sitting or move around the office unnecessarily (De Cocker et al., 2015; Hadgraft et al., 2018). Sit-stand desks are thereby more

favoured by workers than interventions that encourage workers to get up and move away from their work-stations (Hall et al., 2019).

1.4.3 *Dietary behaviours*

The physical and social environment of the office appears to influence dietary behaviours (Clohessy et al., 2019). Workers' dietary consumption can be directly impacted by the availability and proximity of healthy and unhealthy food options at work (Baskin et al., 2016; N. Payne et al., 2012). For example, where unhealthy snack foods are within convenient reach in office canteens or vending machines, and especially when they are more visually salient (Knowles et al., 2020), workers are more likely to eat unhealthy snacks (Baskin et al., 2016). Office-based cultures and social influences can also impact on daily eating and drinking behaviours, with cultures in which colleagues share lunch times fostering healthy eating habits by setting healthy examples and through encouragement, and conversation (Payne et al., 2018; Wang et al., 2014). Conversely, some social environments can have a negative influence. Office 'cake culture' in particular has been highlighted for driving unhealthy dietary consumption (Lake et al., 2016; Nicholls et al., 2017; Walker & Flannery, 2020). Evidence also points toward a combined impact on diet through the social context of job roles and work pressures, where intense workloads can lead to mealtimes being skipped, and instances of working late could foster the consumption of convenient but unhealthy 'fast food' with colleagues (Park et al., 2017; Payne et al., 2012).

1.4.4 *Sleep*

Direct impacts of office-based work on sleep health are generally limited to evidence surrounding the influence of day-time light exposure on worker's circadian rhythms (Boubekri et al., 2014; Figueiro et al., 2017; Figueiro & Rea, 2016). For example, the temporal space that work takes up in an employee's life appears to determine sleep disturbances, where longer commuting hours and actual time spent working can interfere with sleep (Kim et al., 2019). Explanations of this may relate to the potential sleep time lost, among onsite workers, through commuting and working long hours (Hafner et al., 2017). Substantial research undertaken with office workers – albeit not in relation to on-site working in particular – shows how a lack

of work-life balance can reduce the length and quality of sleep (Crain et al., 2018; Gangwisch, 2014). Sleep may also be disturbed when workers feel they have inadequate time to engage in non-work activities; this can lead some workers to delay bedtimes, and greater sleep disturbance can impede workers' ability to psychologically detach from work and to recover from work stress (Cropley & Zijlstra, 2011a). Conversely, issues with sleep quality and duration can arise among those experiencing work-life conflict (Crain et al., 2014; Jacobsen et al., 2014; Nylén et al., 2007). Furthermore, in the context of increased work demands (Magnusson Hanson et al., 2011), and excessive use of ICTs and mobile phone usage (Snyder & Chang, 2019), such sleeping issues may be exacerbated. In sum, research into the effects of office work on sleep highlights work interfaces, routines, stress, and boundary management as potential factors influencing the quality and duration of workers' sleep.

Taken together, research makes a compelling argument for the influence of office-based working practices, routines, and environments on health-related behaviours. By extension, this literature suggests that people who work from home may forego the various beneficial (and detrimental) impacts of onsite working on health behaviour. For example, the absence of the commute may result in a removal of the physical activity benefits of commuting (Hoehner et al., 2012), and may prolong sitting time (Dunstan et al., 2011; Dutta et al., 2014). However, without the need to commute, workers may gain additional time, allowing them to extend their sleep duration prior to starting the workday. However, working in the home environment is not simply 'not working in the office'; home-working involves its own unique environment and its own working practices. These practices may have impact on health-related behaviours and wellbeing, so must be studied in their own right. To comprehend the potential effects of home-working practices on health-related behaviours, it is essential to first establish a theoretical understanding of the relationship between work and health-related behaviours.

1.5 How home-working practices may affect health-related behaviour: Theoretical explanation

In the absence of empirical evidence, the causal links between office-based working practices, routines, and environments and workers' health-related behaviours may be understood by

adopting the framework of the COM-B model (Michie et al., 2011), augmented by insights from goal theories (Austin & Vancouver, 1996). The COM-B framework proposes that three key components are required for behaviour to occur: 'Capability', which denotes individual's physical and psychological capability to engage in the behaviour; 'Opportunity', which highlights environmental and contextual factors involved in either preventing or facilitating behaviours from taking place; and 'Motivation' which captures the conscious and unconscious cognitive processes involved in directing and driving behaviour (Michie et al., 2011). Findings among onsite workers emphasise that the workplace context plays a key role in shaping the physical and social opportunity for health-related behaviours to occur (Candido et al., 2019; Clohessy et al., 2019; L. Smith et al., 2015): for example, vending machines offer the physical opportunity for unhealthy snack consumption, and a snacking culture among colleagues provides a social opportunity. However, understanding the motivations that drive worker engagement in health-related behaviours is more complex, and requires consideration of the goals that workers pursue when working at home, and the complex interaction between motivation, capability and opportunity.

Goal theories employ a hierarchical model of cognition and action (Austin & Vancouver, 1996; Vallacher & Wegner, 1987). At the higher levels of the hierarchy are goals; that is, *why* an action is undertaken. At the lower levels of the hierarchy are mechanistic actions; that is, *what* is done in order to achieve a goal. For example, for someone who is commuting to work, one goal is to 'arrive at work'. This goal is subservient to a yet higher-level goal, which is to 'complete my work tasks'. For a person who is consciously pursuing the goal of 'arriving at work', the act of walking represents a lower-level action, undertaken to achieve the higher-level goal of 'arriving at work'.

For many workers, behaviours that are consequential for health represent lower-level actions (e.g., 'walking to work', 'sitting at one's desk'), which are necessary but incidental steps for achieving the higher-order goal of 'being productive'. Evidence suggests that, for many workers, the predominant goal that drives their activity during working hours is work-related productivity (Gardner et al., 2019; Hadgraft, Brakenridge, et al., 2016), and health-related behaviours are merely incidental actions undertaken in the pursuit of this goal. Any health-related behaviour that offers no benefit for achieving productivity, or that actively hinders the pursuit of productivity, is unlikely to be undertaken. For example, intervention strategies that

are commonly proposed to reduce sitting, such as regular break taking or encouraged desk-based standing, are typically negated when workers deem them to be 'unproductive' (Hadgraft, Brakenridge, et al., 2016; Hadgraft et al., 2018). To illustrate, for office-based workers, the act of 'going to work' requires a daily commute, which necessitates a degree of physical activity (L. Smith et al., 2015), and the act of engaging in office desk-based work typically involves prolonged bouts of sitting (Ryde et al., 2014). Whilst these behaviours are perceivably integral to office-based work engagement, they are not driven by concerns of health, but instead are instrumental in the pursuit of higher order work-related goals (Gardner et al., 2019). For example, for office workers for whom it is necessary to walk to work, 'walking to work' represents both a health-promoting behaviour, and a work-related activity – but crucially, the motivation for this action is likely to be the pursuit of work-related productivity, not health (ten Broeke et al., 2022).

Prioritising work-related productivity can determine the physical and social surroundings of workers, thereby influencing opportunities for health-related behaviours to occur, as well as shaping workers' perceptions of their capability to engage in such behaviours. For example, intentions to meet work-related goals require office-workers to be exposed to office-based physical and social settings, which can impact worker's daily consumption of unhealthy snack foods (Baskin et al., 2016; Walker & Flannery, 2020), inclinations to be seated whilst engaging with work (Hadgraft et al., 2018; Hall et al., 2019; Mansfield et al., 2018), and the degree of physical movement required to complete a working day (Candido et al., 2019; Engelen, 2020; L. Smith et al., 2015). The instrumental actions involved in meeting work objectives thus appear to be determined by workers' perceived capability and environmental opportunity to achieve work-related goals by taking the path of least resistance.

It must be acknowledged that home-working can be beneficial for health behaviour. For example, one study showed that, during the first Covid-related lockdown, while fruit and vegetable consumption and physical activity declined, engagement in strength training exercise increased (Naughton et al., 2021). Similarly, research in the early stages of the 2020 lockdown suggested many people were capitalising on time saved from not commuting by sleeping for longer (Arora & Grey, 2020). This redistribution of time savings, however, is ultimately down to the choice of the individual based on their own preferences and motivations.

Overall, evidence suggests that workers tend to prioritise work-related goals, and that health-related behaviours will be undertaken if they are instrumental to pursuing these goals. Importantly, when considering home-working, the instrumentality of many workplace-based behaviours for achieving productivity changes; for example, the daily commute no longer holds any goal-directed value, whereas sitting will acquire greater instrumental value if performing work tasks becomes more reliant on using a computer at a seated desk (ten Broeke et al., 2022). People who are motivated to engage in health-promoting behaviours may capitalise on home-working arrangements by, for example, going more frequently to the gym, or preparing freshly cooked meals in the evening (e.g., Sarda et al., 2022). Overall, however, we would expect that, due to prioritisation of work-related goals, home-working would prompt declines in physical activity, and increased sitting, both of which behavioural changes may impact on health and wellbeing.

Understanding how home-working affects health-related behaviour, and so wellbeing, thus requires consideration of how people adapt their goal-directed working practices when working from home, and the implications of these adaptations for health-related behaviour. By examining the ways in which work-related goals are achieved when working from home, we can better understand health-related behaviours among home-workers, which in turn will facilitate the development of interventions to promote health behaviour and wellbeing among office workers.

1.6 How to change home-workers' behaviour: Behaviour Change Intervention Frameworks

If home-working practices are indeed consequential for health-related behaviours and so wellbeing, then a structured and systematic approach is needed to develop strategies to modify home-working practices and promote health-conducive behaviours among home-workers. Multiple behaviour change frameworks are available for this purpose, including the Intervention Mapping framework (IM: Fernandez et al., 2019), the Behaviour Change Wheel (BCW: Michie et al., 2011, 2014), and the Medical Research Council (MRC) framework for developing and evaluating complex interventions (MRC: Skivington et al., 2021; see too Yardley et al., 2015). These frameworks converge on the central idea that, to address health-related behavioural issues, understanding must be developed of the problem behaviour

within the context of the target population at risk (Bartholomew-Eldredge LK et al., 2016; Michie et al., 2014; Skivington et al., 2021), and the potentially modifiable determinants of the problem behaviour(s) (Bartholomew-Eldredge LK et al., 2016; Michie et al., 2014; O’Cathain et al., 2019). For example, the first step within the IM framework necessitates the establishment of the health problem, the target population at risk, the behavioural and environmental causes, and the deterministic factors that direct the problem behaviours (Bartholomew-Eldredge LK et al., 2016). Similarly, the first stage of the BCW demands understanding of the broad behaviour of importance, followed by selecting more specific target behaviours for change, and identifying what needs to change to modify this behaviour (Michie et al., 2014). These questions might plausibly be answered using qualitative data to explore experiences of the problem behaviour(s), and quantitative inquiry to model and test relationships between behaviour(s) and their determinants. Where existing data are unable to adequately address these questions, new data must be collected. When the determinants of a target behaviour are known, theory and evidence-based intervention methods that align with these determinants should be employed and adapted to the local context (Bartholomew-Eldredge LK et al., 2016), to develop and design theory to modify the target behaviour in the target population context (Bartholomew-Eldredge LK et al., 2016; Michie et al., 2014; Skivington et al., 2021; Yardley et al., 2015). Newly developed interventions should first be evaluated to address questions regarding their acceptability among the target population, and the feasibility of their implementation (Bartholomew-Eldredge LK et al., 2016; Skivington et al., 2021; Yardley et al., 2015). Acceptability and feasibility are important early markers of the potential of an intervention, because if an intervention is unacceptable to a target population, or it cannot feasibly be delivered, then it does not warrant further testing in a larger scale effectiveness trial. Conversely, an intervention that demonstrates acceptability and feasibility can justifiably progress to further, more rigorous evaluation.

1.7 Overview and aims of thesis

1.7.1 *Aims*

Working from home has increased considerably in prevalence since the COVID-19 pandemic, with many organisations embracing at-least-occasional home-working as part of a ‘hybrid’ working pattern. While there are well-documented advantages – and disadvantages – of

home-working for achieving valued societal and organisational outcomes, questions have been raised around the potential impact of home-working on workers' health and wellbeing. At the time that work on this thesis commenced (October 2019), there was scant evidence regarding whether – and how – home-working might impact on health behaviour in particular. This thesis investigated the health-related behaviour and wellbeing of home-working employees, in order to inform behaviour change interventions to support health and wellbeing among people working from home. Study 1 (Chapter 2) reports a qualitative study undertaken to explore experiences of working from home during the first COVID-19 lockdown of Spring 2020. Study 2 (Chapter 3) reports a measurement development study, undertaken to develop reliable measures of the phenomena that emerged from Study 1. Study 3 (Chapter 4) reports an analysis of relationships between psychological responses to home-working, health behaviour, and wellbeing, undertaken using the items developed in Study 2. Study 4 (Chapter 5) describes work undertaken to assess the acceptability and feasibility of an information-based intervention designed to support normally-office-based workers to adopt home-working practices conducive to health behaviour and wellbeing. In accordance with behaviour change intervention development frameworks, Studies 1-3 were undertaken to collect new evidence regarding how, to what extent, and why home-working can affect health behaviour and wellbeing, and Study 4 was conducted to assess the acceptability and feasibility of a subsequently-developed intervention.

1.7.2 Context, positionality, and philosophical assumptions

While this thesis is written as an investigation into home-working during the COVID-19 pandemic, work on the thesis began prior to the pandemic (October 2019). The original plan was for a mixed-methods project, using quantitative data to compare the health behaviour and wellbeing of employees when working in offices versus working from home, and qualitative data to understand any such differences identified. Data collection for the first study was planned to begin in March 2020. However, the onset of the COVID-19 pandemic in Spring 2020 derailed this plan (Institute for Government, 2021). Specifically, on 23rd March 2020, the UK government ordered a nationwide lockdown, which enforced social distancing measures requiring normally-office-based employees to work from home (Institute for Government, 2021).

While the COVID-19 pandemic disrupted original research plans, these circumstances also represented a unique opportunity to study home-working following the mass shift to home-working brought about by the 2020 UK lockdown. A decision was made to capitalise on this situation and to focus the thesis primarily on office workers working from home, and how to support their health and well-being, rather than drawing comparisons with office workers. The studies reported in this thesis were all planned and undertaken during 2020-21, a period marked by multiple national and local lockdowns and great uncertainty around the future direction of the pandemic and working patterns among normally office-based workers. In light of this uncertainty, a pragmatic approach was taken to the research process. Pragmatism prioritises a 'real-world' approach to research, centred around adopting research tools that are most practical in a given context, and generating optimally actionable insights and outputs (Kelly & Cordeiro, 2020). Our pragmatic approach involved rapid, reactive planning of studies and data collection to address questions that were particularly pertinent at the time.

The research that followed adopted a critical realist perspective. Critical realism acknowledges the existence of an objective reality, yet also recognizes the importance of subjective interpretations (Archer, 1995; Collier, 1994). This philosophical stance diverges from traditional positivist and interpretivist approaches, offering a methodological alternative that integrates elements from both paradigms. Positivism posits an objective reality that can be known and measured through quantitative methods, while interpretivism emphasises subjective understanding through qualitative exploration of meanings and experiences. In contrast, critical realism combines these perspectives by acknowledging the existence of an objective reality while recognising the importance of subjective interpretations (Archer, 1995; Collier, 1994). Critical realism provides a robust framework for comprehending the essence of reality and how we acquire knowledge about it (Bhaskar, 2013; Frauley & Pearce, 2007; Groff & Morgan, 2023).

This approach is particularly pertinent in examining how home-working practices influence health and wellbeing-related behaviours. It underscores the complexity of social phenomena and asserts that reality operates through underlying mechanisms, which may not be immediately observable. Critical realism advocates for the use of mixed methods to uncover these generative mechanisms that shape observable outcomes (Collier, 1994; Mukumbang, 2023). This framework allows researchers to explore how interactions between individual

behaviours and the physical and social environments of home-working contexts may contribute to health and wellbeing outcomes (Patomäki & Morgan, 2023; Scambler, 2018).

A key assumption underpinning this thesis was that health and wellbeing-related behaviours are likely to be instrumental for individuals in meeting work-related goals, notably influenced by both physical and social environments.

1.8 Thesis Overview

1.8.1 Study 1

In response to the COVID-19 restrictions announced in March 2020, we designed a study of normally-office-based workers' experience of working from home during the first UK pandemic lockdown. *The aim of this chapter was to develop understanding of how people adapted their working practices to home-working, and to investigate potential overlap between these working practices and their health behaviour and wellbeing.* An exploratory qualitative approach was undertaken. **Study 1 has been published in the *Journal of Occupational and Environmental Medicine* (2023, volume 65, pp. 330-336).**

1.8.2 Study 2

This study systematically developed quantitative measures of concepts around home-working practices that were qualitatively identified in Study 1. *Study 2 aimed to develop items that could be subsequently used to model potential relationships between home-working practices, workers' thoughts and feelings around these practices, and health-related behaviours and wellbeing.* This chapter describes the systematic derivation and development of these items. The data informing this chapter was collected between March – April 2021, towards the end of the UK's third national COVID-19 lockdown. Due to this study solely serving the purpose of informing a subsequent study, we did not submit it for publication.

1.8.3 Study 3

Using the quantitative measures developed in Study 2, Study 3 used a Network Analysis approach to model relationships between psychological responses to home-working practices and subjective measures of health-related behaviours, and indicators of wellbeing. **The aim of Study 3 was to model a system of relationships between psychological responses to working from home, health-related behaviours, and wellbeing.** The broader aim was to generate information that could identify key determinants and facets of health-related behaviour among home-workers, and therefore inform the development of behaviour change interventions to support home-worker health behaviour and wellbeing. In anticipation of an imminent ease in government-mandated restrictions, a cross-sectional study utilising panel data was rapidly executed in April 2021. This study is currently (June 2024) under review for publication in *BMC Public Health*.

1.8.4 Study 4

The aim of Study 4 was to assess the acceptability and feasibility of an intervention designed to modify home-working practices, which was developed using insights from work reported earlier in this thesis, and delivered via a self-administered digital health and wellbeing guidance document. In accordance with behaviour change intervention development frameworks, we present Study 4 narratively as a progression from Studies 1-3. However, while the intervention would ideally have been developed based on insights from Studies 1-3, the work reported in this chapter was undertaken in January–February 2021, based solely on findings from Study 1 (i.e., not Studies 2 or 3). The reason for this is that time-limited, pandemic-related funding was made available to the thesis supervisor in 2020 to develop an online resource, to assist workers transitioning to ‘hybrid’ working in Winter 2020-21. **Study 3 has been published in *BMC Public Health* (2023, volume 23, pp. 1-13).**

2 Chapter 2: Study 1 - Working from home: Experiences of home-working, health behaviour and wellbeing during the 2020 UK Covid-19 lockdown

2.1 Study 1: Why this study was needed

There had been many studies showing that working in the workplace can have a beneficial impact on health behaviour and wellbeing. Yet, there was little literature available regarding health-related behaviour and wellbeing among those working from home – and moreover, *how* working from home might potentially affect health behaviour or wellbeing. Study 1 used qualitative methods to investigate workers' experiences of working from home, to explore whether and how home-working might impact on their health-related behaviours and wellbeing. We conducted semi-structured interviews with 27 normally-office-based workers, and analysed the data using Thematic Analysis procedures, to identify how they had adapted to working at home, and their experiences of health behaviour and wellbeing. The study was undertaken opportunistically, early during the first UK COVID-19 pandemic lockdown (April – May 2020), during which all normally-office-based workers were required to work from home full time where possible. This provided a unique opportunity to explore how normally-office-based workers adapted their working practices to the home setting, and how this might have impacted their health-related behaviours and wellbeing.

2.2 Abstract

2.2.1 *Objective*

The Spring 2020 UK COVID-19 lockdown required normally-office-based workers to modify their work-related practices to work at home. This study explored experiences of adapting to home-working, health behaviours and wellbeing.

2.2.2 *Methods*

Twenty-seven home-working employees (19 female; aged 23-57y), from various industry sectors, gave individual semi-structured interviews. Topics focused on home-working experiences, working routine adaptations, and changes in health behaviours and wellbeing.

2.2.3 *Results*

Four themes were extracted: changes to the work interface; adaptations to a new workspace; changes to work-life balance; and adjustments to a new social context. Notably, participants reported greater reliance on computer-based interactions, which they felt discouraged physical activity and increased sitting. Working in a domestic environment reportedly challenged work-home boundaries.

2.2.4 *Conclusions*

Work practices can incidentally detrimentally impact health-related behaviours and wellbeing. Organisations should develop policies and procedures to promote health-conducive home-working.

2.3 Introduction

In March 2020, in response to the COVID-19 pandemic, the UK government imposed a national lockdown that required employees to work from home where possible (Institute for Government, 2021). Office-based employees had to adapt their working patterns to home-based working, and many organisations continued to operate near-normally despite this shift to home-working. This has led to the adoption of 'hybrid' working policies, encouraging employees to alternate between working at the workplace and at home (Taylor et al., 2021). Little research has, however, investigated the potential implications of home-working for health and wellbeing (Allen et al., 2015; Charalampous et al., 2019). A wealth of research has documented detrimental changes to health behaviour during the pandemic, such as decreased physical activity, diet, and sleep quality (Bouziri et al., 2020; Ingram et al., 2020; Meyer et al., 2020). Such behavioural changes have typically been attributed to the impacts of self-isolation, shielding, loneliness, confinement, and increased leisure screen time (Bouziri et al., 2020; Ingram et al., 2020; Meyer et al., 2020). Little is known about the extent to which shifting to home-working during the pandemic may have impacted health behaviour (Shifrin & Michel, 2022).

Previous research centring on the workplace has shown that work-oriented practices and patterns demonstrate the potential to affect health behaviour and wellbeing (Candido et al., 2019). For example, in one study, accelerometer data from UK office workers showed that, on workdays, step count was highest during the morning and evening commute, and at lunch time (Smith et al., 2015). This shows that travelling to the workplace, and taking a lunch break, incurs physical activity. Furthermore, the greatest amount of sitting over the waking day was observed during working hours (Smith et al., 2015). This echoes existing evidence indicating that office-based work typically accumulates prolonged sitting (Parry & Straker, 2013; Ryan et al., 2011; Thorp et al., 2012). The physical layout of the workplace environment can influence workers' daily movement and sitting (Candido et al., 2019; Jancey et al., 2016). One study tracked changes in activity among office workers following a move from a 'traditional' office environment to a workplace spread across multiple floors with accessible staircases, height-adjustable workstations and standing-permissive meeting rooms (Gorman et al., 2013). Device-monitored standing time and step count were found to increase while sitting time decreased (Gorman et al., 2013). Studies of dietary behaviour among office workers have

shown greater unhealthy snacking in workplaces that offer greater proximity to or accessibility of unhealthy snacks, such as on-site shops and vending machines (Baskin et al., 2016; Payne et al., 2012). The social environment of the workplace can also determine health-related behaviour. For example, in-person interactions may require walking to colleagues' workspaces or meeting rooms (Edmunds et al., 2013). Conversely, participants in workplace sitting-reduction interventions often describe social norms around appearing dutiful and productive, which can discourage taking breaks from sitting (Hall et al., 2019; Mansfield et al., 2018). Other studies have documented how colleagues create local cultural norms within the office that prescribe unhealthy food choices, such as sharing cakes or biscuits with colleagues or clients (Nicholls et al., 2017; Walker & Flannery, 2020). Evidence from dieting workers has shown that colleagues can be a source of support for healthy eating, demonstrating the potential impact of the workplace social environment on eating behaviours (Wang et al., 2014).

Theoretically, the relationship between work practices and health behaviour can be understood using the COM-B model (Michie et al., 2011), and insights from goal theories (e.g., Austin & Vancouver, 1996). The COM-B model proposes that all behaviours require capability, opportunity and motivation to be performed (Michie et al., 2011). Goal theories help to clarify the structure of motivation that drives everyday health behaviours in a work setting. Goal theories adopt a hierarchical model of action, whereby outcome goals are situated at higher levels of the hierarchy (e.g., 'be productive'), and are served by discrete behaviours at lower levels (e.g., 'go to work', 'sit at my desk'; Austin & Vancouver, 1996; Vallacher & Wegner, 1987). Studies demonstrate that, for many workers, work-related productivity is a prioritised goal (e.g., Gardner et al., 2019; Hadgraft, Healy, et al., 2016), pursuit of which can incidentally elicit or inhibit health-related behaviours. For example, the act of commuting to the workplace necessitates physical activity (Smith et al., 2015), and office work undertaken at a desk typically incurs prolonged sitting (Ryde et al., 2014). Such behaviours are motivated not by health, but rather by their utility for achieving higher-order work-related goals (Gardner et al., 2019). The pursuit of productivity goals also shapes the opportunities available for health-related behaviours, and workers' perceptions of their capability to engage in such behaviours. For example, the greater accessibility of food in the home environment increases opportunities for food consumption, and may diminish workers' perceptions of their capabilities to resist temptations.

Discontinued exposure to the physical and social environment of the workplace during the pandemic likely affected motivation, capability, and opportunity to engage in health behaviour, and so health, among home-workers. Following the shift to home-working during the pandemic, many of the instrumental health-related behaviours centring on the workplace were no longer required to meet work motives. For example, the removal of the daily commute with colleagues rendered incidental physical activity redundant for work purposes, and lessened the opportunity to accrue physical activity during work-related activity. Similarly, the shift to online communication may have increased the importance of sitting at work, diminished opportunities for physical movement, and lessened perceptions of capability to reduce sitting among workers keen to meet perceived norms of being available to colleagues (Adisa et al., 2021).

Although the impact of home-working on health behaviour during the pandemic remains under-researched, whether employees work in the workplace or the home environment could have both positive and negative impacts on health behaviour and wellbeing. For example, some commentators have argued that working within the home environment gives workers a greater sense of autonomy (Suh & Lee, 2017) and can reduce work-related distractions (Fonner & Roloff, 2010). This may enhance productivity and potentially lower work-related stress. Others, however, have voiced concern about work and leisure boundaries becoming blurred when working from home, leading to extended working hours, disruptions to work-life balance, and greater stress (Felstead & Henseke, 2017). Similarly, not having to commute may allow workers greater time to engage in health-promoting behaviours, such as home-based physical activity (Dwyer et al., 2020). Conversely, levels of incidental physical activity will likely decline for many people when commuting is no longer necessary (Smith et al., 2015). Lastly, the discontinued exposure to 'office cake' culture offered by home-working may minimise some food-based temptations (Ammons & Markham, 2004), but the greater availability of food at home may increase food consumption (Marteau et al., 2012).

Home-working is expected to become more prevalent after the COVID-19 pandemic ends [28], but little is known about how home-working may impact health and wellbeing (Shifrin & Michel, 2022). Understanding how home-working practices may affect health behaviours and wellbeing more broadly could provide valuable insights to support health-conducive, post-pandemic working practices and policies (Shifrin & Michel, 2022). The present study aims to

document individuals' experiences of working from home during the first UK COVID-19 pandemic lockdown. Our research question was: "During the pandemic, how did office-based workers experience working from home, health-related behaviours, and wellbeing?"

2.4 Method

2.4.1 *Participants and Procedure*

Participants were recruited via a study advertisement during April-May 2020 circulated via social media (LinkedIn, Twitter), inviting individuals to take part in an interview exploring their experience of working from home during the COVID-19 pandemic. A £15 shopping voucher was offered as an incentive for completion of the interview. The advertisement contained a URL link where potential participants confirmed their eligibility and provided their email address to allow us to contact them. Eligibility criteria were: UK based adults (18+ years of age); working from home full-time, due to the COVID-19 pandemic; no caring responsibilities for pre-teen or older adults.

Potential participants were then contacted via email to arrange an interview and were prompted to complete an online survey aimed at ensuring participant eligibility and gathered participant consent and demographic information (age, gender, industry, occupational role). In the early days of the COVID-19 pandemic, expectations were that the pandemic would be over within weeks of the announcement of the March lockdown. We thus aimed to interview people as quickly as possible, before stay-at-home restrictions might have been lifted. We also wanted to interview people before changes in health behaviour could become ingrained and so less salient and reportable. An initial target sample size of 25-30 was deemed realistic within our intended 1-month recruitment window, credible for capturing a broad range of home-working narratives, perspectives, and industry representation, and likely to achieve theoretical saturation. Thirty-six individuals expressed interest in participating by providing their email address. Twenty-seven (75%; 19 female, 8 male) took part in semi-structured interviews. Participants were aged 23–57y (M = 29y, SD = 6.75), and worked in a range of industry sectors, including education (seven), information services (five participants), retail (three), public relations (three), software (two), charity (two), healthcare (two), finance (two), and recruitment (one). Length of employment in current roles ranged between 0–13 years. Data collection ceased at the end of the one-month recruitment window, during which theoretical data saturation was achieved. Following the '10+3' stopping criterion, we conducted a minimum of ten interviews and continued until three consecutive interviews revealed no new themes, ensuring a comprehensive understanding of the subject matter (Francis et al., 2010).

2.4.2 *Interview schedule*

Semi-structured interviews were conducted by phone or video call (using Skype, Teams, or Zoom) according to participant preference. Interviews were recorded via an external recording device.

The original aim of this study was to gather descriptions of experiences of health-related behaviours when working from home, with a particular focus on understanding how health behaviours may have changed as a result of new home-work settings and routines imposed by the COVID-19 pandemic lockdown.

Interview topics included: experiences of working from home; home-working and workplace-based practices; everyday work and leisure routines; and changes in health behaviour, health and wellbeing. Additional questions were posed regarding the COVID-19 pandemic lockdown more generally, and participants' awareness of (and attitudes and beliefs surrounding) guidelines on health-conducive practices during the pandemic lockdown. (See Appendix A for full interview schedule.) However, as analysis proceeded, the direction of the study shifted, in response to emergent insights suggesting that health behaviours had changed as a potential consequence of changes in working practices, rather than such changes coinciding. Interview data relating to the COVID lockdown and health guidelines for home-working were deemed of little relevance to the new study focus, so extracts relating to these questions were not included in the presented results.

Interviews were conducted by SK, a male doctoral research student who received formal interview training whilst receiving regular supervision from BG. Interviews ranged between 31–90mins (mean 59 minutes). All procedures were approved by the King's College London ethics committee (MRSP-19/20-18230).

2.4.3 *Analysis*

Digital interview recordings were automatically transcribed via transcription software Otter (Corrente & Bourgeault, 2022). To ensure data accuracy, and to aid familiarisation, transcripts were manually error checked and edited by SK. Analysis was organised using NVivo 12 (Nvivo, 2018). We used Thematic Analysis, underpinned by critical realist assumptions (Braun & Clarke, 2006, 2019). Analysis involved six distinct steps: Data familiarisation, systematic coding, generating preliminary themes, incremental development of themes, refining and naming themes, and writing up the analysis (Braun & Clarke, 2021). Our analysis approach blended elements of 'codebook' Thematic Analysis, by inductively generating potential codes and themes early on to aid later coding processes, and

'reflexive' Thematic Analysis, whereby analysis remained grounded in the data, and early coding structures were refined in response to insights from later coding (Braun & Clarke, 2021).

Our 'codebook' methods involved two authors (SK & BG) first independently coding three transcripts. Coding specifically involved assigning labels (i.e. codes) to the data, writing memos to elaborate on the meaning of each code, and the significance of the code and accompanying data excerpt, in relation to the study aims. Once the three transcripts were coded, SK and BG discussed and compared coding notes and developed an agreed preliminary thematic structure, outlining clusters of codes. This structure doubled as a 'code book' for application to remaining transcripts (see Appendix B for preliminary thematic 'code book'). SK independently continued the analysis by applying this thematic structure to the remaining transcripts. During this stage, SK incrementally refined and reviewed the thematic codebook and theme names, incorporating new insights drawn. SK met regularly with BG, a senior qualitative researcher, throughout the coding process. This allowed BG to provide 'critical friend' input on emerging themes and codes, and to verify the credibility of the analysis, so ensuring rigour and trustworthiness (B. Smith & McGannon, 2018).

2.4.4 Researcher positionality

The study was conceived jointly by all authors in late March 2020, in response to the first UK COVID-19 lockdown. At that time, SK was a first-year doctoral research student, undertaking research to investigate the relationship between home-working, health behaviour and health among office workers. Prior to the pandemic, all authors were predominantly office-based and desk-based, working from home at most once weekly. All authors worked from home, due to the pandemic, during the data collection period. Author BG, a social psychologist working mostly in health psychology, has previously published research based on understanding and promoting reductions in sitting and, during the data collection period, took daily walks and attempted daily workouts to maintain health and wellbeing. MD, an occupational psychologist with expertise in intervention research in work and wellbeing, was on maternity leave during the study period. SK has conducted research investigating the work-related wellbeing outcomes of office workers experiencing perceived isolation, and during data collection, engaged in regular daily cycling to finish off his working day.

2.5 Results

Four distinct themes were identified, each of which related to a potential aspect of adaptation to home-working that potentially affected participants' health behaviours or wellbeing: changes to the work interface; adaptations to a new workspace; changes to work-life balance; and adjustments to a

new social context. See Appendix C for an excerpt (Changes to the work interface) of the Thematic ‘code book’ breakdown of findings alongside exemplary quotation.

2.5.1 *Changes to the work interface*

Participants reported a greater dependence on digital technology to work from home, which appeared to reduce incidental physical activity and increase sitting time. The loss of impromptu interactions with co-workers, and an increase in formal work meetings appeared to impact workload, stress, and wellbeing.

While impromptu communication remained possible, most participants felt communicating with colleagues from home required greater purpose, organisation, and formal scheduling - i.e., a “*meeting spot in your diary*” (P35) - than when in the workplace. Home-working was felt to preclude the spontaneous and potentially productive in-person communication available in the workplace:

I feel that things [are] getting done a little bit slower just because you can't have those quick chats ... that I would usually have in the office. (P26)

The reduction in informal communication with co-workers was mirrored by a reported increase in daily meetings (“*I probably [now] spend about three hours a day in different calls ... which is quite a lot*”; P9). Attending multiple consecutive meetings limited participants’ perceived opportunity to take breaks (“*you don't have a minute or two in between meetings just to go to the bathroom*”; P22) and potentially reduced frequency of eating (“*it's an ongoing struggle to find the time to eat*”; P23).

Not only were meetings seen as time-consuming and unproductive, but many participants also reported being allocated additional work in meetings. The combination of reduced productivity and increased workload led many to feel obliged to work longer hours:

When you have five or six hours of calls a day, you know, those all eat into the working time that you have in your normal working day. And often you're collecting work to do during those calls. [On] a couple of occasions I've worked later into the evening to just get some stuff done. (P2)

Many participants also reported using their computers for longer, and remaining within close proximity to their workstation due to a perceived obligation to remain mentally connected to work. This limited their physical movement and so elicited lengthier periods of sitting (“*it's easy just to end up sitting there for the [whole] day*”; P35).

Participants reported having to adjust to new behavioural norms in online meetings and calls. When attending large online meetings characterised by one-way flows of information, participants felt more able to attend with their camera off which allowed them to multitask. Some participants used this as an opportunity for physical activity:

[On] phone calls ... when I am just listening in [...] [I] put my headphones on and then go for the walk. I'm still paying attention, but I can still get the walk in. (P23)

In smaller online meetings however, many felt obligated to not only ensure their video camera was on to demonstrate engagement and conformity with colleagues (“you get a call that everybody’s got their video screen on, so you have to do it too”; P35), but also to sit (“[You] have to sit in the same place all the time, especially if [you] have to do calls back to back”; P9). Sitting was seen as strongly normative for formal meetings and for hosting meetings.

If it’s just a call, like a discussion or something I can do that kind of stood up or on the sofa, but a lot of what I do is [...] webinars with lots of people coming on to watch me presenting. [...] So I feel like I need to look ... professional rather than just sat on the sofa. So ... I need to sit at my desk and have my two screens and be on webcam and look presentable. (P6)

2.5.2 Adaptations to a new workspace

Participants discussed multiple challenges arising from using the home for work purposes. One challenge was to identify or create physical environments conducive to working. Some had pre-existing areas of the home designed for work activities such as offices or studies. Others described makeshift workspaces, improvised through transforming or repurposing leisure spaces (“we bought one of those laptop tables, you can get, so you can sit on the sofa”; P19). Some reported converting a specific area in the home into a temporary designated workspace at the beginning of each day, which helped differentiate leisure and work time:

I actually physically move my laptop and notebook and bits and pieces out from underneath where they’re sitting under the kitchen table. And then that is kind of, that’s the start of the workday. (P23)

The physical separation of work and leisure was deemed important for achieving a mental separation. Several participants described purposefully removing work-related visual cues to allow them to detach more fully from thoughts about work during leisure time:

I kind of make sure that my workstation is like pushed into the corner of the room. Because otherwise it feels like you're sat on the sofa watching TV and you've got work in the corner.

(P6)

Many participants used trial and error to identify an optimal permanent workspace. Attempts were sometimes abandoned, for example because participants found themselves being disturbed by other family members or housemates (*"my mum was coming in and out to make tea ... it was really distracting, so I moved into my room now and that's much better"*; P1). Many participants were unable to find a permanent workspace, so used a variety of spaces. Workspace selection appeared to be driven by the nature of expected work tasks, workload, perceived engagement requirements, and formality:

If I have a lighter day like today, I am in my bedroom, and work from bed if I just have one or two calls, or [if] they're a bit more casual or informal. (P2)

Many reported that their home environment was ill-suited to work. For some, the physical environment was deemed incompatible with prolonged computer-based work (*"the table is not really a desk [and] the chairs are not really meant for people to be sitting on them [for long periods]"*; P22). Several participants described physical comfort and posture problems that they attributed to using household furniture for normally-desk-based work:

The chair is quite uncomfortable to sit on and work and I don't think it's at the right height and sometimes I'm sat on the sofa with my laptop, but then that makes you really achy in the shoulders and neck. (P29)

For some participants, relative to the workplace context, the home-working environment offered more access to food and so convenience, which resulted in greater temptations to snack:

I feel a bit more of a desire to snack during the afternoons [at home] ... because [food is] within walking distance, and [it's] a little bit harder to kind of control a craving, or you feel like you need something else to eat. Whereas in the office ... we don't really have anywhere we can buy things. (P21)

The proximity of snacks was especially perceived as an unwanted distraction by those working near or in kitchen spaces. Conversely however, home-working discontinued exposure to office snacking culture, so removed some temptations:

Sometimes people would bring snacks into the office ... [like] cakes to eat. There's less [of] that [when working at home]. (P17)

Participants reported that amenities were in closer proximity, so they tended to accrue minimal incidental physical activity in the course of the workday:

The toilet [at my workplace] is a few hundred metres away ... I'm getting a few hundred steps in just going to the toilet. Whereas obviously [at home], the bathroom's right next to my bedroom. (P21)

Consequently, while some participants reported feeling motivated to take regular activity breaks from sitting, they often found doing so unsatisfactory due to the negligible movement involved ("*I'm getting up quite a bit but not really having anywhere to go*"; P11). Some participants adapted to this by taking breaks to undertake household chores and other non-work-related activities. For some, these breaks were designed to reduce sitting time ("*I'm always like running around, like washing the dishes - whenever I can get a chance to leave that chair. I do it.*"; P22), whereas others were taken to obtain 'thinking space' needed to solve work problems:

If I've got some [mental] block ... then I'll just take the dog [for a walk] ... 15 minutes, 20 minutes just to go around the block. And try and calm my mind. Give me some reflection time. (P14)

2.5.3 Changes to work-life balance

Participants described various benefits and challenges to work-life balance arising from working at home. The time savings from not commuting, and the flexibility of working at home, made some feel more able to engage in activities potentially beneficial to health and wellbeing. Some participants invested time savings in sleeping longer, which reportedly enhanced sleep quality ("*I'm sleeping better now, and having that time back from commuting has really helped*"; P9), and some reported going to bed later. Others reported spending more time preparing fresh food or diversifying their diet ("*[I've been able to] do a wider variety of meals because you've got that bit of extra time from not commuting;*" P19). Not having to travel was felt by some to conserve their physical energy, so allowed them to take more physical activity:

In a normal situation, you come home from the train from work, you're so tired, you still have to get changed and run to the gym. It demotivates you a little bit sometimes. [But] right now I feel a little bit more motivated. (P5)

Not having to worry about getting to work on time also reduced stress for some ("*Now I know that my 'office' is next door, I don't feel as anxious, and ... the quality of my sleep is probably better*"; P36).

However, many participants reported that aspects of home-working compromised their work-life balance, by blurring the physical and psychological boundaries of work and leisure. Some reported challenges in adhering to normal working hours (*"I'm trying to ... get my job done in my working hours, rather than letting it creep and bleed into personal time."*; P2). Many described difficulties with 'switching off' at the end of the workday, because they remained in close physical – and so psychological – proximity to work tasks and tools:

It takes me longer to get to sleep now because my mind's just wearing. ... [I] can't switch off from work because work is just there all the time. (P6)

Some participants experienced their daily commute as a valued psychological tool for demarcating work and leisure mindsets:

Previously, I've used the journey home as my transition period from work to family. [I] try not to think about family when I'm at work, [and] try [not] to think about work when I'm at home. However, now work is at home all the time. Sometimes when I wake up in the morning I wake up thinking about work. (P14)

Some participants sought to replicate this demarcation by engaging in purposeful events to bookend the workday. This event often mimicked the daily commute in that it involved physical activity, such as walking or cycling. Many reported this vitalised them before work, or helped them disconnect and unwind after work:

I used to walk to work. [...] [Now] I get up and walk at about 7.30 in the morning, and then I get back I'll have a cup of tea with my parents and boot up my computer. (P30)

Removing oneself from the home environment (e.g., to go for a walk) appeared valuable for separating work and leisure. Those with less opportunity to move away from the home-working environment expressed difficulties in mentally disconnecting:

I felt like I did everything in the living rooms. [I was] working [in there], and then I used to relax in the living room and then workout. So for me, it was quite hard to kind of detach yourself from work ... Having to do everything in one space is quite difficult. (P36)

Other participants sought to separate work and non-work time by consuming alcohol, a behaviour that for some symbolised leisure:

I have a glass of wine like every night now. It's part of that wind-down for me. I know that I shouldn't be thinking about work when I have my glass of wine. (P6)

2.5.4 Adjustments to a new social context

Participants experienced notable changes to their immediate social environment, arising both from working in the informal social context of the home and the absence of social influences from the workplace.

Outside of online meetings, participants reported feeling less social pressure from colleagues, due to reduced visibility. This allowed them a newfound freedom to take impromptu breaks from sitting ("*it's not as if I'm sitting amongst people [where] everyone else is working so you just work. At home, I feel like, Okay, [I can] just take a break*"; P26). Some participants reported being more productive because they were less likely to be distracted by colleagues ("*even though it's nice that someone will say '[do] you wanna have a coffee', I just feel obliged to get up even if you're in the middle of something*"; P25). Conversely, others felt that not being in the physical presence of colleagues was detrimental to their productivity, because they were less accountable and so more susceptible to self-generated distractions:

There's no fear of work colleagues looking over my shoulder not seeing that I'm not working. I think it's a bit dangerous, I find it more difficult to stay focused. (P21)

The physical absence of co-workers led some to worry that colleagues would suspect they were not working ("*there's always that fear, you know, that people [will think you're slacking]*"; P14). This prompted many to feel obliged to demonstrate that they were 'getting work done' ("*it's kind of got into a culture now, it's like you're proving how much work you've done in that day*"; P6), which in turn led participants to feel compelled to remain digitally present, and so seated at their workstation for longer hours.

However, others reported that home-working freed them from presenteeism and allowed them the agency to manage their working hours, take more breaks, and achieve a better work-life balance:

I find it easier to actually only work my hours [at home]. In the office, there is a culture of staying late or working through your lunch break, which I think is bad. (P9)

Social interaction during the workday was highly valued by many participants, and some reported compensating for the absence of colleagues by replicating their usual sociable workplace-based actions in the home environment. For example, some found their break-taking synchronised with other household members ("*if [my partner] gets up to ... make his lunch or a cup of coffee, naturally I find myself wanting to get up as well ... I'm like that in the office*"; P19). Others reported consciously working in areas of their home conducive to social interaction with household members:

I just think it's just nice to sometimes just work in the kitchen and ... if you're not too busy ... if someone can distract you and you have a bit of a chat. It's almost like being in a common space where someone can talk to you. (P25)

Other participants felt restricted by the presence of non-working household members, and sought to avoid them by confining themselves to specific areas of the home during the working day.

I can't really leave this room because if I do then my parents are in the next room, watching TV or doing everything, they don't want to disturb me and I don't want to disturb them. (P30)

2.6 Discussion

Interviews with normally-office-based workers who were required to work exclusively from home during the first UK COVID-19 lockdown documented reported changes to working practices and environments. These changes reportedly had consequences for workers' health behaviour and wellbeing. Home-working benefitted health behaviour and wellbeing for some, who for example felt more able to control their diet and take breaks from sitting in the physical absence of colleagues, and some reported investing the time saved by not having to commute in health-promoting behaviours like cooking nutritious meals. There were however also reportedly deleterious impacts of home-working. For example, some felt that a shift towards digital communication had increased their sitting time and inhibited physical activity; a blurring of physical and psychological boundaries between work and leisure time reportedly compromised wellbeing; and changes to the accessibility of foods apparently affected dietary consumption. Although home-working experiences during the COVID-19 lockdown may not accurately represent more typical home-working, our findings have important implications for organisational policy and practices outside of pandemic settings. Organisations should encourage work-related practices that support health and wellbeing among home-workers.

Our research suggests that adaptations to working practices when working at home rather than in the workplace may have incidentally impacted health behaviours and wellbeing during the COVID-19 lockdown of Spring 2020. For some, not being at the workplace provided valuable opportunities to engage in behaviours conducive to health and wellbeing. For example, in the physical absence of colleagues, and so social pressure to appear productive, some felt more capable of taking regular breaks from sitting. Some valued the removal of the daily commute because they used the time savings to engage in exercise, to cook meals, or to sleep. For others, however, working from home detrimentally impacted health behaviour and wellbeing. For example, it is well-documented that physical activity decreased and sedentary behaviours increased among home-workers during the

pandemic (Fukushima et al., 2021; Howe et al., 2021; Ráthonyi et al., 2021). Our participants reported that the discontinuation of in-person communication during the lockdown rendered day to day working practices entirely dependent on digital interfaces (see too DeFilippis et al., 2020). Home-workers experienced a greater number of online meetings, and many described feeling pressured to be visibly online throughout the day to demonstrate to colleagues that they were working. Consequently, many described sitting for long periods and decreases in daily physical activity. Significantly, our participants felt that having to be available online limited their opportunity to take breaks from their workstation. This may explain findings by Spence et al (Spence et al., 2021), who found that a perceived lack of physical opportunity predicted decreased physical activity in a UK sample in early June 2020, during the same COVID-19 lockdown during which we undertook our study. Organisations should actively champion taking activity breaks or incorporating movement into everyday work activities when working from home, as well as communicate clear work time expectations, to prevent digital presenteeism (Steidelmuller et al., 2020). One promising way to do this is by encouraging workers to take walks during online meetings, which some of our participants reported doing. While workers and managers often find non-seated meetings inappropriate for formal meetings or group discussions (Mansfield et al., 2018), going for a walk may be feasible during informal meetings, or those that require minimal input from attendees.

Maintaining work-life boundaries is thought to be crucial for health and wellbeing, because failing to 'switch off' from work can impair work-life balance and lead to exhaustion (Sonnentag, 2003; Wepfer et al., 2018). Our participants' working routines appeared to be important in shaping work-life boundaries. Whilst some participants had a dedicated room in which to work, most reported difficulties finding feasible workspaces in their homes, and instead repurposed domestic spaces such as kitchen counters and dining tables. Such improvisation of workspaces in the home was commonplace during the 2020 COVID-19 lockdown (Xiao et al., 2021). Significantly, some of our participants reported feeling unable to disengage from work, because of the continued presence of work cues. This attests to the potential for physical workspace decisions to lead to blurred work-life boundaries. Other participants appeared to maintain boundaries more effectively by purposefully clearing their workspaces when completing their workday. Similarly, the removal of the need to commute appeared consequential for boundary management. Some participants reported finding commuting useful for transitioning between work and home 'mindsets', and so felt less able to detach from work in the absence of the commute. Research shows that transitioning between physical environments can promote psychological detachment (Sonntag et al., 2010). Some participants appeared mindful of the value of this physical transition, so sought to engage in purposeful activities to start or finish their working time. These not only reportedly helped demarcate work and leisure

time but also, because they typically occurred outside of the home, often involved incidental physical activity (e.g., going for a walk). Given that home-working typically reduces the physical activity incurred by commuting (Smith et al., 2015), engaging in such activities may have particular health behaviour benefits. Organisations should encourage home-workers to replicate the psychological adjustment and health behaviour benefits of commuting (Chatterjee et al., 2020), by bookending their work time with non-work events that ideally involve leaving the home and engaging in some form of physical activity such as walking, running or cycling. We also found that some participants consumed alcohol as a way of 'switching off' from work demands. This demonstrates the potential for health-risk behaviours to be adopted for boundary management purposes, which may explain previously established links between work-life conflict and alcohol consumption (Lopez et al., 2022). Our study points to the importance of encouraging workers to engage in positive health behaviours to manage work-life boundaries.

Our results suggest that social and physical environment differences between the workplace and the home may influence dietary intake. For example, the physical absence of colleagues reportedly led to a reduction in snacking due to discontinued exposure to snacking norms, such as 'cake culture' among co-workers (Nicholls et al., 2017; Walker & Flannery, 2020). Conversely however, participants described having greater access to food at home which, whilst appearing to enhance lunch time dietary intake for some, also increased unhealthy snacking. Proximity and perceived availability of food has been shown to impact dietary consumption and health (Hollands et al., 2013). For many workers, working at home may increase access to potentially unhealthy foods. Physical environment changes may also affect workers' health behaviours via habit mechanisms. Habitual behaviours are built on learned associations between environments and actions (Gardner, 2015). For many people, the home environment is likely associated with leisure time behaviours such as snacking (van't Riet et al., 2011). Everyday settings and cues within the home (e.g., the kitchen) may therefore act as unconscious triggers to such behaviours in a way that the workplace environment does not. Developing interventions to support healthy eating patterns among home-workers may require further research to understand which microenvironments within the home are least conducive to unhealthy dietary consumption. Workers should also be given self-regulatory advice on how to overcome unwanted unhealthy eating habits in the home environment (Gardner, Lally, et al., 2020).

From a theoretical perspective, by documenting the impact of changes in everyday work activities on health behaviour, our findings demonstrate the importance for health of work-related motives, and the constraints that pursuing work goals imposes on perceived capabilities and opportunities for engaging in health conducive behaviours (Michie et al., 2011). Many work-related activities incidentally facilitate or inhibit health-related behaviours, because such behaviours are congruent or incongruent

with work goals. For example, moving around large workspaces involves physical activity (Gorman et al., 2013), and is instrumental to interacting with colleagues or using essential facilities. Conversely, using a computer at a desk prolongs sitting and inhibits movement (Ryde et al., 2014), but is often necessary to complete work tasks. Our results show how, when working from home, the instrumentality of health-related behaviours to the pursuit of work goals changed significantly. For example, greater use of digital communication, and a smaller physical environment, reduced the importance of movement for interaction when working at home. Indeed, our participants reported that physical activity became largely incongruent with work goals, such that taking activity breaks was seen as potentially compromising their engagement with work. Although some participants made purposeful attempts to engage in health behaviours during or outside of work time, many participants reported engaging in less physical activity and sitting for longer periods than usual. Organisations should support health behaviour among home-workers by portraying health-promoting activities as instrumental to meeting organisational goals. For example, workers might be encouraged to take walks to obtain 'thinking space' when facing difficult tasks (Ramsden, 2017; Thøgersen-Ntoumani et al., 2014) boost productivity. Encouraging health behaviours as part of work-related activity would likely target all components of the COM-B model (Michie et al., 2011). If behaviours were explicitly encouraged as beneficial for – or, at least, no hindrance to – work purposes, workers should be more motivated, and perceive greater opportunity and capability to engage in them, due to allayed concerns about appearing to be compromising productivity in the pursuit of personal health goals.

2.6.1 Limitations

Study limitations must be acknowledged. We collected data on home-working during the first UK COVID-19 lockdown which required workers and organisations to cease all non-essential workplace-based activity. Organisational policy and practice has evolved since the first lockdown, with many organisations embracing 'hybrid' home- and workplace-based working patterns (Taylor et al., 2021). Consequently, our participants' experiences could be argued to have limited application to post-pandemic settings. However, many of the phenomena we observed, such as difficulties in managing work-life boundaries when in a domestic setting, are likely to remain relevant beyond the pandemic. We recruited participants from social media platforms, who are likely to be technology literate (Alshaikh et al., 2014). Our sampling method may therefore have precluded experiences among less technologically skilled office workers, for whom greater digital dependence may be a source of anxiety (Cheng et al., 2021). In an attempt to restrict our findings to changes in work-related practices rather than changes in experiences of caring for others during lockdown, we excluded workers with dependants. Yet, one in seven workers are thought to have caring responsibilities (Graham, 2019). More research is needed to examine the health and wellbeing impacts of home-working for workers

with dependants. We did not assess participants' home-working experience prior to the pandemic. Greater home-working experience has been shown to foster development of more effective work-life balance management strategies (Allen et al., 2015). Our participants' experiences may reflect a relative lack of experience of adaptation to home-working, which may have dissipated over the longer term as they became accustomed to home-working and spontaneously adopted health-protective strategies (Allen et al., 2015). Additionally, we did not consider individual differences in our study. Individual differences, such as how people respond to work pressure, may have shaped how our participants responded to changes in home-working practices during the pandemic (Grawitch et al., 2017). For example, employees scoring higher on neuroticism tend to experience greater problems managing work-life balance (Soni & Bakhru, 2019). Future research should examine the extent to which individual differences influence how changes in work practices affect health and wellbeing.

Although we attempted to capture all relevant health behaviours via the interviews, it is possible that our prior research interest in sedentary behaviour may have influenced interview and analysis procedures, such that participants' accounts emphasised sitting and physical activity more than other health behaviours that may have changed in line with home-working practices (Darwin Holmes, 2020). Lastly, the qualitative nature of our study precludes estimation of the magnitude of impact on health and wellbeing of each of the work practice changes we documented. Future research is needed to quantify the effects of home-working practices on worker health and wellbeing.

Previous studies have identified significant detriments to health behaviour, health and wellbeing during COVID-19 pandemic lockdowns (Bouziri et al., 2020; Ingram et al., 2020; Meyer et al., 2020). Our study suggests that some of these detriments may have arisen from changes to work practices that occurred when office workers were instructed to work from home, rather than their usual workplace. Our findings illustrate the importance of recognising, outside of pandemic settings, that home-working requires adaptations to workplace-based practices, and that these adaptations can potentially affect workers' health and wellbeing. We encourage organisations to champion policies and practices that support employees' health and wellbeing when working from home.

3 Chapter 3: Study 2 - Developing measures of psychological responses to home-working practices

3.1 Study 2: Why this study was needed

Findings from Study 1 revealed important adaptations that normally-office-based workers made to their home-working practices during the first COVID-19 lockdown in Spring 2020. It suggested that home-based working practices, and the way in which participants psychologically adapted to these practices, could potentially impact their health-related behaviour and wellbeing. Specifically, findings suggested that the actions people undertake in pursuit of work-related productivity in a home-work setting may inadvertently promote the adoption of health-risk behaviours and compromise wellbeing. Study 1 was however a qualitative study, with a relatively small sample (27 participants). To more reliably establish links between how people psychologically adapt to home-working, and their health behaviour and wellbeing, and to generalize findings to a broader population of home-workers, it was necessary to construct and test a statistical model of such relationships. However, no quantitative measures of the concepts derived from Study 1 were available. Study 2 was run (March 2021) to develop and psychometrically evaluate quantitative measures of the responses to home-working practices that we identified in Study 1. These measures would then be used in Study 3, to construct a model of relationships between home-working, health behaviour and wellbeing. Study 2 was a cross-sectional study, undertaken using 240 home-workers recruited through an online study recruitment platform (Prolific). Questionnaire data were analysed via a systematic item reduction procedure, to generate a coherent and minimal set of items for use in Study 3.

3.2 Abstract

3.2.1 Objective

The qualitative findings from Chapter 2 suggest that the practices and settings associated with home-based work, along with how workers psychologically react to these work conditions, may have the capacity to influence the health-related behaviours and wellbeing of workers. To estimate links between home-working determinants and worker health-related behaviours and wellbeing, and apply findings to a broader home-working population, a statistical modelling study was needed. First, however, it was necessary to develop quantitative measures of home-working practices, and how people psychologically respond to these, to use in a statistical model of the indicated relationships.

3.2.2 Methods

Drawing on the qualitative findings of Study 1, 105 quantitative items capturing 35 tentative home-working constructs were generated (by the author [SK] and supervisor BG) for psychometric evaluation. A cross-sectional survey was then administered, in March 2021, to capture the prospective psychological responses to home-working practice items, among 240 home-working participants recruited via an online platform (Prolific). Items were systematically refined and reduced using this dataset. Data were psychometrically evaluated for construct and face validity using Exploratory Factor Analyses, and construct reliability was examined via Cronbach's Alpha and McDonald's Omega. Face validity was assessed by SK and supervisor BG.

3.2.3 Results

The item refinement procedure produced a final set of 25 valid and reliable items, which measured ten discrete psychological responses to home-working practices. The ten psychological responses to home-working practices constructs included: Ability to switch off, Workload manageability, Pressure to work at the same time as colleagues, Video on / off pressure, Home-working autonomy, Freedom to transition between home & working environments, Pressure to attend meetings, Perceived excess of daily work meetings, Ability to transform workspaces, Work-day planning & organization.

3.2.4 Conclusions

Valid and reliable measures for psychological responses to home-working practices were obtained. This equipped us with the quantitative measures necessary to undertake a subsequent statistical modelling exercise to test relationships between home-working, health-related behaviours and wellbeing.

3.3 Introduction

The growing prevalence of home-working among office-based employees, catalysed by the COVID-19 pandemic, prompted the previous study (Study 1; Chapter 2), which used qualitative methods to investigate experiences of normally-office-based workers working from home during the UK COVID-19 pandemic lockdown (Institute for Government, 2021 Study 1, Chapter 2). Responses from Study 1 participants suggested that the way in which office workers adapted their working practices and routines when working from home could potentially impact their health behaviours and wellbeing. For example, participants reported sitting more and moving less due to an increased use of digital technology to perform work tasks. More specifically, Study 1 (Chapter 2) demonstrated how workers responded *psychologically* to changes in their working practices and routines when working from home, and the often detrimental impact that these psychological adaptations had on their health behaviour and wellbeing. For example, many reported a psychological blurring of home and work boundaries, and reported difficulties switching off in the evenings and trouble getting to sleep. Such findings align with the observed absence of incidental benefits of office-based work, whereby homeworkers no longer engaging in a commute or the work practices performed in-office likely experience a decrease in daily movement (Jancey et al., 2016; Smith et al., 2015), and also no longer benefit from a physical and psychological demarcation between work and home life (Jachimowicz et al., 2021).

Study 1 (Chapter 2) was based on a sample of only 27 homeworkers, which questions the generalisability of our findings. Study 1 (Chapter 2) also used qualitative methods, which are suitable only for documenting experiences, not establishing causal relationships. This echoes a broader research gap, whereby there is a general lack of quantitative research regarding whether and to what extent home-working practices, and workers' psychological responses to these, have a causal impact on health and wellbeing (Atieno OP, 2009; Shifrin & Michel, 2022). Statistical modelling, with a large and adequately powered sample, is required to explore the potentially complex interactions between working from home and the health-related behaviour and wellbeing changes that may subsequently occur. More specifically, adopting a 'network analysis' approach to model and quantify relationships would allow us to understand how specific experiences of and psychological responses to home-working practices, specific health behaviours, and indicators of wellbeing relate to one another (Sanbonmatsu et al.,

2021). Modelling such relationships would facilitate an understanding of possible home-working determinants of home-worker's health-related behaviours, which in turn may begin to inform the development of interventions aimed at supporting home-worker health (Bartholomew-Eldredge LK et al., 2016; O'Cathain et al., 2019; Skivington et al., 2021; Yardley et al., 2015).

To statistically model relationships between variables, reliable and robust measures of home-working practices and participants' psychological responses to these practices are needed. To our knowledge, at the time that the study described in this chapter was undertaken (Spring 2021), no validated measures were available of any of the core concepts that we inductively derived from Study 1 (Chapter 2). This chapter reports work to develop quantitative measures of core concepts derived from the qualitative findings in Study 1 (Chapter 2). The study was undertaken as preliminary work to inform the selection of measures in a subsequent predictive study (Study 3; Chapter 4). Specific study aims were to (1) convert qualitative thematic findings into meaningful quantitative Likert style items, (2) identify and confirm measurable latent constructs, and (3) refine and reduce items down to provide a parsimonious measure of identified latent constructs.

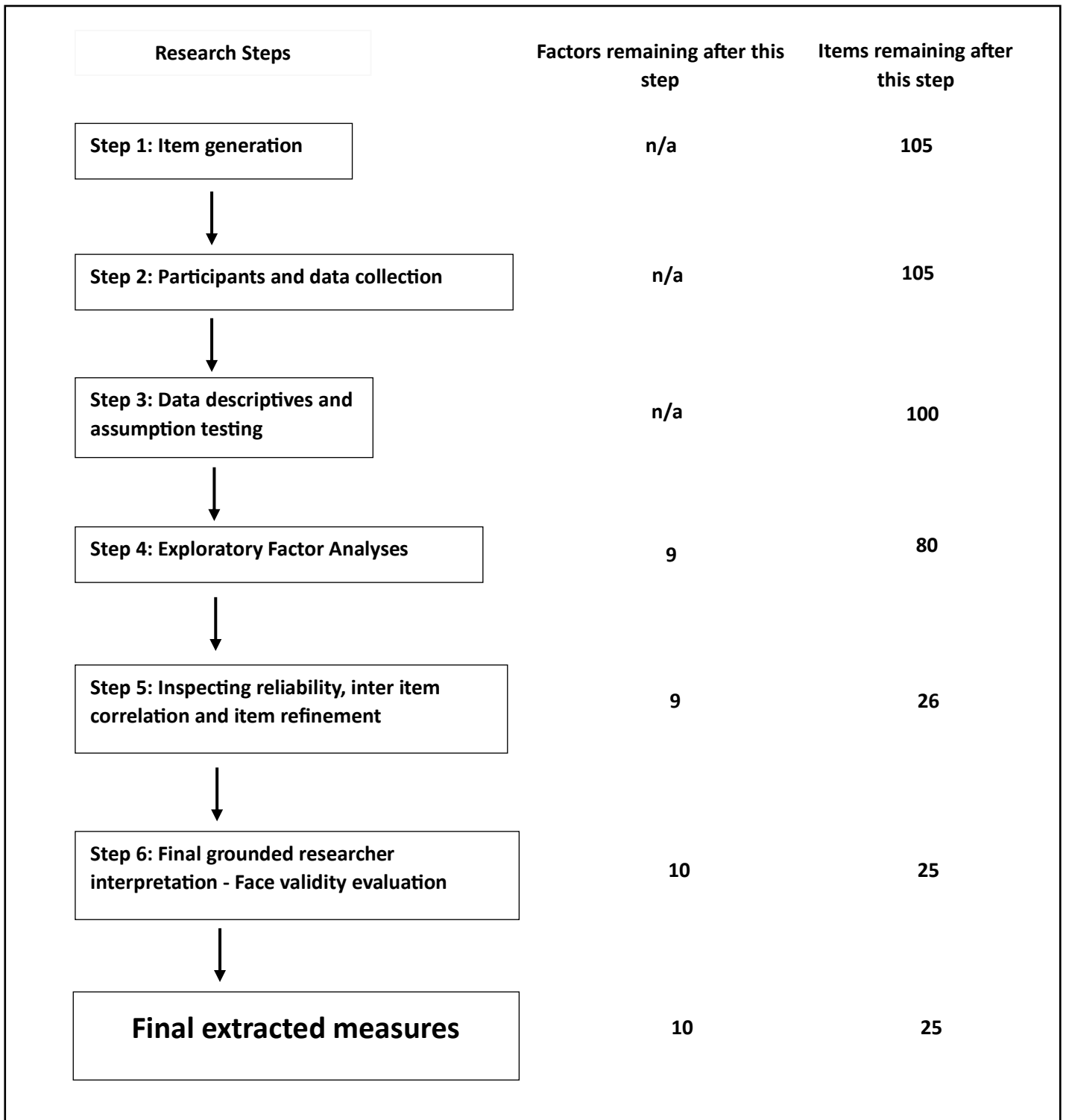
3.4 Method and Results

3.4.1 Summary

Drawing on the mixed-methods scale validation model recommended by Zhou (2019), and best practice guidelines for developing and validating health, social, and behavioural scales provided by Boateng et al. (2018), we followed six stages to develop quantitative measures of psychological responses to home-working practices (see Figure 1). Step one involved generating potential items that aimed to quantitatively measure home-working practices and participants' psychological responses to these practices. Step two involved collecting survey data online, among a sample of homeworkers recruited via a panel data platform Prolific, to be used in steps 3-6 (data analysis). Step three involved inspecting and evaluating the suitability of the data obtained to proceed with the intended analyses. Step four, using exploratory factor analysis (EFA), identified and reduced items to a set of core, representative constructs. Step five involved assessing factor composite reliability, which informed further refinement and reduction in items contributing to each of the identified constructs. Step six involved interpreting, labelling and iteratively refining the extracted multi-item constructs, to optimise them for use in a subsequent quantitative study (Chapter 4).

Figure 1

Flow diagram of six stages of item development, construct identification and item reduction.



3.4.2 Step 1: Quantitative item generation

This step aimed to generate quantitative item statements representing notable concepts identified in the qualitative findings of Study 1 (Chapter 2). Items capturing responses to home-working practices were generated by drawing from the four themes and sub-themes that emerged from Study 1 (see Chapter 2). These themes related to how workers interfaced with work tasks and colleagues ('changes to the work interface'), how they adapted to a new physical space ('adaptations to a new workspace'), how they negotiated work-life boundaries ('changes to work-life balance'), and their 'adjustments to a new social context' (see Study 1). Step 1 involved the conversion of thematic concepts from Study 1 into a set of variables and potential measures of these variables, followed by a review of item content validity through construct reflection and debriefing (Zhou, 2019). Reflection involved a collaborative process of defining each of the scale constructs and debriefing involved discussing the structural relationships of how each item may contribute to the defined construct (Zhou, 2019). Step 1 was undertaken collaboratively and iteratively by the present author (SK) and the research supervisor (BG) – both of whom were involved in analysing the Study 1 data – through a series of online supervision meetings, email exchanges, and messages on Microsoft Teams, between February – March 2021. This item generation process occurred during the UK's second national COVID-19 pandemic lockdown (Institute for Government, 2021). Given the urgency of data collection amidst potential changes to lockdown restrictions and so to home-working dynamics, a comprehensive content validity assessment via a panel review, as typically recommended, was not feasible within the time and resource constraints.

First, we sought to identify and determine the distinct components embodied among the four themes from Study 1. This produced a list of 35 distinct concepts that both researchers agreed could potentially be converted into Likert-type scale measurement. Utilising compiled representative quotations, sub-theme titles and summary descriptions, and our analytical understanding of each of the themes, we next developed statements intended to measure each of the 35 constructs via three possible facets representing a type of response to home-working practices. These facets included engagement in that practice (i.e., behaviour; e.g. 'I

am online throughout the working day'), the individual's sense of control over engaging in this behaviour (e.g. *'I am free to choose when I am online during the working day'*), and perceived social pressure from colleagues to engage (or refrain from engaging) in this behaviour (e.g. *'my colleagues expect me to be online throughout the working day'*). All items were refined – i.e., reworded and reorganised as necessary – until both researchers agreed that they were satisfied that the items captured the intended constructs.

A total of 105 items were generated, i.e., three items for each of 35 tentative variables (see Table 2 for full item breakdown). Each item was preceded with one of three allocated prefixes, according to which prefix was most applicable (“When working from home...”, “When I finish a home-working day...”, “On days when I work from home...”). All items were designed to be scored on a seven-point Likert scale, either capturing agreement with an item statement (e.g. ‘Strongly disagree’ to ‘Strongly agree’) or the frequency at which participants engaged with the presented behaviour (e.g. ‘Never’ to ‘Always’).

3.4.3 Step 2: Collection of empirical data

The objective of this step was to elicit responses from a home-working population to collect data suitable for psychometric evaluation based on the generated items. The 105 items generated in Step 1 were randomised in order and inputted into an online questionnaire including questions that also gathered the following demographic data: age, gender, employment status, occupational industry, current job tenure, and living situation (living alone or with others). An attention check (e.g. “For this item, please click 'Somewhat agree'”) was utilised to aid identification of disengaged responses (Hauser & Schwarz, 2016). During March 2021, the questionnaire was made available on the online panel data platform Prolific. Eligible participants were fluent English-speaking employees who were working from home due to the COVID-19 pandemic. On average, the questionnaire took 23.5 minutes to complete and upon completion, participants were compensated £2.94 for their time. A total of 331 responses were collected, however, 91 participants were retrospectively found not to meet our eligibility criteria so were removed. Specifically, 79 participants were unemployed, 11 were not fluent in English, and one individual failed an attention check. The final dataset comprised data from 240 participants, each of whom provided full data for each of the 105

items, such that there were no missing data. Table 1 presents the demographic characteristics of the participants involved.

Table 1*Step 2: Demographic characteristics of participants*

	<i>n</i>	%	M	SD
Age	240	100	31.89	9.50
Gender				
Female	128	53.33		
Male	112	46.66		
Cohabitation				
Live with others	201	16.25		
Live on own	39	83.75		
Employment Status				
Full-time	197	82.08		
Part-time	43	17.92		
Occupational Industry				
Finance and Insurance	31	12.92		
Information Services and Data Processing	22	9.17		
College, University, and Adult Education	19	7.92		
Software	19	7.92		
Computer and Electronics	17	7.08		
Government and Public Administration	17	7.08		
Health Care and Social Assistance	14	5.83		
Retail	9	3.75		
Telecommunications	9	3.75		
Design	7	2.92		
All other industries*	55	22.92		
Job tenure	240	100	4.2y	4.69y

Note. All other industries* contained the 14 remaining identified industries.

3.4.4 Step 3: Testing the assumptions of Exploratory Factor Analysis

The aim of this step was to assess whether data from Step 2 were suitable for entry into an Exploratory Factor Analysis.

3.4.4.1 Assessing data for normality.

The suitability of the estimation method employed in exploratory factor analysis can be determined by whether the data obtained displays multivariate normality. Accordingly, data distributions were evaluated for each of the 105 items, where non-normality was indicated by skewness values of ∓ 1.5 and kurtosis value of ∓ 2 . These criteria resulted in the identification and removal of five items displaying non-normality (Q40, Q24, Q22, Q25, Q100; see Table 2). Data for the remaining 100 items displayed multivariate normality, so were suitable for entry into an exploratory factor analysis using the maximum likelihood estimation method (Fabrigar et al., 1999). Kolmogorov-Smirnov and Shapiro-Wilk normality tests indicated deviations from normality across our item data. However, these tests are known to be conservative and factor analysis remains robust under moderate violations of normality (Mvududu & Sink, 2013).

3.4.4.2 EFA assumption testing.

EFA assumptions were assessed via the Kaiser Mayer Olkin (KMO) test of sample size sufficiency (Kaiser, 2016) and Bartlett's Test of Sphericity (Bartlett, 1954). KMO test values greater than 0.60 indicate a sufficient sample size for the analyses and a significant Bartlett's sphericity test indicate that the data were inter-related, and factor analysis is appropriate (Hair et al., 2019). Bartlett's test of sphericity ($\chi^2 = 19767.94, p < .001$) results indicated significant correlations among the observed variable items, and KMO test (0.80) supported the adequacy of the sample obtained. Accordingly, the assumption testing confirmed the suitability to proceed with exploratory factor analysis.

Table 2

Item and intended construct breakdown detailing measure dimension, Likert scale frame, mean, standard deviation, skewness and kurtosis.

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis
Perceived frequency of meetings/calls	Behaviour	1	When working from home, I attend too many meetings	A	3.71 (1.86)	0.20	-1.13
		2	When working from home, the amount of meetings I have is burdensome	A	3.56 (1.9)	0.26	-1.24
		3	When working from home, the amount of meetings I have is excessive	A	3.6 (1.87)	0.18	-1.14
	Control	4	When working from home, I am free to decide how many meetings I attend	A	4.74 (1.59)	-0.36	-0.75
		5	When working from home, I have little control over how many meetings I attend	A	3.35 (1.63)	0.42	-0.64
		6	When working from home, I have no choice over how many meetings I attend	A	3.5 (1.65)	0.19	-0.96
	Social norm/pressure	7	When working from home, my colleagues expect me to attend all work-related meetings	A	5.31 (1.54)	-1.02	0.50
		8	When working from home, I feel that I have to attend all work-related meetings	A	5.27 (1.45)	-0.98	0.56
		9	When working from home, I feel pressured to attend all work-related meetings	A	4.79 (1.7)	-0.65	-0.45
Control over break taking	Control	10	When working from home, I am free to take breaks whenever I please	A	5.23 (1.49)	-0.97	0.50
		11	When working from home, it is difficult for me to take breaks	A	4.8 (1.74)	-0.54	-0.81

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis
Time richness of WFH day	Control	12	When working from home, I have no choice over when I take breaks	A	5.49 (1.46)	-1.32	1.26
		13	When working at home, I have enough time in the day to deal with my workload	A	4.96 (1.57)	-0.82	-0.16
		14	When working from home, the time that I have each day is sufficient to deal with my workload	A	4.83 (1.53)	-0.70	-0.18
		15	When working from home, there is not enough time in the day to deal with my workload	A	4.68 (1.77)	-0.52	-0.87
Perceived workload manageability	Control	16	When working from home, my day to day working tasks are manageable	A	5.31 (1.18)	-1.15	1.82
		17	When working from home, I am capable of managing my workload	A	5.51 (1.24)	-1.26	1.95
		18	When working from home, I am unable to manage my workload	A	5.16 (1.55)	-0.83	-0.04
Break taking - at computer or away	Behaviour	19	When working from home, when I take a break from work, I get up and leave my work space	F	4.73 (1.55)	-0.37	-0.73
		20	When working from home, when I take a break from work, I stay in my workspace	F	4.27 (1.53)	-0.10	-0.78
		21	When working from home, when I take a break from work, I move away from my workspace	F	4.67 (1.49)	-0.23	-0.74

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis	
Workspace consistency	Control	22	When working from home, when I take a break from work, I am free to get up and leave my workspace	A	6.03 (1.24)	-1.56	2.24	
		23	When working from home, when I take a break from work, it is difficult for me to leave my workspace	A	4.87 (1.76)	-0.60	-0.81	
		24	When working from home, when I take a break from work, I can leave my workspace if I want to	A	6.02 (1.24)	-1.87	3.79	
	Behaviour	25	When working from home, I consistently use the same workspace for all work-related tasks	A	5.8 (1.32)	-1.50	2.21	
		26	When working from home, I use different areas of my home for work-related tasks	A	4.88 (1.93)	-0.56	-1.12	
		27	When working from home, I complete all my work-related tasks in the same area of my home	A	5.73 (1.35)	-1.22	0.85	
		Control	28	When working from home, I have no choice but to use the same workspace for all work-related tasks	A	3.46 (1.97)	0.29	-1.29
			29	When working from home, I am able to use different areas of my home for work-related tasks	A	4.21 (1.94)	-0.25	-1.23
			30	When working from home, I am free to choose where I complete my work-related tasks	A	5.21 (1.64)	-1.09	0.36
			Behaviour	31	When I finish a home-working day, I pack away my work-related items (e.g. computer, documents etc.) for the evening	F	2.93 (1.97)	0.82
Transforming workspace								

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis
		32	When I finish a home-working day, I leave my work-related items (e.g. computer, documents etc.) set up for the morning	F	3.06 (2.1)	0.67	-0.98
		33	When I finish a home-working day, I place my work-related items (e.g. computer, documents etc.) out of sight for the evening	F	3.3 (2.14)	0.53	-1.19
	Control	34	When working from home, I have no choice but to leave my work-related items (e.g. computer, documents, etc) set up when I finish the working day	A	4.74 (1.96)	-0.60	-0.97
		35	When working from home, I am free to pack away my work-related items (e.g. computer, documents, etc.) when I finish the working day	A	5.37 (1.65)	-1.08	0.32
		36	When working from home, it is difficult for me to pack away my work-related items (e.g. computer, documents etc.) when I finish the working day	A	4.59 (2.04)	-0.37	-1.31
Snacking	Control	37	When working from home, I can easily access snacks	A	5.82 (1.22)	-1.22	1.36
		38	When working from home, it is difficult for me to access snacks	A	5.96 (1.17)	-1.42	1.77
		39	When working from home, I have snacks readily available to me	A	5.14 (1.54)	-0.85	0.04
Visibility	Behaviour	40	When working from home, I am online throughout the working day	A	6.02 (1.13)	-1.62	3.05

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis
		41	When working from home, I am online at times that suit me during the working day	A	3.69 (1.76)	0.31	-1.08
		42	When working from home, I am online at all times	A	5.71 (1.28)	-1.29	1.69
	Control	43	When working from home, I am free to choose when I am online during the working day	A	3.58 (1.81)	0.19	-1.16
		44	When working from home, I have no choice but to be online throughout the working day	A	3.02 (1.71)	0.61	-0.58
		45	When working from home, it is up to me when I'm online during the working day	A	3.59 (1.78)	0.22	-1.12
	Social norm/pressure	46	When working from home, my colleagues expect me to be online throughout the working day	A	5.4 (1.45)	-0.88	0.22
		47	When working from home, I feel that I have to be constantly online during work hours	A	5.48 (1.47)	-1.05	0.65
		48	When working from home, I feel pressured to be online throughout the working day	A	4.88 (1.83)	-0.60	-0.80
Work time quantity	Behaviour	49	When working from home, I make sure to work the same amount of hours as my colleagues	A	4.69 (1.67)	-0.61	-0.56
		50	When working from home, I work for the same amount of hours as my colleagues	A	4.89 (1.56)	-0.71	-0.31

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis	
Work clock-based time	Control	51	When working from home, I work for a similar amount of time as my colleagues	A	5.21 (1.39)	-1.20	1.08	
		52	When working from home, I have no choice but to work for the same amount of hours as my colleagues	A	4.22 (1.84)	-0.11	-1.21	
		53	When working from home, I am free to determine the amount of hours that I work each day	A	3.66 (1.91)	0.09	-1.29	
	Social norm/pressure	54	When working from home, I can choose how many hours to work each day	A	3.79 (1.94)	0.11	-1.32	
		55	When working from home, my colleagues expect me to work the same amount of hours as they do	A	4.76 (1.65)	-0.68	-0.40	
		56	When working from home, I feel that I have to work for the same amount of hours as my colleagues	A	4.88 (1.67)	-0.62	-0.57	
		57	When working from home, I feel pressure to work for the same amount of hours as my colleagues	A	4.16 (1.86)	-0.22	-1.16	
	Behaviour	58	When working from home, I work at the same time of day as my colleagues	F	5.15 (1.49)	-0.81	0.07	
		59	When working from home, I work at the times of the day that suit me	F	3.92 (1.68)	0.13	-0.99	
		60	When working from home, I work at similar times of day as my colleagues	F	5.32 (1.3)	-0.88	0.60	
		Control	61	When working from home, I have no choice but to work at the same time as my colleagues	A	3.7 (1.87)	0.24	-1.20
			62	When working from home, I am free to complete my work tasks at whatever time I wish	A	4.2 (1.7)	-0.22	-1.06

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis
Video-on culture	Social norm/pressure	63	When working from home, I can choose when to complete my work tasks	A	4.29 (1.72)	-0.32	-0.98
		64	When working from home, my colleagues expect me to work at the same time as they do	A	4.91 (1.61)	-0.78	-0.13
		65	When working from home, I feel I have to work at the same time as my colleagues	A	4.91 (1.66)	-0.76	-0.29
		66	When working from home, I feel pressured to work at the same time as my colleagues	A	3.98 (1.79)	-0.07	-1.14
	Behaviour	67	When working from home, I have my <u>video on</u> during video calls	F	4.24 (1.93)	-0.16	-1.21
		68	When working from home, I have my <u>video off</u> during video calls	F	4.23 (1.93)	-0.17	-1.25
		69	When working from home, I only have my video on for certain video calls	F	3.93 (1.94)	0.16	-1.20
	Control	70	When working from home, I am free to have my video off during video calls	A	3.29 (1.88)	0.49	-1.05
		71	When working from home, I am free to choose whether to have my video on or off during video calls	A	4.62 (1.89)	-0.53	-0.86
		72	When working from home, I can choose whether I have my video on or off during video calls	A	4.62 (1.87)	-0.58	-0.79
73		When working from home, my colleagues expect me to have my video on during video calls	A	3.97 (1.89)	-0.07	-1.16	
	Social Pressure/norms						

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis	
Video call standing/walking	Behaviour	74	When working from home, I feel that I should have my video on during video calls	A	4.39 (1.96)	-0.31	-1.25	
		75	When working from home, I feel pressured to have my video on during video calls	A	3.68 (1.87)	0.07	-1.18	
		76	When working from home, I sit down whilst on video calls	F	5.92 (1.4)	-1.46	1.82	
		77	When working from home, I stand whilst on video calls	F	5.88 (1.35)	-1.24	0.98	
		78	When working from home, I move around whilst on video calls	F	5.57 (1.47)	-1.01	0.26	
	Control	79	When working from home, I have no choice but to sit down whilst on video calls	A	3.9 (1.98)	-0.01	-1.39	
		80	When working from home, I am free to stand or move around whilst on video calls	A	4.19 (1.87)	-0.29	-1.10	
		81	When working from home, I can choose whether to stand or move around whilst on video calls	A	4.08 (1.85)	-0.13	-1.15	
		Social norm/pressure	82	When working from home, my colleagues expect me to be sitting whilst attending video calls	A	4.18 (1.75)	-0.17	-0.85
			83	When working from home, I feel that I should sit down whilst attending video calls	A	5.02 (1.63)	-0.80	-0.22
84	When working from home, I feel pressured to be seated whilst attending video calls		A	3.75 (1.82)	0.08	-1.13		

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis
Distractibility of home environment	Control	85	When working from home, I get distracted by matters unrelated to work	F	4.04 (1.48)	0.04	-0.70
		86	When working from home, non-work-related matters distract me from my work tasks	F	3.92 (1.46)	0.05	-0.60
		87	When working from home, non-work-related matters get in the way of my work	F	3.46 (1.45)	0.29	-0.61
Working past normal hours	Behaviour	88	When working from home, I work more hours than I am contracted to	F	3.76 (1.79)	0.15	-1.06
		89	When working from home, I work into my leisure time	F	3.75 (1.61)	0.05	-0.83
		90	When working from home, I work past my daily contracted hours	F	3.82 (1.67)	0.15	-0.73
Planning/managing working day	Behaviour	91	When working from home, I plan out each day to make sure I get all my work done	F	4.23 (1.53)	-0.13	-0.59
		92	When working from home, I plan out the home-working tasks I am doing day by day	F	4.07 (1.55)	-0.02	-0.71
		93	When working from home, I make sure to plan out each working day	F	4.18 (1.61)	-0.10	-0.78
Switching off from work	Behaviour	94	On days when I work from home, I 'switch off' from work when I have finished working	F	4.73 (1.77)	-0.39	-0.90
		95	On days when I work from home, I think about work long after I have finished the working day	F	4.22 (1.6)	-0.14	-0.81
		96	On days when I work from home, I am able to disconnect from work after I have finished the working day	F	4.63 (1.73)	-0.23	-1.11

Tentative Variable	Measurement dimension	#	Item	Likert option	M (SD)	Skewness	Kurtosis
Environmental transitions	Behaviour	97	When I finish a home-working day, I leave the space that I was working in	F	4.69 (1.79)	-0.38	-0.90
		98	When I finish a home-working day, I stay in the space that I was working in	F	4.38 (1.82)	-0.21	-0.98
		99	When I finish a home-working day, I move to a space that I don't use for work	F	4.64 (1.87)	-0.41	-0.93
	Control	100	When I finish a home-working day, I am free to leave the space that I was working in	A	5.96 (1.44)	-1.65	2.04
		101	When I finish a home-working day, I have no choice but to stay in the space that I was working in	A	5.48 (1.75)	-1.09	0.02
		102	When I finish a home-working day, it is difficult for me to leave the space that I was working in	A	5.08 (1.88)	-0.66	-0.89
Behavioural transitions	Behaviour	103	When working from home, I routinely engage in a non-work activity before I start working	F	3.95 (1.78)	-0.01	-1.05
		104	When working from home, I routinely engage in a non-work activity when I finish work	F	5.19 (1.53)	-0.64	-0.36
		105	When working from home, I make sure to engage in a non-work activity before and after I start working.	F	4.14 (1.66)	-0.04	-0.83

Note. Likert option A = Agreement scale ('Strongly disagree' to 'Strongly agree'); Likert option F = Frequency scale ('Never' to 'Always'); SD = Standard deviation.

3.4.5 Step 4: Conducting Exploratory Factor Analyses

This step aimed to identify representative underlying home-working practices and psychological responses to these practices, thereby refining items down to discrete conceptual constructs and establishing the construct validity of the concepts indicated to be measured.

3.4.5.1 Selecting a Factor analysis method.

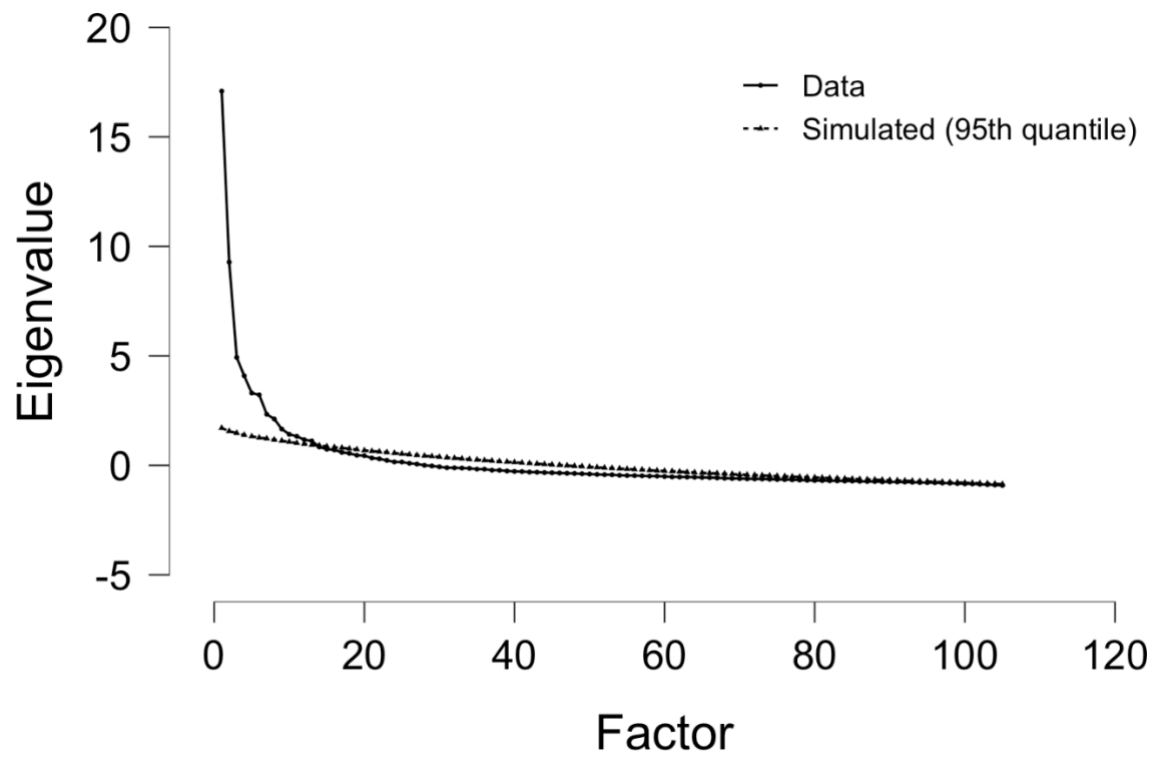
Due to satisfactory indications of normality exhibited by the remaining items for analysis, Exploratory Factor Analysis (EFA) was conducted using a maximum likelihood estimation method (H. S. Park et al., 2002). In anticipation of inter-correlation among factors, a rotation method that assumes factors to be related was employed, specifically, direct oblimin rotation (Tabachnick & Fidell, 2014). Toward establishing core latent factors in the data, factor retention was estimated by method of parallel analysis (Horn, 1965; Howard, 2016). This method approaches factor retention by comparing the eigenvalues of the present data set with a simulated random data set, whereby, eigenvalues of the actual data set greater than that of the random data set provide support to retain the observed factor, therefore ensuring that possible spurious factors are ignored (Çokluk & Koçak, 2016). Factor loadings below the value of 0.3 were deemed to be non-meaningful and were therefore suppressed from the analyses (Shrestha, 2021).

3.4.5.2 Conducting the first EFA.

The first EFA analyses produced a 12-factor structure accounting for 54.60% of the variation in the data. Factor extraction was determined by parallel analyses and Kaiser's criterion (see scree plot in Figure 2). Most items loaded on to the 12 extracted factors, whereby each factor had between 3 – 16 loaded items. Twelve items however did not load on any of the extracted factors (<0.30). With the aim of obtaining a simple structure with no unloaded or cross-loaded items, the EFA was conducted iteratively with an item removal procedure applied. The following iterations displayed satisfactory KMO (>.80) and Bartlett's test of sphericity ($p<.001$) values.

Figure 2

Step 4: 1st iteration of Exploratory factor analyses: Scree plot



3.4.5.3 EFA – iterative unloaded item removal.

Initial concern was directed towards items that did not load on any factor and one by one, unloaded items displaying the highest uniqueness value were removed. As seen in Table 3, 12 EFA iterations were conducted which led to the identification and removal of 12 unloaded items (27, 103, 105, 39, 37, 38, 26, 42, 29, 87, 86, and 12). This approach ensured that only items empirically demonstrated to be closely aligned with the underlying constructs were retained, thereby enhancing the coherence and robustness of the factor structure. The 13th EFA iteration produced a nine-factor structure on which all items loaded on at least one factor.

3.4.5.4 EFA – iterative cross-loaded item removal.

In the 13th EFA iteration, ten items cross-loaded on at least two extracted factors. One by one, cross-loaded items were removed based on having either low loadings on multiple factors, indicating that they did not contribute sufficiently to any factor, equal loadings on multiple factors, indicating that they did not contribute uniquely to, so were not sufficiently characteristic of, the extracted factors. Instances of cross loadings that had a high loading ratio, indicating a substantial contribution to one factor, but a negligible contribution to another (e.g. below 0.325), were considered for retention. This process was repeated until a factor structure was obtained that no longer warranted the removal of any items. EFA iterations were ran eight more times leading to the removal of one unloaded item and seven cross-loading items (see Table 3). Specifically, on the 13th EFA iteration, item 80 was removed (factor 3 = -0.315; factor 8 = 0.341). At the 14th stage of EFA iteration, item 28 did not load on any factor and was removed. On the 15th EFA iteration, item 66 was removed (factor 1 = -0.33; factor 5 = 0.35). The 16th EFA, item 82 was removed (factor 3 = 0.32; factor 5 = 0.377). EFA iteration 17, item 44 was removed (factor 4 = 0.354; factor 5 = -0.385). The 18th EFA iteration, item 32 was removed (factor 5 = -0.379; factor 8 = 0.483). On the 19th EFA, item 81 was removed (factor 3 = -0.311; factor 9 = 0.33). The 20th EFA, item 23 was removed (factor 6 = 0.393; factor 9 = 0.36).

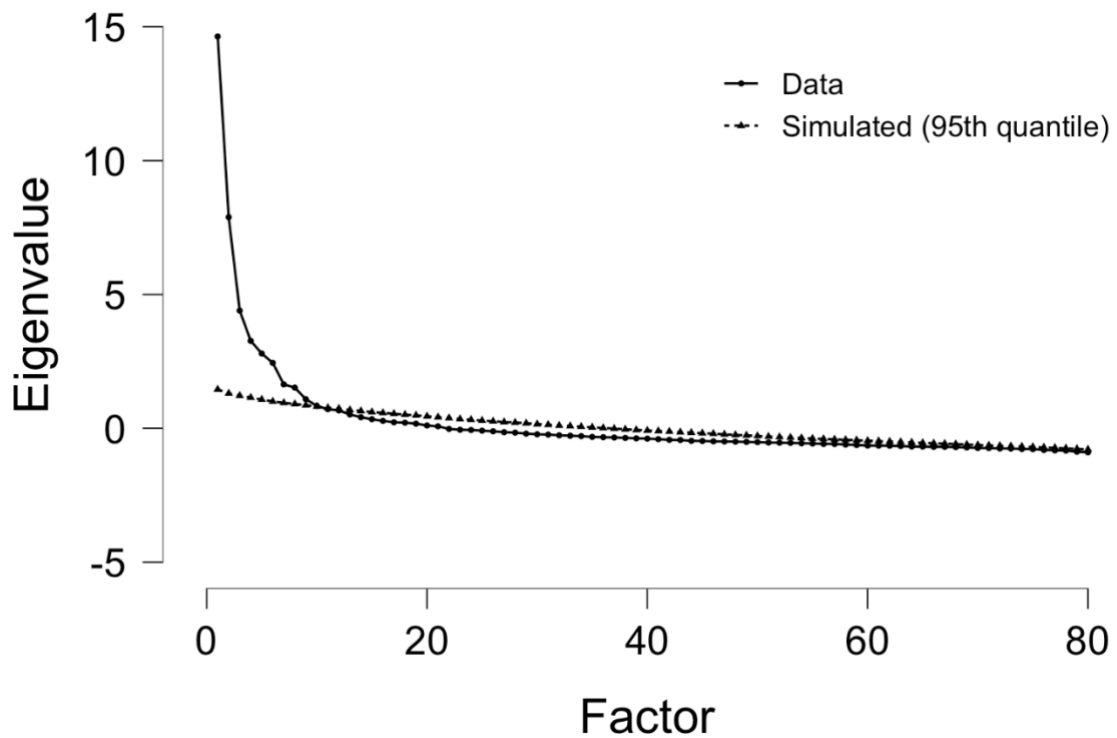
Table 3*Step 4: Exploratory factor analysis item removal iterations*

EFA Iteration	Factors extracted	Item removed (item #)	Reason
1	12	I consistently use the same workspace for all work-related tasks (27)	Unloaded + Highest uniqueness (0.869)
2	11	I routinely engage in a non-work activity before I start working (103)	Unloaded + Highest uniqueness (0.862)
3	10	I make sure to engage in a non-work activity before and after I start working. (105)	Unloaded + Highest uniqueness (0.862)
4	10	I have snacks readily available to me (39)	Unloaded + Highest uniqueness (0.869)
5	9	I can easily access snacks (37)	Unloaded + Highest uniqueness (0.884)
6	9	It is difficult for me to access snacks (38)	Unloaded + Highest uniqueness (0.852)
7	9	I use different areas of my home for work-related tasks (26)	Unloaded + Highest uniqueness (0.851)
8	9	I am online at all times (42)	Unloaded + Highest uniqueness (0.829)
9	9	I am able to use different areas of my home for work-related tasks (29)	Unloaded + Highest uniqueness (0.798)
10	9	Non-work-related matters get in the way of my work (87)	Unloaded + Highest uniqueness (0.76)
11	9	Non-work-related matters distract me from my work tasks (86)	Unloaded + Highest uniqueness (0.823)
12	9	I have no choice over when I take breaks (12)	Unloaded (<.30)
13	9	I am free to stand or move around whilst on video calls (80)	Lowest cross factor loadings
14	9	I have no choice but to use the same workspace for all work-related tasks (28)	Unloaded (<.30)
15	9	I feel pressured to work at the same time as my colleagues (66)	Lowest cross factor loadings
16	9	My colleagues would expect me to be sitting whilst attending video calls (82)	Lowest cross factor loadings
17	9	I have no choice but to be online throughout the working day (44)	Lowest cross factor loadings
18	9	I leave my work-related items (e.g. computer, documents etc.) set up for the morning (32)	Lowest cross factor loadings
19	9	I can choose whether to stand or move around whilst on video calls (81)	Lowest cross factor loadings
20	9	When I take a break from work, it is difficult for me to leave my workspace (23)	Lowest cross factor loadings
21	9	All items retained	n/a

The 21st and final iteration of EFA produced a nine-factor structure (80 items). Within this iteration, two items (4 & 61) displayed cross-loadings but were considered suitable for retention due to a relatively high ratio between factor loadings (item 4: factor 4 = -0.301; factor 5 = 0.556 & item 61: factor 1 = -0.563; factor 4 = 0.325). Factor extraction was determined by parallel analyses and Kaiser’s criterion (see scree plot in Figure 3). The factor structure accounted for 52.78% of the variance in the data.

Figure 3

Step 4: 21st iteration of Exploratory factor analyses: Scree plot



As seen in Table 4, factor one contained 14 items displaying a range of absolute factor loadings between 0.403 – 0.723. Items referred to perceptions of working times, workload, break taking, and being able to switch off from work in the evenings. Factor two contained 12 items displaying a range of absolute factor loadings between 0.535 – 0.775. All items referred to perceived expectations and felt pressures to work for similar amounts of time and at similar times of the day as compared to work colleagues. Factor three contained 11 items displaying absolute factor loadings ranging between 0.374 – 0.875. All items referred to perceptions of

pressures or tendencies to have video on or off during digital work meetings. Factor four contained 10 items displaying absolute factor loadings ranging between 0.529 – 0.73. Items mostly referred to a perceived freedom to choose when work tasks are completed during the working day. Factor five contained eight items displaying factor loadings ranging between 0.361 – 0.935. Items referred to the freedom to physically transition between work and home spaces during and after the workday. Factor six contained 13 items with absolute factor loadings ranging between 0.322 – 0.715. Items referred to pressure to be online, to attend meetings, and perceptions of whether to be seated or standing during digital work meetings. Factor seven consisted of just three items with factor loadings ranging from 0.811 – 0.987. The three items primarily referred to perceptions of having an excess of daily work meetings. Factor eight comprised five items with factor loadings ranging between 0.475 – 0.701. Items referred to experiences of transforming workspaces in the home. Factor nine contained three items with absolute factor loadings ranging between 0.316 – 0.931. Two items referred to perceived engagement in planning and organising work-day tasks, and one item related to the distractibility of working from home. See Table 4 for full itemised breakdown at this stage of the item reduction process.

Table 4

Factors and items after Step 4: Extracted factors, items, and item factor loadings.

Item	f 1	f 2	f 3	f 4	f 5	f 6	f 7	f 8	f 9
Q11_It is difficult for me to take breaks	0.53								
Q13_I have enough time in the day to deal with my workload	0.71								
Q14_The time that I have is sufficient to deal with my workload	0.70								
Q15_There is not enough time in the day to deal with my workload	0.65								
Q16_My day to day working tasks are manageable	0.61								
Q17_I am capable of managing my workload	0.54								
Q18_I am unable to manage my workload	0.56								
Q88_I work more hours than I am contracted to	-0.61								
Q89_I work into my leisure time	-0.61								
Q90_I work during my leisure time	-0.67								
Q94_I switch off from work when I have finished working	0.66								
Q95_I think about work long after I have finished the working day	0.73								
Q96_I am able to disconnect from work after I have finished the working day	0.71								
Q104_I routinely engage in a non-work activity when I finish work	0.42								
Q49_I make sure to work the same amount of hours as my colleagues		0.71							
Q50_I work for the same amount of hours as my colleagues		0.71							
Q51_I work for a similar amount of time as my colleagues		0.72							
Q52_I have no choice but to work for the same amount of hours as my colleagues		0.66							
Q55_My colleagues expect me to work the same amount of hours as they do		0.77							
Q56_I feel that I have to work for the same amount of hours as my colleagues		0.73							

Item	f 1	f 2	f 3	f 4	f 5	f 6	f 7	f 8	f 9
Q57_ I feel pressure to work for the same amount of hours as my colleagues		0.53							
Q58_ I work at the same time of day as my colleagues		0.68							
Q60_ I work at similar times of day as my colleagues		0.58							
Q61_ I have no choice but to work at the same time as my colleagues		-0.56		0.33					
Q64_ My colleagues expect me to work at the same time as they do		0.75							
Q65_ I feel I have to work at the same time as my colleagues		0.75							
Q67_ I have my video on during video calls			0.68						
Q68_ I have my video off during video calls			0.75						
Q69_ I only have my video on for certain video calls			0.47						
Q70_ I am free to have my video off during video calls			0.88						
Q71_ I am free to choose whether to have my video on or off during video calls			-0.84						
Q72_ I can choose whether I have my video on or off during video calls			-0.83						
Q73_ My colleagues expect me to have my video on during video calls			0.78						
Q74_ I feel that I should have my video on during video calls			0.70						
Q75_ I feel pressured to have my video on during video calls			0.67						
Q79_ I have no choice but to sit down whilst on video calls			-0.37						
Q84_ I feel pressured to be seated whilst attending video calls			0.42						
Q10_ I am free to take breaks whenever I please				0.53					
Q30_ I am free to choose where I complete my work-related tasks				0.55					
Q41_ I am online at times that suit me during the working day				-0.57					
Q43_ I am free to choose when I am online during the working day				0.73					
Q45_ It is up to me when to be online during the working day				0.60					
Q53_ I am free to determine the amount of hours that I work each day				0.68					

Item	f 1	f 2	f 3	f 4	f 5	f 6	f 7	f 8	f 9
Q54_ I can choose how many hours to work each day				0.67					
Q59_ I work at the times of the day that suit me				-0.55					
Q62_ I am free to complete my work tasks at whatever time I wish				0.72					
Q63_ I can choose when to complete my work tasks				0.71					
Q19_ When I take a break from work, I get up and leave my work space					0.37				
Q20_ When I take a break from work, I stay at my workspace					0.54				
Q21_ When I take a break from work, I move away from my workspace					0.49				
Q97_ I leave the space that I was working in				0.93					
Q98_ I stay in the space that I was working in				0.82					
Q99_ I move to a space that I don't use for work				0.87					
Q101_ I have no choice but to stay in the space that I was working in				0.55					
Q102_ It is difficult for me to leave the space that I was working in				0.56					
Q4_ I am free to decide how many meetings I attend						0.55			
Q5_ I have little control over how many meetings I attend						-0.57			
Q6_ I have no choice over how many meetings I attend						-0.49			
Q7_ My colleagues expect me to attend all work-related meetings						0.71			
Q8_ I feel that I have to attend all work-related meetings						0.68			
Q9_ I feel pressured to attend to all work-related meetings						0.61			
Q46_ My colleagues expect me to be online throughout the working day						0.42			
Q47_ I feel that I have to be constantly online during work hours						0.40			
Q48_ I feel pressured to be online throughout the working day						0.45			
Q76_ I sit down whilst on video calls						0.56			
Q77_ I stand whilst on video calls						0.39			
Q78_ I move around whilst on video calls						0.40			
Q83_ I feel that I should sit down whilst attending video calls						0.33			

Item	f 1	f 2	f 3	f 4	f 5	f 6	f 7	f 8	f 9
Q1_ I attend too many meetings							0.94		
Q2_ The amount of meetings I have is burdensome							0.81		
Q3_ The amount of meetings I have is excessive							0.99		
Q31_ I pack away my work-related items (e.g. computer, documents etc.) for the evening								0.73	
Q33_ I pack away my work-related items (e.g. computer, documents etc.)								0.64	
Q34_ I have no choice but to leave my work-related items (e.g. computer, documents etc.) set up when I finish the working day								0.50	
Q35_ I am free to pack away my work-related items (e.g. computer, documents etc.) set up when I finish the working day								0.55	
Q36_ It is difficult for me to pack away my work-related items (e.g. computer, documents etc.) when I finish the working day								0.59	
Q85_ I get distracted by matters unrelated to work									-0.32
Q91_ I plan each day to make sure I get all my work done									0.87
Q92_ I plan the home-working tasks I am doing day by day									0.64
Q93_ I make sure to plan out each working day									0.93

Note. Final items retained after Step 6 are in **Bold**.

3.4.6 Step 5: Inspecting reliability, inter item correlation and item refinement

The aim of this step was to assess the reliability of the resulting latent construct measures, and to further refine and improve reliability by removing unnecessary items. The nine-factor structure was assessed for composite factor reliability and was subject to an iterative item removal process following a stepwise procedure involving the inspection of Cronbach's alpha (α : Raubenheimer, 2004). It was considered that Likert style items may not uphold Tau's equivalence for each of the identified factors; that is, the items may not equally discriminate between different levels of the latent construct. Therefore, McDonald's Omega coefficients (ω) were also inspected during this process (Crutzen & Peters, 2017; Trizano-Hermosilla & Alvarado, 2016). Reliability values (α / ω) for each factor were determined. Items with negative factor loadings were reverse coded.

3.4.6.1 Initial factor reliability.

As seen in Table 5, all factors initially displayed satisfactory indicators of internal consistency, with α values ranging between 0.76 – 0.94 and ω ranging between 0.77 – 0.94, indicating a good level of internal consistency (Kelley & Pornprasertmanit, 2016).

Table 5

Step 5: Item composite reliability evaluation and removal - Before and after iterative item removal process

Factor (# of items prior to Step 5)	Before		After		Final number of items per factor after Step 5
	α	ω	α/ SBf^*	ω	
1 (14)	.92	.92	.86	.87	4
2 (12)	.93	.93	.80	.81	3
3 (11)	.91	.91	.80	.80	3
4 (10)	.91	.92	.73	.73	3
5 (8)	.87	.87	.82	.82	3
6 (13)	.89	.89	.79	.79	3
7 (3)	.94	.94	.95*		2
8 (5)	.76	.77	.72	.73	3
9 (4)	.92	.92	.89*		2

Note. Factors contain two items: reliability coefficient was modified using the Spearman-Brown formula (SBf) (Eisinga et al., 2013)

3.4.6.2 Factor item refinement.

When evaluating composite reliability, any items for which it was indicated that α/ω would increase if absent, they were removed iteratively, starting with items for which the highest potential increase in α/ω was indicated. This process was repeated until increases in α/ω were no longer possible.

Further item removal was achieved by inspecting inter-item correlations, whereby items that correlated with other items at $r > .60$ were flagged for removal due to potentially problematic overlap (Panayides, 2013). The decision on which of two highly correlated items to remove was based on a combination of factors: primarily, the items' factor loadings, with a preference for removing lower-loading items; and secondly, changes in α/ω , with a preference for removing items that, when removed, resulted in the greatest increases in α/ω . Throughout these assessments, the authors (BG and SK) exercised their judgment on the conceptual mapping of each item to the underlying construct, preferring to remove items deemed less representative of the construct. In instances where factor loadings and α/ω changes were not informative enough to decide, the final decision was made based on the interpreted construct validity of the items. Although three items are recommended as a minimum to represent a factor (Tabachnick & Fidell, 2014), where necessary item removal continued until there were only two items, given evidence supporting the methodological validity of a factor containing two highly correlated items (Gosling et al., 2003; Yoo et al., 2001). For factors that resultantly contained only two items, the Spearman Brown formula was employed to evaluate factor reliability (Eisinga et al., 2013).

The following adjustments were thereby made for each of the nine factors.

For *Factor 1*, Initial reliability inspection led to the removal of item 104. Items 89, 14, 16, 15, and 88 were iteratively removed based on item inter-correlations ($r = 0.65 - 0.79$), low factor loadings, and conceptually similar remaining items. Next, items 17, 18, and 11 were removed based on low factor loadings and small reductions in reliability coefficient values. Finally, removing item 90 led to a ω value improvement. The final factor comprised four items (see Table 6).

For *Factor 2*, initial reliability inspection only led to the removal of item 57. Inter item correlations revealed several items up for consideration ($r = -0.64 - 0.75$). Weighing up factor

loadings, reliability coefficient improvements, and conceptual contributions, items 61, 64, 50, 49, 60, and 56 were removed. Items 58 and 51 were removed after displaying low factor loadings as well as presenting no substantial detrimental impact on either α or ω . The final factor comprised three items (see Table 6).

For *Factor 3*, First reliability inspection led to the iterative removal of items 69, 79, and 84, all of which led to an increase in reliability coefficients (both α or ω). Inter-item correlations revealed potentially redundant items, which led to the removal of items 71, 72, and 67. Item 68 was determined to be inconsistent in framing with the remaining items and displayed no substantial change to α or ω , and was therefore removed. A final item (75) was then removed for having a relatively low factor loading and posed no threat to reliability of the observed factor. The final factor comprised three items (see Table 6)

For *Factor 4*, Reliability inspections led to the initial removal of item 30. Inter-item correlations resulted in the removal of items 45, 54, and 63. Further, items 10, 59, and 41 were iteratively removed for having low factor loadings and displaying minimal changes to α or ω . The final factor comprised three items (see Table 6).

For *Factor 5*, Item 19 was firstly removed as it posed no change to the factor ω value. Following, inter-item correlations revealed highly correlated items and in light of a considerably lower factor loading, item 101 was removed. Items 21, 102, and 20 were then iteratively removed for having low factor loadings and posing no considerable change to the reliability coefficients. The final factor comprised three items (see Table 6).

For *Factor 6*, Initial reliability inspections led to the removal of items 77, 83, 78, 76, with displayed α and ω coefficient improvements. At this point, item 47 was also removed for having the lowest factor loading and posed minimal change to both α and ω . Inter-item correlations led to the removal of item eight. Further inspection of conceptual item contribution and factor loadings, items 46 and 48 were removed. Items six and five were removed for having low factor loadings and displayed only small changes to the reliability coefficients. The final factor comprised three items (see Table 6).

For *Factor 7*, Inspecting the reliability coefficients, item two displayed a coefficient increase in its absence. Further, upon inspection of the conceptual contribution, item two appeared to

deviate from the expected meaning of the remaining items one and three and was therefore removed. The final factor comprised two items (see Table 6).

For *Factor 8*, Initial inspection of the reliability coefficients if items were absent pointed toward no item removals. Inter-item correlations led to the removal of item 33, which then pointed toward removing item 31 which posed the greatest increase in reliability coefficient when absent. The final factor comprised three items (see Table 6).

For *Factor 9*, First of all, item 85 was removed for having the lowest factor loading. Next, item 92 was removed for reasons relating to a low factor loading, a reliability coefficient increase when absent, and a high inter item correlation with the remaining items. The final factor comprised two items (see Table 6).

Table 6

Factors and items after Step 5: Determined factor and contributing items with original EFA factor loadings.

Latent Factor	Item (item #)	f
Factor 1	I think about work long after I have finished the working day (95)	.718
	I am able to disconnect from work after I have finished the working day (96)	.698
	I have enough time in the day to deal with my workload (13)	.723
	It is difficult for me to take breaks (11)	.529
Factor 2	My colleagues expect me to work the same amount of hours as they do (55)	.775
	I feel I have to work at the same time as my colleagues (65)	.754
	I have no choice but to work for the same amount of hours as my colleagues (52)	.665
Factor 3	My colleagues expect me to have my video on during video calls (73)	.778
	I feel that I should have my video on during video calls (74)	.706
	I am free to have my video off during video calls (70)	.875
Factor 4	I am free to choose when I am online during the working day (43)	.73
	I am free to complete my work tasks at whatever time I wish (62)	.714
	I can choose how many hours to work each day (54)	.671
Factor 5	I leave the space that I was working in (97)	.935
	I move to a space that I don't use for work (99)	.867
	I stay in the space that I was working in (98)	.819
Factor 6	My colleagues expect me to attend all work-related meetings (7)	.715
	I feel pressured to attend to all work-related meetings (9)	.615
	I am free to decide how many meetings I attend (4)	.556
Factor 7	The amount of meetings I have is excessive (3)	.987
	I attend too many meetings (1)	.934
Factor 8	It is difficult for me to pack away my work-related items (e.g. computer, documents etc.) (36)	.608
	I am free to pack away my work-related items (e.g. computer, documents etc.) when I finish (35)	.599
	I have no choice but to leave my work-related items (e.g. computer, documents etc.) set up (34)	.475
Factor 9	I make sure to plan out each working day (93)	.931
	I plan each day to make sure I get all my work done (91)	.866

3.4.7 Step 6: Factor consistency, interpretation, and labelling

The aim of this step was to evaluate and interpret the final extracted construct measures resulting from steps 1-5 (see Figure 1) to assess content and face validity, and ensure the measures were conceptually valid. All procedures in this step were undertaken by the present author (SK) and research supervisor BG.

We evaluated items for conceptual consistency and wording, which led to factor and item modification as well as allocating a conceptual title for each of the finalised factors. A review of the determined factors and the contributing items led to the removal of item 98 ('I stay in the space that I was working in') from factor five. The meaning of this item was deemed unclear in retrospect and was inconsistent with remaining items that appeared to capture whether participants physically moved away from where they work at home at the end of the day. Factor five was originally measured on a frequency scale (e.g. 'Never' to 'Always'). However, at this stage, it was deemed appropriate to convert these items to a frequency scale (e.g. 'Strongly disagree' to 'Strongly agree').

From the generated 105 item statements intended to capture either a core home-working behaviour, a sense of control over engaging in a behaviour, or a social pressure from colleagues to engage in a behaviour, the overall majority of the retained factor items captured individual's perceived control or social pressure to engage in a home-working behaviour (see Table 6). However, factors five and seven stood out separate since they indicated engaging in a specific behaviour (see Table 6). Considering all other factors were worded toward capturing a perceptual indication of being able to engage in a certain behaviour, for reasons of consistency, it was deemed appropriate to modify the wording of all the items in both factors five and seven. For example, factor 5, item 97 ('I leave the space that I was working in') was modified to 'I am able to leave the space that I was working in' (see all item modifications in Table 7).

A final but significant change led to the separation of the four items in factor one into two factors containing two items each. Factor one initially appeared to capture both a sense of workload manageability as well as an ability to switch off from work in the evenings. Whilst highly empirically related, we felt that these were two discrete concepts and so should be treated separately (See Table 7).

Upon final modification of all the observed factors and the contributing items, we agreed conceptual labels for each of the extracted factors (see Table 7). Our final item structure comprised 25 items, measuring 10 conceptually discrete factors (Table 7).

Table 7*Factors and items after Step 6: Final set of factors and items, with reliability coefficients.*

Latent Factor (prefix)*	Item (item #)	α / SBf*	ω	
1. Ability to switch off (3)	I think about work long after I have finished the working day (95)	.80*	.81	
	I am able to disconnect from work after I have finished the working day (96)			
2. Workload manageability (2)	I have enough time in the day to deal with my workload (13)	.68*		
	It is difficult for me to take breaks (11)			
3. Pressure to work at the same time as colleagues (2)	My colleagues expect me to work the same amount of hours as they do (55)	.80		
	I feel I have to work at the same time as my colleagues (65)			
	I have no choice but to work for the same amount of hours as my colleagues (52)			
4. Video on / off pressure (2)	My colleagues expect me to have my video on during video calls (73)	.84		.84
	I feel that I should have my video on during video calls (74)			
	I am free to have my video off during video calls (70)			
5. Home-working autonomy (2)	I am free to choose when I am online during the working day (43)	.82	.82	
	I am free to complete my work tasks at whatever time I wish (62)			
	I can choose how many hours to work each day (54)			
6. Freedom to transition between home & working environments (4)	I am able to leave the space that I was working in (97)	.86*		
	I am able to move to a space that I don't use for work (99)			
7. Pressure to attend meetings (2)	My colleagues expect me to attend all work-related meetings (7)	.79	.79	
	I feel pressured to attend all work-related meetings (9)			
	I am free to decide how many relevant work-related meetings I attend (4)			
8. Perceived excess of daily work meetings (2)	I feel that the amount of meetings I have is excessive (3)	.95*		
	I feel that I attend too many meetings (1)			
9. Ability to transform workspaces (2)	It is difficult for me to pack away my work-related items (e.g. computer, documents etc.) when I finish the working day (36)	.72	.73	
	I am free to pack away my work-related items (e.g. computer, documents etc.) when I finish the working day (35)			
	I have no choice but to leave my work-related items (e.g. computer, documents etc.) set up when I finish the working day (34)			
10. Work-day planning & organization (3)	I make sure to plan out each working day (93)	.89*		
	I plan each day to make sure I get all my work done (91)			

Note. *Prefix statements are as follows: 1. When working from home (frequency scale), 2. When working from home (agreement scale), 3. On days when I work from home (frequency scale), 4. When I finish a home-working day (agreement scale); f = Factor loadings, α = Cronbach's alpha; Factors contain two items: reliability coefficient was modified using the Spearman-Brown formula (SBf) (Eisinga et al., 2013)

3.5 Discussion

This study aimed to develop and refine reliable and robust quantitative measures of home-working concepts that were identified in the previous qualitative study as potentially significant in shaping health behaviour and wellbeing (Chapter 2). This was important preparatory work for a subsequent study seeking to explore relationships between these concepts, which is reported in the next chapter (Study 3, Chapter 4). The validity and reliability of the items developed were systematically refined based on an empirical dataset collected among a sample of 240 homeworkers. This dataset underwent exploratory factor analyses, assessments of reliability, and grounded conceptual interpretation. From an initial 105 developed items measuring 35 potential variables, a final scale structure was obtained that represented 10 distinct psychological responses to home-working practices, comprised of a total of 25 items (see Table 7). All scales displayed satisfactory construct, content, and face validity and reliability, thus meeting all study aims. The factors and items developed and refined in this study give us confidence in the prospect that, in the subsequent study (Study 3; Chapter 4), core concepts derived from Study 1 may be quantitatively measured in an empirically and conceptually meaningful way.

Notably, while the initial set of items covered three measurement dimensions (Behaviour, Control, & Social norms/pressures) the final scale structure captured only the psychological dimensions, namely, perceptions of control, and social norms/pressures to engage in home-working practices. Items aimed at gathering reports of actual engagement in home-working practices were discarded.

Interestingly, while the previous qualitative study highlighted four themes surrounding work practices changes and psychological responses to the changes that resulted from working from home (Study 1; Chapter 2), the results of the present study did not follow this conceptual structure. Instead, we extracted ten distinct concepts that appear to derive from each of the pre identified themes. The measurement constructs included homeworkers' ability to switch off from work in the evenings, perceived workload manageability, a perceived pressure to work at similar times of the day as work colleagues, a perceived pressure to have video on or off during digital work meetings and home-working autonomy. Further constructs derived included freedom to transition between home and working environments, a perceived pressure to attend daily digital work meetings, a perceived excess of daily work meetings,

freedom to transform workspaces in the home, and home-workers' intention to plan and organise their working day. In comparing the qualitative origin and quantitative outcome of the item development process, whilst no derivative qualitative theme was broadly captured, the concept measures together provide a representative coverage of the four themes that emerged from Study 1 (Chapter 2). For example, a homeworker's ability to switch off relates to the theme 'changes to work life balance' (Theme 1 from Study 1), a perceived pressure to have video on or off during work meetings relates to the 'changes to the work interface' (Study 1 Theme 2), freedom to transform workspaces in the home relates well to 'adaptations to a new workspace' (Study 1, Theme 3), and perceived pressure to work at similar times of the day as work colleagues relates to the theme 'adjustments to a new social context' (Study 1, Theme 4). While it may seem that extracting ten distinct conceptually distinct measures from four identified themes presents a degree of discrepancy, it is important to recognise that thematic analysis aims to comprehend individual's experiences by orienting towards searching for and organising patterns of complex meaning (Sundler et al., 2019). This therefore emphasises that the themes derived are an organised interpretation of individual's experiences, which may very well encapsulate several conceptually discrete constructs. For example, the constructs extracted from this study, namely, 'ability to switch off' and 'freedom to transition between home and working environments', were both derived from the Study 1 theme of 'Changes to work-life balance'.

Another notable outcome of the systematic process of deriving meaningful construct measures from the 105 items was that, although the initially developed items covered three measurement dimensions of subjective reports of home-working practices (i.e., Behaviour, Control, and Social norms/pressures), the psychometric evaluation process produced a final set of 25 items measuring 10 distinct psychological responses to home-working practices. Specifically, these included items that captured workers' perceived control or social norms/pressures to engage in home-working practices. All items that primarily aimed to gather reports of actual engagement in certain home-working practices were discarded in the item reduction process. This result aligns with contemporary approaches to understanding behaviour, highlighting the importance of psychological responses over mere engagement reports (Daryabeygi-Khotbehsara et al., 2024). The measures derived begin to provide a foundation for mapping out key determinants of health and well-being home-working

practices, as asserted by the COM-B model (Michie et al., 2014). For instance, items that capture perceptions of home-working practices and the associated social (e.g., “When working from home, I feel I have to work at the same time as my colleagues”) and physical (e.g., “When I finish a home-working day, I am able to move to a space that I don’t use for work”) opportunities that shape these practices can help subsequent research understand the definitive health behaviour and wellbeing consequences linked to these opportunities.

3.5.1 Strengths and future direction

By demonstrating reliable and valid scale measurements of previous qualitatively identified pertinent psychological responses and experiences of home-working, this study offers not only evidence of a wider generalisability of findings derived from Study 1 (Chapter 2), but also lays a platform for future quantitative inferential research. Being the first of a two-phase investigation into the health and wellbeing impacts of working from home, the scales determined can now be utilised in a data collection phase alongside validated scales of health behaviours, health, and wellbeing. The conduct of such quantitative explorative work may help uncover a complex network of home-working interactive outcomes to individual’s health and wellbeing. Further evidence to support the potential causality of the health and wellbeing impacts of working from home can inform the development of effective and contextually suitable interventions.

3.5.2 Limitations

Limitations must be considered. First, although the sample was deemed adequate for analyses through EFA assumption testing, it must be noted that our sample was obtained via the panel data platform Prolific, using an international sample amidst the COVID-19 pandemic. Firstly, this presents challenges for generalizability, as we cannot ascertain that the participants obtained from Prolific accurately represent the intended broader population of home-workers. Specifically, this concern stems from evidence that acknowledges that panel data often produce differing results than do data derived from randomly selected methods of recruitment (Porter et al., 2019; Thompson & Pickett, 2020). Another concern regarding the recruitment method relates to the criteria chosen for refining the obtained sample.

Specifically, participants on Prolific were eligible to take part in the study based on whether they were working from home everyday during the time of study. However, this criterion did not align with that of Study 1 (Chapter 2), which specifically focused on home-workers who were typically office-based employees working from home full-time due to the COVID-19 Pandemic. This is potentially problematic since it poses an inconsistency between the qualitative data that informed item generation and the data used in the present study for psychometric evaluation of the item measures. Consequently, the current study might have incorporated participants who were not typically office-based workers working from home due to the pandemic. Hence, they may not represent a fully appropriate population to contribute to the psychometric development of the quantitative items derived from the findings of Study 1 (Chapter 2). However, at this stage, we have little reason to suspect that individual responses to home-working would differ based on whether they were previously office-based or not. This is emphasised by evidence suggesting that novice and experienced home-workers have similar experiences of work-related demands and home-working environments (Foster et al., 2022).

An additional limitation relates to the rigour of the item development phases followed in this study. Specifically, a recommended phase of item generation is to assess content validity via cognitive interviewing or expert panel reviews (Boateng et al., 2018; Zhou, 2019). We did not undertake either of these processes because we were under time pressure to collect data before any significant changes to home-working practices could occur as a result of changes to pandemic lockdown restrictions. The lack of external involvement in the identification of items, content validation of such items, and interpretation and removal of items at each stage may have limited the comprehensiveness of the items entered into analysis and was ultimately based on the subjective judgements of two researchers (SK and BG). Decisions made in the item identification and reduction procedure will necessarily have shaped and constrained the observed network of relationships between items. Similarly, the complexity and intentionality of the item reduction process involved sequential decision-making for item removal, guided by theoretical interpretations of content validity. Although this process was meticulously planned to prioritize indicators of construct validity and reliability while assessing content validity, the rigorous adherence to this sequence may have resulted in an

unnecessary reduction of items. Ultimately, this approach, while robust, might have constrained the breadth of construct definition.

Measures were derived based on empirical data from one dataset. Ideally, we would have collected a larger dataset to increase confidence in insights emerging from item reduction based on our dataset, and conducted multiple waves of data collection at different points in the item reduction process, to enhance the rigour of item selection. In circumstances where time and resources allow, a more robust method of scale development and evaluation is recommended (Boateng et al., 2018). Further data collection would have permitted the conduct of confirmatory factor analyses (CFA), which would have increased the trustworthiness of our findings regarding measurement dimensionality, the structure and stability of derived scales, and measurement invariance. Caution must therefore be exercised in interpreting our final factor structure, which requires replication. Future research should aim to address these limitations by conducting further scale development work on the measures derived from this stage of analysis.

3.5.3 Conclusion

This study systematically generated and developed reliable measures of psychological responses to home-working practices. These scale measures appeared suitable for use in a larger quantitative study to investigate and model relationships between psychological responses to home-working practices, health-related behaviours, and wellbeing (Study 3; Chapter 4).

4 Chapter 4: Study 3 - Psychological responses to home-working practices: A network analysis of relationships with health behaviour and wellbeing

4.1 Study 3: Why this study was needed

Study 1, which used qualitative methods, suggested that psychological responses to home-working practices could potentially affect workers' health behaviour and wellbeing. In Study 3, we aimed to quantify and test the relationships indicated in Study 1 by statistically modelling psychological responses to home-working practices alongside indicators of health-related behaviours and wellbeing. Study 3 was facilitated by Study 2, which used rigorous item generation and reduction procedures to provide a set of the quantitative measures for inclusion in the statistical model in Study 3. In anticipation of potentially complex relationships between home-working, health-related behaviours, and wellbeing, Study 3 used a network analysis approach. This allowed the estimation not only of the presence of potential relationships, but also their strength and their centrality (or importance) within the network of relationships. Study 3, conducted in April 2021, was a cross-sectional questionnaire study, undertaken with 491 home-workers recruited through an online study recruitment platform. Data were analysed using Exploratory Network Analysis methods.

4.2 Abstract

Home-working has been suggested to potentially affect health and wellbeing. This cross-sectional study sought to identify discrete psychological responses to home-working practices, and investigate their relationship with engagement in health-related behaviours and wellbeing. A sample of 491 home-workers completed a survey assessing ten psychological responses to home-working (e.g., ability to 'switch off' from work), ten health behaviour indices (e.g., sleep trouble) and seven wellbeing indices. Network Analysis modelled relationships between these variables. Results showed four clusters of psychological responses to home-working practices (representing 'home-working independence', 'home-work transition', 'daily work pressure', and 'work-day forecasting'). Variables within these clusters linked to health behaviour and wellbeing: perceptions of workload manageability, ability to switch off from work, home-working autonomy, and planning and organising a home-working day had cascading influences on indicators of health, health behaviours, and wellbeing. Findings demonstrate a complex system of potential health and wellbeing consequences of working from home. While further evidence is needed to establish truly causal relationships, our findings call for the development of policies and practices to support the adoption of home-working practices to benefit the health and wellbeing of home-workers.

4.3 Introduction

Increased adoption of digital technology in the workplace has facilitated a steady rise in employees 'working from home' (Messenger, 2017). The Covid-19 lockdowns of 2020 catalysed home-working (Webb, 2023). Organisations and employees were required to adapt to remote working, and many found that desk-based work could be conducted as productively at home as in the workplace (Lodovici, 2021). Post-pandemic, regular home-working, if only for some of the working week, remains prevalent and has become a new norm (Barrero et al., 2020; Phillips, 2020). Yet, home-working practices may have adverse consequences for individuals' health-related behaviours and wellbeing (Lunde et al., 2022; Wilms et al., 2022). For example, to access their work tasks, office-based workers must commute to and from the workplace. Commuting incurs physical activity (Smith et al., 2015), and can benefit wellbeing by allowing psychological demarcation of work and home settings, facilitating work-life separation (Jachimowicz et al., 2021). When working from home, commuting is discontinued, reducing physical activity and hindering work-life separation. Features of the home-working environment can also affect health behaviour and wellbeing. The qualitative investigation into normally-office-based workers' experiences during the UK Covid-19 lockdown of 2020 (Study 1, Chapter 2), for example, showed that workers reported working in smaller workspaces, and feeling pressured to be digitally present during working hours. Perhaps consequently, they reported increased sedentary behaviour, decreased daily movement, and greater difficulty in mentally detaching from work (see too Loeff et al., 2022; Wilms et al., 2022). This echoes research showing that home-working is associated with greater work-life conflict (Tejero et al., 2021), work-related rumination and difficulties switching off (Querstret & Cropley, 2012). There is, however, little literature directly examining the relationship between psychological responses to home-working, health behaviour and wellbeing (Study 1, Chapter 2; Lunde et al., 2022; Wilms et al., 2022).

Identifying how psychological responses to home-working relate to health behaviour and wellbeing could help to inform the future development of initiatives to protect health and wellbeing among employees who work from home. This study sought to quantitatively model relationships between psychological responses to home-working practices, health-related behaviours, and wellbeing. Given the exploratory stage of enquiry and the possible complexity of relationships between the observed variables, a Network Analysis (NA) method was adopted (Borsboom et al., 2021). NA offers a level of exploratory statistical inquiry not achieved by other methods commonly used to explore health behaviours and wellbeing of workers, such as correlational or regression analyses (De Clercq et al., 2015; Hoert et al., 2018). When correlation and regression analyses are used to construct structures of relationships between variables, such structures are composed based on a series of discrete estimates of bivariate associations. NA, however, allows for estimation of a system of interacting variables (Mkhitarian et al., 2019), thereby highlighting potential constellations and patterns of relationships between variables. While this may be achieved using methods such as structural equation modelling (SEM), such analyses require predefined models and paths and assume linearity between variables. At this stage of exploratory investigation, we cannot assume linearity. NA provides a more flexible approach to uncovering complex, emergent patterns within the data. Applied to the current study, NA allows for the identification of potential complex interactions between psychological responses to home-working practices and workers' health and wellbeing related behaviours. By revealing such patterns of co-occurring constructs, NA can help identify potential focal points for research to further understand how interventions may be developed to support and promote health and wellbeing related home-worker behaviour.

This study aimed to (a) establish discrete psychological responses to home-working practices (b) examine how these psychological responses interact with one another, and (c) investigate the potential interconnecting pathways of association between psychological responses of home-working practices and indicators of health behaviour and wellbeing.

4.4 Method

Further details of the study methods and analyses are provided in Appendix F (8.2.8).

4.4.1 Design, Participants & Procedure

A cross-sectional survey design was used. English-speaking UK adults in full-time employment, who were working from home at the time of data collection, were recruited online via Prolific (Palan & Schitter, 2018). Data were collected in April 2021, 13 months after the first UK Covid lockdown was announced, during which office workers were required to work from home (Institute for Government, 2021). At the time of the present study, some Covid-related restrictions were in place, but workers were able to go to the workplace if necessary (Institute for Government, 2021).

Four-hundred and ninety-six participants completed an online questionnaire, for which they received a payment of £1.88. After removing five participants who failed at least two of three attention-check items in the questionnaire, the final sample comprised 491 participants (272 female, 218 male, one non-binary; age range 18 – 73, $M = 36.59$, $SD = 10.40$). Participants were most commonly White (English, Welsh, Scottish, Northern Irish), lived in a household with other people, worked an average of five days a week, and working in finance and insurance or government and public administration (see Appendix F, Table 1).

4.4.2 Measures

All measures were self-reported.

4.4.2.1 Preliminary work: Item generation and development.

We measured psychological responses to home-working practices with the potential to affect health behaviour or wellbeing, as identified in an earlier qualitative study undertaken during the 2020 UK Covid lockdown (Study 1, Chapter 2). Although the qualitative study identified four thematic clusters, authors SK and BG identified across these four themes a set of 35 core, quantifiable psychological responses (i.e., perceptions, experiences or behaviours). SK generated a set of self-report items intended to capture core dimensions of each concept. Proposed items were refined, reworded and verified iteratively through discussions between SK and BG.

For each of the 35 variables (e.g., 'having video on during video calls'), three items were generated (i.e., 105 total items). Each item was preceded by one of three prefixes ("When working from home..."; "When I finish a home-working day..."; "On days when I work from home..."). The three items per variable respectively captured whether a core behaviour was undertaken (e.g., "...I make sure to have my video on during video calls"; 'never' [1] – 'always' [7]), perceived control over that behaviour ("...I am free to decide whether or not to have my video on during video calls"; 'strongly disagree' [1] – 'strongly agree' [7]), and perceived pressure to engage in that behaviour ("...my colleagues expect me to have my video on during video calls"; 'strongly disagree' [1] – 'strongly agree' [7]).

The 105 items were refined using a separate questionnaire-based dataset collected via Prolific among 240 home-workers in March-April 2021. Exploratory Factor Analysis generated a nine-factor structure incorporating 83 items. The remaining 22 items were discarded. We removed an additional item which, in hindsight, we deemed unclear ("When I finish a home-working day, I stay in the space that I was working in"). The remaining 82 items were reduced to 25 items, by removing items from each factor iteratively until none could be removed without reliability falling below $\alpha = .70$ (Table 8). A final factor was created by splitting one four-item factor into two separate concepts ('workload manageability'; 'ability to switch off').

4.4.2.2 Questionnaire measures.

4.4.2.2.1 Psychological responses to home-working practices.

Table 8 lists items used to assess each of the ten preconceived 'psychological response' variables.

Table 8*Psychological responses to home-working practices and representative items*

Psychological home-working responses (prefix)*	Item
Ability to switch off (3)	I think about work long after I have finished the working day I am able to disconnect from work after I have finished the working day
Workload manageability (2)	I have enough time in the day to deal with my workload It is difficult for me to take breaks
Pressure to work at same time as colleagues (2)	My colleagues expect me to work the same amount of hours as they do I feel I have to work at the same time as my colleagues I have no choice but to work for the same amount of hours as my colleagues
Video on / off pressure (2)	My colleagues expect me to have my video on during video calls I feel that I should have my video on during video calls I am free to have my video off during video calls
Home-working independence (2)	I am free to choose when I am online during the working day I am free to complete my work tasks at whatever time I wish I can choose how many hours to work each day
Freedom to transition between home & working environments (4)	I am able to leave the space that I was working in I am able to move to a space that I don't use for work
Pressure to attend meetings (2)	My colleagues expect me to attend all work-related meetings I feel pressured to attend all work-related meetings I am free to decide how many relevant work-related meetings I attend
Perceived excess of daily work meetings (2)	I feel that the amount of meetings I have is excessive I feel that I attend too many meetings
Ability to transform workspaces (2)	It is difficult for me to pack away my work-related items (e.g. computer, documents etc.) when I finish the working day I am free to pack away my work-related items (e.g. computer, documents etc.) when I finish the working day I have no choice but to leave my work-related items (e.g. computer, documents etc.) set up when I finish the working day
Work-day planning & organization (3)	I make sure to plan out each working day I plan each day to make sure I get all my work done

Note. *Prefix statements are as follows: 1. When working from home (frequency scale), 2. When working from home (agreement scale), 3. On days when I work from home (frequency scale), 4. When I finish a home-working day (frequency scale).

4.4.2.2 *Health-related behaviour.*

Self-reported **physical activity** was measured using moderate physical activity (MPA), vigorous physical activity (VPA), and walking items from the International Physical Activity Questionnaire short version (IPAQ-SF; Lee et al., 2011). Standardised physical activity

definitions from the IPAQ-SF were presented alongside items for comprehension. Items prompted participants to identify on how many days in a working week they engaged in MPA, VPA, and walking (e.g. “Over the past working week, on how many workdays did you do vigorous physical activities?”), and where appropriate, average hours/minutes spent in these activities per day (e.g. “How much time did you usually spend doing vigorous physical activities on one of those days?”).

Metabolic equivalent of task (MET) was calculated for the three physical activity categories. Pre-specified values (Walking = 3.3; Moderate = 4.0; Vigorous = 8.0) were multiplied by total minutes in each activity, multiplied by number of days engaged in this activity in a week (e.g. Walking MET-minutes/week = 3.3 * walking minutes * walking days). A single item developed for this study captured daily movement during the working day (“When working from home, which of the following best describe how physically active you are during the working day”; “Very inactive” [0] - to “Very active” [7]).

Self-reported **sedentary behaviour** was measured via the Physical Activity and Sedentary Behaviour Questionnaire (PASB-Q; Fowles et al., 2017; Sattler et al., 2020). Two items respectively captured sedentary behaviour during work (e.g. “On a typical working day, how many hours do you spend sitting e.g. whilst completing work-related tasks / activities?”) and leisure time (e.g. “On a typical working day, how many hours do you watch television, use a computer, read, or spend time sitting quietly during your leisure time?”). As per Fowles et al’s (2017) coding instructions, eight categorical response options (e.g. “None” [1], “<1 hour” [2], “1-2 hours” [3] ... “Above 6 hours” [8]) were converted to a single median value (e.g. 2-3 hours = 2.5) to calculate a composite time estimate. Estimated total sedentary behaviour time was calculated by summing work and leisure time sedentary behaviour time estimates. An additional item developed for this study sought to capture average total sitting time during a home-working day (“When working from home, on average, how many hours are you sat down during a typical working day?”; 0-24 hours).

One item from the PASB-Q (Fowles et al., 2017) captured intervals for **breaks from sitting** (“When sitting for prolonged periods (one hour or more), at what interval would you typically take a break to stand or move around?”). Eight categorical options were provided (e.g. < 10

minutes, 10 – 20 minutes, 20 – 30 minutes... up to >2 hours). Ranged response options were converted to median values (e.g. 10-20 minutes = 15) and final response >2 hours was coded as 120 (Fowles et al., 2017).

Sleep trouble (i.e., poor sleep quality) was assessed using the mean of four items from the Copenhagen Psychosocial Questionnaire (COPSOQ - III; Burr et al., 2019) (e.g. “How often have you slept badly and restlessly?”; “Not at all” [1] - “All the time” [5]). Responses were coded into scores between 0-100 in increments of 25 (e.g. 0, 25, 50, 75, 100; $\alpha = .88$).

Snacking frequency was captured via three items relating to frequency of eating between meals in the morning, afternoon, and evening (“On a typical working day, how often did you usually eat something between meals in the [morning/afternoon/evening]?”; Hartmann et al., 2013). General consumption of sweet and savoury snack foods was measured with a fourth item (“Please state how often you consume sweet and savoury snack foods”). Responses to all items were on a five-point scale ranging between ‘less frequently or never’ (coded as 0), ‘1-3 times per month’ (coded as 24), ‘1-3 times per week’ (coded as 104), ‘4-6 times per week’ (coded as 260), and ‘daily’ (coded: 360). A total snacking composite score was calculated by summing values and dividing by 52 ($\alpha = .73$).

4.4.2.2.3 Health and wellbeing outcomes.

Self-rated health was measured via a single item from the Copenhagen Psychosocial Questionnaire (COPSOQ–III; “In general, which of the following best describes your health...” (“Poor” [1] - “Excellent” [5]; Burr et al., 2019) Responses were converted to scores between 0-100 in increments of 25 (e.g., 0, 25, 50). **Stress** was measured via the Perceived Stress Scale Short Form (PSS-SF; Warttig et al., 2013), which comprises four items capturing experienced stress over a one-week period (e.g., “how often have you felt difficulties were piling up so high that you could not overcome them?”; “Never” [1] - “Very often” [5]). One of the four items was adapted to the home-working context: “How often have you found that you could not cope with all the things that you had to do?”. Items were summed to produce a total stress score ($\alpha = .81$).

The COPSOQ-III was used to capture four *work-related wellbeing* constructs (Burr et al., 2019). **Cognitive stress** (e.g. “How often have you had difficulty in making decisions?”) and **Burnout** (e.g. “How often have you been emotionally exhausted?”) were measured on four item scales (“Not at all” [1] – “All the time” [5]). Responses to four **Work-life Conflict** items (e.g. “The demands of my work interfere with my private and family life”) ranged from “To a very small extent” [1] to “To a very large extent” [5]. We used a single **Job Satisfaction** item (“Regarding your work in general over the past working week, how pleased are you with your job as a whole, everything taken into consideration?”; “Very unsatisfied” [1] - “Very satisfied” [5]. Multi-item scales scores were averaged to create composite scores (α 's = .86-.91). All four work-related wellbeing variables were converted into 0-100 scores in increments of 25 (e.g. 0, 25, 50, 75, 100).

General wellbeing was measured using the seven-item Short Warwick-Edinburgh Mental Wellbeing Scale (Stewart-Brown et al., 2009; e.g.: “I’ve been feeling optimistic about the future”; “None of the time” [1] - “All of the time” [5]). Items were summed and converted to a metric score via Stewart-Brown et al’s (2009) conversion table ($\alpha = .84$).

Perceived isolation was measured using the UCLA Three-Item Loneliness Scale (Hughes et al., 2004; e.g., “how often do you feel that you lack companionship?”; “Hardly ever” [1], “Some

of the time” [2], “Often” [3]; $\alpha = .82$).

4.4.3 Data Analysis

Statistical analyses were conducted using R Version 4.2.2 (R Core Team, 2021) with R studio version 2022.7.2.576 (RStudio Team, 2021). Exploratory Network Analysis was undertaken to estimate the structure of relationships between variables. Prior to network estimation, to account for non-normal values on four variables (moderate exercise, vigorous exercise, walking, & work-time sedentary behaviour), data was nonparanormal transformed using the *npn* function in the *huge* R package (Zhao et al., 2012). Pre and post normalisation results are presented in in Supplementary Table 2, in Appendix F. Network analysis was undertaken on the ten home-working response variables, ten health behaviour variables, seven wellbeing variables, and two demographic variables (age, job tenure; Supplementary Table 1, Appendix F). No data were missing.

4.4.3.1 Estimating a network of relationships between responses to home-working practices, health behaviour and wellbeing.

A visual network of relationships between variables based on the Gaussian Graphical Model was estimated using the R package *bootnet* (Epskamp et al., 2018b). Within the network analysis, the variables were visualised as circles. Observed relationships between variables represent partial correlation coefficients between each of the variables in the network (Epskamp et al., 2018a), so estimate the extent of (in)dependence of each variable on neighbouring variables (Costantini et al., 2015). Relationships in a network were visualised as connecting lines, with positive relationships depicted in blue and negative correlations in red, and thicker lines indicating a stronger relationship (Hevey, 2018).

To protect against spurious associations (false positives) among observed variables in the network, and to retain notable partial correlations, a common regularisation method was applied (Least Absolute Shrinkage and Selection Operator [LASSO]), whereby parameter estimates shrink and weak estimates become exactly zero (Costantini et al., 2015; Epskamp & Fried, 2018). Minimizing the Extended Bayesian Information Criterion (EBIC; Chen & Chen, 2008)

demonstrates sound retrieval of true network structures (Foygel & Drton, 2010) as well as high specificity (Epskamp & Fried, 2018), and was therefore employed as our network selection method. For the purposes of our study and as recommended by (Foygel & Drton, 2010), a hyperparameter of 0.25 was chosen (see Appendix F for iterative network estimations with hyperparameters ranging between 0 – 0.5). The chosen network estimation method was applied using the EBICglasso function (Friedman et al., 2008, 2014). The results of the network estimation were plotted using the qgraph package and nodes were visualised via colour-blind-friendly palettes (Garnier et al., 2021).

4.4.3.2 Identifying clusters of psychological responses to home-working practices.

Exploratory Graph Analysis (Golino & Epskamp, 2017), using a weighted network community detection algorithm (*Walktrap*), was used to identify whether distinct clusters existed within the measured responses to working from home (Pons & Latapy, 2006). Each extracted cluster was labelled by the authors according to their contributing components.

4.4.3.3 Network accuracy and centrality stability.

The accuracy of the estimated network and the stability of centrality indices were assessed through non-parametric bootstrapping methods via the boonet package (Epskamp et al., 2018b). Estimated network accuracy was determined by calculating edge-weights in 2000 randomly allocated bootstrapped samples. Centrality stability was indicated via the case-drop bootstrap (2000), which estimated the maximum number of participants that could be dropped whilst retaining a correlation of $\geq .70$ between the original sample and iteratively smaller subsets of the sample (ranging between 90% - 30% of the sample, reduced by 10% iterations). CS coefficients (Correlational Stability) were calculated for each of the centrality indices to quantify the proportion of data that could be dropped to retain with 95% certainty a correlation of at least 0.7 with the original centrality value. CS coefficients indicate stability when above 0.5 (Epskamp et al., 2018a).

4.4.3.4 Identifying influential variables and relationships in the network.

Node characteristics can be examined via centrality indices, each aiming to assist in the

exploration and discovery of influential nodes in the estimated network. Indices available to examine were node strength, closeness, betweenness (Hevey, 2018), and expected influence (Robinaugh et al., 2016). Due to the absolute value calculation, strength is limited to only accurately informing the centrality of positively associated edges. Expected influence addresses the strength indices limitation and informs us of the importance of when nodes both activate and deactivate one another. Our estimated network contains nodes where code reversal would be inappropriate, therefore the interpretation of expected influence was chosen over strength (Robinaugh et al., 2016). Nodes furthest away from the value of zero indicate a high expected influence, with the direction of association denoted by whether the expected influence is positive or negative. The remaining centrality indices (betweenness & closeness) were not included in the analyses due to demonstrated instability indicated by correlational Stability coefficients below 0.5.

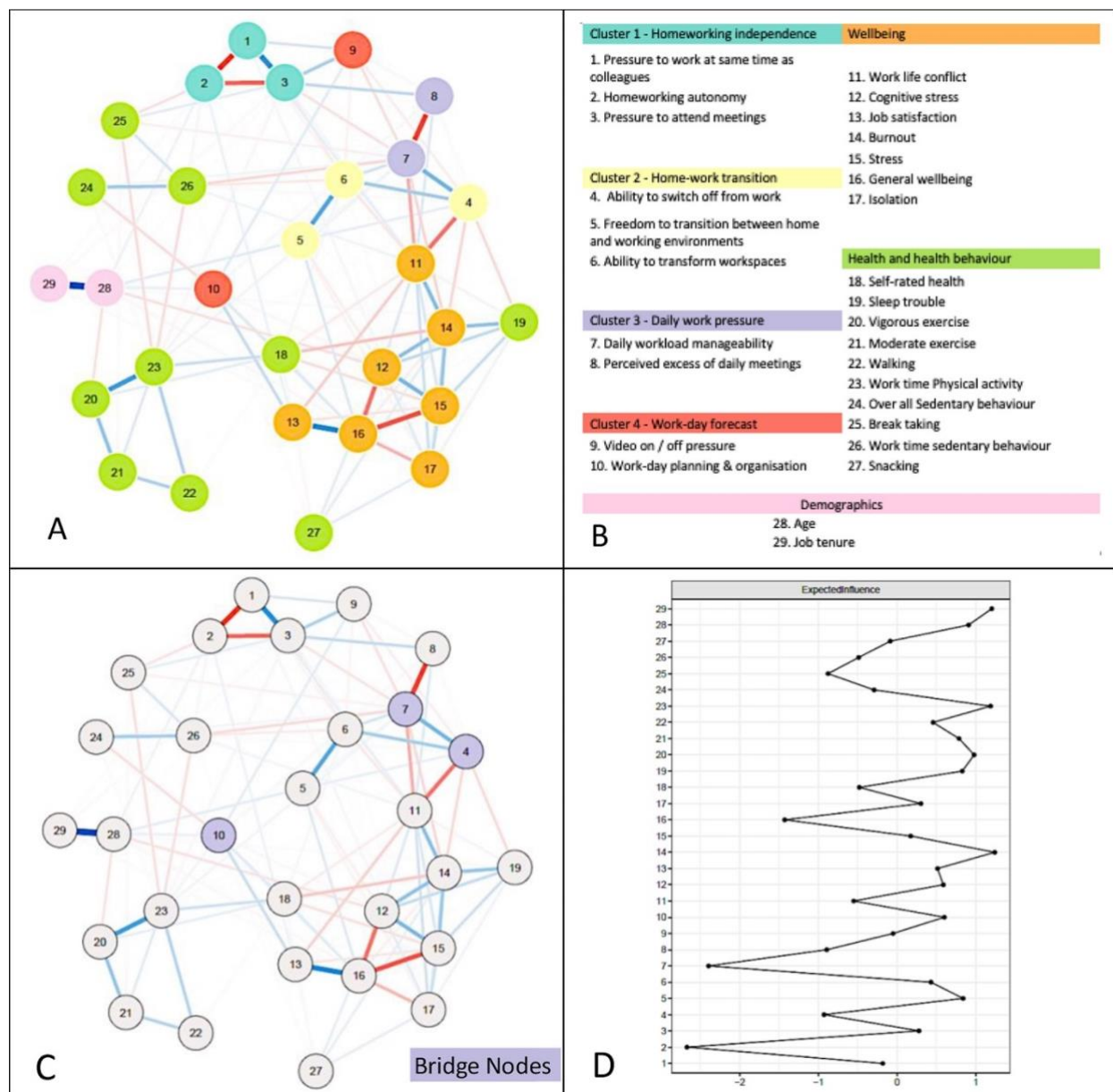
4.4.3.5 Identifying the influence of psychological responses to home-working practices on health behaviour and wellbeing.

The influence of home-working responses variables on health behaviour and wellbeing variables was modelled using 'bridge expected influence' coefficients, which highlights the importance of variables demonstrating a cumulative role in connecting observed clusters together in a network. Estimated bridge expected influence is the sum of all connections between a variable belonging to one cluster to all the variables of an opposing cluster. Strong 'bridge expected influence' values indicate that a variable has greater potential to activate or deactivate a *cluster* of other variables within the network (P. Jones, 2018; P. J. Jones et al., 2021). Values furthest from zero demonstrate the potential for the variable to positively or negatively influence other aspects of the network. *Shortest pathway* diagrams were created to visualise key variables and their direct and indirect associations with other variables in the network (Isvoranu et al., 2017).

4.5 Results

Figure 4

Final estimated network (Figure 4A), final observed clusters and indicators of health, health behaviours, and wellbeing, (Figure 4B), variables observed to bridge gaps between clusters (Figure 4C), and centrality indicator expected influence (Figure 4D).



Note. (A) Overall network including clusters of psychological responses to home-working. Blue lines = positive relationships; red lines = negative relationships. Thicker lines between variables indicates a stronger relationship. (B) Representative node names & network cluster names. (C) Observed links between psychological home-working practice responses and health behaviour and wellbeing. (D) Standardised Z-scores for node *expected influence* centrality metric; Nodes furthest away from the value of zero indicate a high *expected influence*.

4.5.1 Network accuracy and centrality stability

Calculated bootstrap confidence intervals for the relationships observed in the network were small to moderate in width, indicating a good level of network accuracy (see SF2). Of the observed centrality indices (see SF3), only expected influence (CS [cor = 0.7] \approx 0.67) demonstrated stability, whereas betweenness (CS [cor = 0.7] \approx 0.28), and closeness (CS [cor = 0.7] \approx 0.36) demonstrated instability with CS coefficients below 0.5 and were therefore treated with caution and excluded from the main interpretation (Epskamp & Fried, 2018; Hevey, 2018). CS coefficients were calculated to assess the stability of the considered centrality indices produced for the bridge analyses. Bridge expected influence (CS [cor = 0.7] \approx 0.52) displayed acceptable stability, supporting its use as informative centrality indices.

4.5.2 Identifying clusters of psychological responses to home-working practices

Four clusters of home-working practice responses were observed (see Figure 4A & 4B). Cluster one, which we labelled “home-working independence”, contained three items, relating to perceived home-working autonomy (Variable 2 [V2]), perceived pressure to work at the same time as colleagues (V1) and pressure to attend online meetings (V3). Cluster two (“home-work transition”) comprised three items incorporating the ability to ‘switch off’ from work (V4), perceived control over transitioning between home and working environments (V5), and perceived ability to transform workspaces (V6). Cluster three (“daily work pressure”) comprised two items, covering perceptions of daily workload manageability (V7) and perceived excess of daily meetings (V8). Cluster four (“Work-day forecast”) combined two items, including perceived pressure to have video on during meetings (V9) and intentions to plan and organise the work-day (V10).

4.5.3 Estimated relationships among psychological responses to home-working practices and indicators of health, health behaviour, and wellbeing.

The strongest relationship (partial correlation = $pcor$) between home-working and wellbeing variables was a negative association ($pcor = -0.22$) between the perceived ability to switch off (V4) and perceived work-life conflict (V11). The home-working responses variable that had the strongest relationship with health behaviours or wellbeing was perceived workload

manageability (V7), which had a negative association ($pcor = -0.09$) with work-time sedentary behaviour (V26). The strongest relationship observed between any health-related behaviour and wellbeing variable was a positive association ($pcor = 0.17$) observed between sleep trouble (V19) and burnout (V14). Please note: the employed Network estimation method (Epskamp & Fried, 2018) utilised regularization (EBICglasso), leading to seemingly small partial correlation values. However, these values represent statistically significant connections within the identified network structure. Regularization prioritizes strong relationships, ensuring edges reflect meaningful associations. Interpretation should therefore focus on the overall interconnectedness of variables revealed by the network, rather than fixating on individual edge strengths. That said, for inspection of partial correlations prior to network estimation, see Appendix D. See also Appendix E for bivariate correlations among variables.

4.5.4 Influential variables within the network.

Of home-working response variables, home-working autonomy (V2; expected influence [EI] - 2.67) and perceived daily workload manageability (V7; EI: -2.40) had greatest influence across the whole network. Influence was markedly lower for the other home-working response variables, though the perceived ability to switch off (V4; EI: -0.93), perceived excess of daily meetings (V8; EI: -0.89), and perceived autonomy over transitioning between home and work environments (V5; EI: 0.84) demonstrated relatively high expected influence. Among wellbeing indicators, general wellbeing (V16; EI: -1.43) and burnout (V14; EI: 1.24) displayed highest influence. Other wellbeing-related nodes of apparent importance, were cognitive stress (V12; EI: 0.59), work-life conflict (V11; EI: -0.55), and job satisfaction (V13; EI: 0.51). Among the indicators of health-related behaviour, similar influence values were found for work-time physical activity (V23; EI: 1.19), vigorous exercise (V20; EI: 0.98), break-taking intervals (V25; EI: -0.88), sleep trouble (V19; EI: 0.83), and moderate exercise (V21; EI: 0.79). All remaining variables demonstrated relatively low influence ($EI \leq |0.5$).

4.5.5 Assessing relationships between clusters in the network.

The three variables that most strongly linked home-working responses with health behaviour or wellbeing clusters were: perceived ability to switch off from work (V4; Bridge Expected

Influence [BEI]: -0.42), which was situated in the 'home-working transition' cluster; daily workload manageability (V7; BEI: -0.32), which was located in the 'daily work pressure' cluster; and work-day planning and organisation (V10; BEI: 0.23), which was in the 'work-day forecast' cluster (Figure 4C). Notably high expected influence values were also identified for work-life conflict (V11; BEI: -0.27), which was in the 'wellbeing' cluster, and sleep trouble (V19; BEI: 0.39), which was in the 'health and health behaviour' cluster.

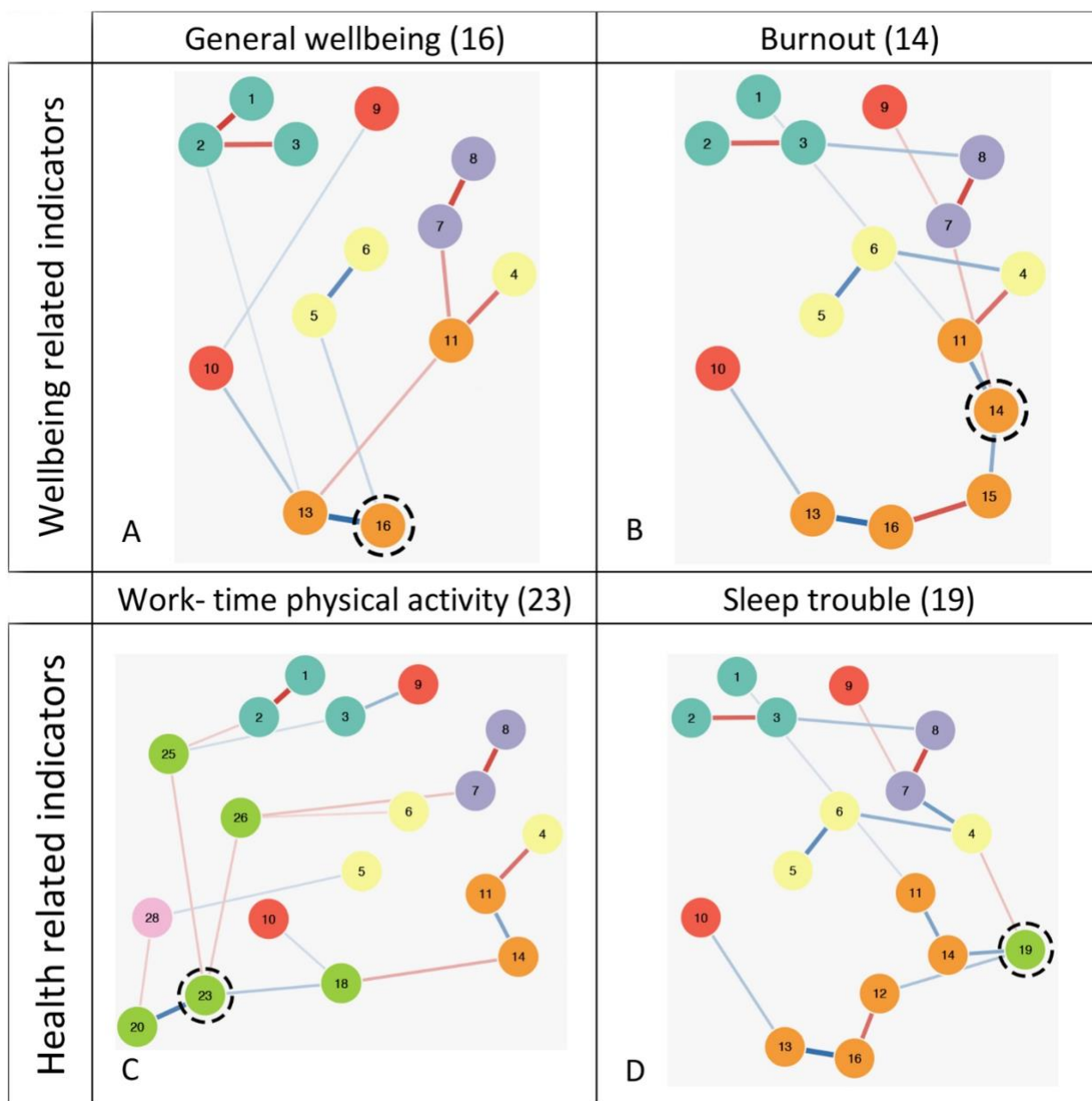
Perceived ability to switch off from work (V4) was most associated to the 'wellbeing' cluster via its negative relationship with work-life conflict (V11; $r=-0.22$) and was most related to the 'health and health behaviour' cluster via a negative relationship with sleep trouble (V19; $r=-0.08$). Daily workload manageability (V7) was most strongly associated with the 'wellbeing' cluster via a negative relationship with work-life conflict (V11; $r=-0.15$) and with 'health and health behaviour' via a negative relationship with work-time sedentary behaviour (V26; $r=-0.09$). Work-day planning and organisation (V10) was most related to the 'wellbeing' cluster via a positive relationship with job satisfaction (V13; $r=0.11$) and with the 'health and health behaviour' cluster via a negative relationship with global sedentary behaviour (V24, $r=-0.07$).

4.5.6 Shortest route of associations between psychological responses to home-working practices and health behaviour and wellbeing clusters.

Based on the initial expected influence centrality values, the top indicator variables of wellbeing and health were selected to investigate the shortest pathways to home-working experiences. From the indicators of wellbeing, general wellbeing (V16, EI = -1.43) and burnout (V14, EI = 1.24) were selected. Among the health-related indicators, work-time physical activity (V23, EI: 1.19), vigorous exercise (V20, EI: 0.98), break taking (V25, EI: -0.88), sleep trouble (V19, EI: 0.83), and moderate exercise (V21, EI: 0.79) demonstrated the highest expected influence values. However, due to similar shortest pathways observed from variables 23, 20, and 21 to 25, only variables 23 (work-time physical activity), and 19 (sleep trouble) were chosen for focussed interpretation.

Figure 5

Isolated networks of direct pathways between identified most influential wellbeing related and health-related nodes.



Note. (A) Network depicting shortest paths between node 16 (general wellbeing) to home-working responses (nodes 1-10). (B) Network depicting shortest paths between node 14 (burnout) to home-working responses (nodes 1-10). (C) Network depicting shortest paths between node 23 (Work-time physical activity) to home-working responses (nodes 1-10). (D) Network depicting shortest paths between node 19 (sleep trouble) to home-working responses (nodes 1-10). Blue lines = positive partial correlations; red lines = negative partial correlations. The thickness of the edge between nodes indicates the size of correlation (the thicker the line the stronger the connection). See figure 4B for representative node names.

General wellbeing (V16) displayed the shortest pathway of association to psychological responses to home-working practices via perceived freedom to transition between home and working environments (V5), showing a notable connection with a perceived ability to transform workspaces (V6; Figure 5A). Work-day planning and organisation (V10) and home-working autonomy (V2) connected with general wellbeing (V16) via an intermediate step, through job satisfaction (V13). Remaining home-working response variables connected with the strongest wellbeing cluster variables via two intermediate steps. Figure 5B demonstrates shortest associative pathways from burnout (V14), with only a single direct connection to home-working practice responses via daily workload manageability (V7). This association showed interactions with perceived excess of daily meetings (V8) and video on / off pressure (V9). Burnout (V14) displayed a notable connection with ability to switch off requiring an intermediate step via work life conflict (11). Remaining connections between home-working response variables and burnout (V14) were weak or required at least two steps.

Work-time physical activity (V23) required an intermediate associative step between work time sedentary behaviour (V26) when connecting with perceived daily workload manageability (V7) and ability to transform workspaces (V6; Figure 5C). Work-time physical activity also displayed an intermediate association with home-working autonomy (V2) and pressure to attend meetings (V3) via break taking intervals (V25) and displayed an indirect connection to work-day planning and organisation (V10) via self-rated health (V18). Remaining associative pathways to home-working practice responses required two or more intermediate steps. In Figure 5D, the shortest pathway of association between sleep trouble (V19) and most other home-working practice responses were via ability to switch off (V4). Remaining associative connections between sleep trouble (V19) and home-working practice responses required multiple intermediate steps.

4.6 Discussion

This study sought to document discrete psychological responses to home-working practices and their relationship with health-related behaviours and dimensions of wellbeing. Psychological responses suggested by previous research to be consequential for health behaviour and wellbeing – for example, perceptions of workload manageability, and the ability to ‘switch off’ from work – were found to fit into three distinct clusters, whilst a fourth weaker cluster was identified. These clusters corresponded to perceptions of independence when working at home, the psychological transition between home and work, perceived work pressure, and forecasting the workday. Indicators of the four clusters of psychological responses were linked, within a complex network, to health-related behaviours and indicators of wellbeing. Perceptions of workload manageability, ability to switch off, and feeling able to plan and organise the workday had notably strong relationships with health-related behaviours and indicators of wellbeing. These findings suggest that modifying home-working practices, or the ways in which people psychologically respond to such practices, may have the potential to influence the health and wellbeing of home-workers.

Our findings showed that there are four distinct ways in which home-working practices are psychologically responded to, and that these responses appear consequential for health and wellbeing. A cluster relating to ‘home-working independence’ encapsulated perceptions of autonomy when working from home, and a lack of perceived pressure to work at the same time as colleagues and to attend meetings. These findings echo previous research by suggesting that feeling pressured to be seen to be performing certain work tasks, to the same schedule as colleagues, can limit perceived autonomy (Abgeller et al., 2022; Cañibano, 2019). Autonomy at work has previously been linked to workers’ opportunities to move more and sit less during the working day (Morris et al., 2018). The presented path analyses provide evidence for a similar behavioural phenomenon, whereby the degree of home-working autonomy displayed a negative connection with work time physical activity via break taking intervals. This suggests that workers who felt less autonomous during work hours were less likely to report frequently standing up and moving around during concentrated work periods. This underlines perceptions of autonomy to be a potential determinant of worker’s perceived ability to take breaks during work hours. This is important because taking breaks offers crucial

opportunities for recovery (Hunter & Wu, 2016) and provides a key chance during work hours to interrupt prolonged sitting, thereby reducing overall sedentary behaviour in home-working environments (Rudnicka et al., 2022). We urge employers to foster among workers a sense of freedom to shape their home-working day, while also endorsing regular break-taking, as a means of promoting rest and recovery, physical activity, and productivity, health and wellbeing.

Two clusters of home-working practice responses, relating to feeling able to transition between 'home' and 'work' mindsets, and perceived daily work pressure, had similarly notable relationships with indicators of health behaviour and wellbeing. The 'home-work transition' cluster captured workers' ability to transform their workspace at the end of the home-working day, an ability to 'switch off' from work during leisure time, and a perceived freedom to transition between home and working environments. The 'daily work pressure' cluster comprised workers' perceptions that their workload was unmanageable, and that excessive online meetings were interfering with their productivity. Within these clusters, as highlighted by the assessment of key bridge variables and reinforced by the presented path analyses, the perceived capability to 'switch off' displayed direct negative associations with work life conflict and sleep trouble, as well as an associative connection to burnout via work-life conflict. Such findings demonstrate the potential for individuals who struggle to disconnect from work to be more likely to experience conflicts between their professional and personal lives, increased levels of burnout, and disrupted sleep. Furthermore, a manageable workload was found to associate with a reduction in sedentary behaviour during work hours, less work-life conflict, and reduced burnout. These relationships may be explained by previous research. For example, workload stress can increase the time and psychological effort that workers spend on work-related matters in non-work time (Hallman et al., 2021; Tejero et al., 2021), and where managing workload involves engaging in more computer-based work, this will likely increase sitting time (Tzaneti, 2021). Moreover, the blurring of work-home boundaries and increases in workload can leave individuals to ruminate about work during their leisure time (Cropley & Zijlstra, 2011b), which has been shown to increase stress, which in turn impairs rest and recovery (Barber & Jenkins, 2014; Mellner et al., 2016; Melo et al., 2021). The combination of increased stress, and a lack of rest and recovery increases risk of burnout (Vandevala et al., 2017). Our findings suggest that feeling one's workload is unmanageable,

and failing to psychologically detach from work, can instigate a cascade of adverse health behaviour and wellbeing outcomes for home-workers. Employers should seek to adopt policies that minimise non-productive work time (e.g., limiting unnecessary meetings, or imposing maximum meeting lengths). Employers should also educate, train and support their workers to adopt practices that can aid workload management, and encourage workers to prioritise detaching from work at the end of the home-working day. For example, workers who bookend their working day by engaging in a purposeful activity can experience wellbeing benefits arising from a marked transition from work to leisure time (Study 1, Chapter 2). Where such activities are also directly health-conducive, such as going for a walk (e.g., a 'fake commute'; Nikolaeva et al., 2023), health and wellbeing benefits will likely be heightened (Singleton, 2019).

Surprisingly, the 'workday forecast' cluster revealed a positive relationship between feeling able to plan and organise one's workday and experienced pressures to have one's video camera on during work meetings. This relationship was the weakest of all those observed within the four clusters so may represent a statistical anomaly rather than a meaningful, unidimensional psychological experience. Nonetheless, some evidence highlights the fatigue effects of camera on digital meetings, indicating a greater associated work load which possibly requires a heightened need to plan and organise one's working day (Johnson & Mabry, 2022; Shockley et al., 2021). However, such disparate interpretative associations should be treated with caution. We also found that intentions to plan the workday predicted greater job satisfaction and general wellbeing. This may reflect that those who intend to plan their day have greater control, agency and self-efficacy over their working schedule, which have been found to predict both job satisfaction and wellbeing among home-workers (e.g., Reuschke, 2019; Wood et al., 2022). We also observed a link between feeling able to plan one's home-working day predicted a reduction in both workday and waking-day sedentary behaviour. This could suggest that people with greater opportunity to plan the day ahead may purposefully limit the time spent in seated tasks, or that those with greater planning and organisation abilities more broadly tend to spend less time sitting (see too Rollo et al., 2016; Szczuka et al., 2022). While further research is needed to replicate and explain the potential influence of workday planning and organisation on other home-working practice responses and health behaviour, our findings nonetheless point to the potential for individual differences in

psychological responses to home-working practices to influences health behaviour and wellbeing.

4.6.1 Limitations

Limitations must be acknowledged. Our study used data collected in April 2021, when UK Covid-19 lockdown restrictions had been eased (Institute for Government, 2021), but remaining restrictions likely resulted in more normally-office-based workers working at home than before or after the pandemic. Findings may lack generalisability to the more stable, post-pandemic home-working contexts. Additionally, while our statistical analysis estimated directional relationships between variables, the cross-sectional nature of our data precludes conclusions around causality. Similarly, reliance on self-report data is problematic, because people typically overestimate engagement in health-promoting behaviours and under-report health risk behaviours (Norwood et al., 2016). We encourage replications of our study using longitudinal, time series methods for a more rigorous estimation of home-workers' psychological responses to working practices, and their impact on health behaviours and wellbeing, in the post-pandemic context (Gao et al., 2016).

Our study overlooked the heterogeneity of home-working practices and responses to them. Home-working practices, and their impact on health behaviour and wellbeing, may differ according to job type, role, expectation, and work (Grawitch et al., 2010; Mullane et al., 2017; Shifrin & Michel, 2022). For example, unique work cultural factors associated with call centre jobs, such as continuous monitoring of productive and personal time and a high expectation to be digitally present, demonstrate notable impacts for work time physical activity and prolonged sitting (Morris et al., 2018). We also excluded home-workers with caring responsibilities, who we deemed likely to have personal circumstances that likely influence their working practices, and by extension their health and wellbeing. Yet, one in seven UK workers has caring responsibilities (Carers UK, 2022). Future research should seek to better account for the various organisational, situational and individual characteristics that influence home-working practices and psychological responses to them.

4.6.2 Conclusion

We showed that psychological responses to home-working practices are linked to health-related behaviours and wellbeing. Workers' perceptions of workload manageability, ability to switch off from work in the evening, a tendency to plan a home-working day, and home-working autonomy appeared to have cascading effects on health behaviours such as sitting and physical activity, and aspects of work-related wellbeing such as stress and burnout. While more research is needed to replicate the complex causal relationships we observed, our findings call for the development of interventions to support productive home-working practices conducive to workers' health and wellbeing.

5 Chapter 5: Study 4 - An intervention to promote positive homeworker health and wellbeing through effective home-working practices: A feasibility and acceptability study

5.1 Study 4: Why this study was needed

Studies 1 and 3 illustrated that working from home can impact workers' health-related behaviours and wellbeing; in the pursuit of productivity, workers make adaptations to their working practices that inadvertently impact their health behaviour and wellbeing. Given such evidence of the potentially detrimental consequences of home-working, Study 4 sought to investigate the acceptability of an intervention designed to modify these behaviours. Specifically, Study 4 aimed to assess the acceptability and feasibility of an information based online intervention designed to promote working practices conducive to health and wellbeing. For the purpose of the thesis narrative, we present Study 4 as a logical progression on from Studies 1-3. However, Study 4 was undertaken directly after Study 1 (January – February 2021), because the intervention in Study 4 was developed in response to a time-critical funding opportunity (awarded to the supervisor to develop a resource to support workers adjusting to hybrid working as Covid lockdown restrictions were eased, around July-September 2020). Study 4 was undertaken as a mixed-methods study with 42 participants, who were office-based workers recruited from a London-based university. Quantitative data were descriptively analysed, and qualitative data were analysed using 'codebook' Thematic Analysis.

5.2 Abstract

5.2.1 Background

In the wake of Covid-19, the prevalence of working from home ('home-working') is expected to rise. Yet, working from home can have negative health and wellbeing impacts. Interventions are needed to promote effective ways of working that also protect workers' health and wellbeing. This study explored the feasibility and acceptability of an intervention intended to promote home-working practices that would protect and promote health behaviour and wellbeing.

5.2.2 Methods

An uncontrolled, single-arm mixed-methods trial design was employed. Forty-two normally-office-based UK workers, working from home between January–February 2021 (during the Covid pandemic), consented to receive the intervention. The intervention: a digital document offering evidence-based recommendations for home-working in ways conducive to health behaviour and wellbeing. Feasibility and acceptability were quantitatively indexed by: expressions of interest within 1 week (target threshold ≥ 35); attrition across the one-week study period (threshold $\leq 20\%$); and the absence of any apparent detriments in self-reported physical activity, sedentary behaviour, snacking, and work-related wellbeing prior to and one week after receiving the intervention. Qualitative think-aloud data, obtained while participants read through the intervention, and analysed using 'codebook' thematic analysis, explored acceptability. Semi-structured interviews conducted one week after intervention exposure were content-analysed to identify whether and which behaviour changes were adopted.

5.2.3 Results

Two feasibility criteria were met: 85 expressions of interest indicated satisfactory intervention demand, and no detriments were observed in health behaviours or wellbeing. Forty-two participants (i.e., maximum capacity for the study; 26 females, 16 males, aged 22-63) consented to take part. 31% dropped out over the one-week study period leaving a final sample of 29 (18 females, 11 males, aged 22-63), exceeding identified attrition thresholds. Think-aloud data showed that participants concurred with intervention guidance, but felt it lacked novelty and practicality. Follow-up interviews produced 18 (62%) participant reports of intervention adherence, where nine recommendations reportedly prompted behaviour change in at least one participant.

5.2.4 Conclusions

Mixed evidence was found for intervention feasibility and acceptability. Whilst the information was deemed relevant and of value, further development is required to increase its novelty. It may also be more fruitful to provide this information via employers, to encourage and emphasise employer endorsement.

5.3 Introduction

Before 2020, organisations' increasing reliance on digital technology had prompted a steady rise in employees 'working from home' (i.e., "home-working"; Messenger et al., 2017; ter Hoeven & van Zoonen, 2015). The Covid pandemic, and associated lockdowns that led many normally-office-based employees to work from home, further increased the prevalence of home-working (Sostero et al., 2020). The pandemic also led many organisations to recognise that employees can work as productively at home as in the office (Lodovici, 2021). Home-working is forecast to become common through 'hybrid' working arrangements that combine on-site and home-based working patterns (Hickman & Robinson, 2020). However, home-working may have consequences for individual's health-related behaviours and wellbeing (Study 1, Chapter 2; Białek-Dratwa et al., 2022; Charalampous et al., 2019; Forte et al., 2021; Xiao et al., 2021). Efforts to promote health and wellbeing among employees tend to focus on and be administered in the workplace (Pieper et al., 2019). Few interventions exist that explicitly promote health behaviour and wellbeing when working from home (Morton et al., 2022).

The potential impact of working from home, rather than the office, on health behaviour and work-related wellbeing can be understood by adopting a goal-based perspective on work practices (Abraham & Sheeran, 2003; ten Broeke et al., 2022). For organisations and their employees, the priority during working time is typically to be productive (Cooley et al., 2022). Pursuing the goal of productivity often incurs behaviours that incidentally improve or diminish employee health and work-related wellbeing (Candido et al., 2019). For example, many office-based employees are required to be on-site to complete their work tasks, which in turn requires them to commute to and from the workplace. For those that use non-car travel modes (e.g. cycling, walking), the act of travelling to and from work often incidentally incurs physical activity. For example, a study of London office workers showed that, on workdays, step count was highest during the morning and evening commute (Smith et al., 2015). Commuting can also support individuals' work-life balance because it offers an opportunity to psychologically demarcate and transition between work and home settings (Jachimowicz et al., 2021). Similarly, many office-based work tasks - such as collecting printing from a communal printer or accessing refreshments - require physical movement around the workplace (Candido et al., 2019; Jancey et al., 2016). The physical layout of the workplace can encourage or inhibit physical activity: for example, teams that work across multiple floors,

have accessible staircases, height adjustable workstations, and standing permissive meeting rooms, tend to be more physically active (Gorman et al., 2013). The social environment within the workplace can also shape health-related behaviours. For example, in the workplace, people are more proximally exposed to localised office cultural norms that promote and encourage shared healthy workday eating behaviours (Wang et al., 2014). The physical presence of colleagues in the office space also encourages movement to other desk spaces or meeting rooms during the workday, to facilitate face-to-face interactions (Edmunds et al., 2013).

When individuals work from home, the instrumentality of many of their workplace-oriented behaviours for achieving work goals changes, which in turn affects engagement in health-related behaviours and work-related wellbeing. For example, commuting becomes unnecessary, which can reduce daily physical activity and limit individuals' ability to psychologically transition between work and leisure time. Additionally, the spatial environment of the home is likely smaller compared to a typical office, so attending to working tasks and communicating with colleagues requires less physical activity. Accordingly, research shows that those working from home instead of the workplace experience a decrease in daily physical activity (Argus & Pääsuke, 2021; Loef et al., 2022; Xiao et al., 2021), increased sedentary behaviour (Ráthonyi et al., 2021), and greater difficulties achieving work-life balance (Tejero et al., 2021). The qualitative study of homeworkers during the stay-home Covid-19 lockdowns (Study 1, Chapter 2) showed how adaptations to work-related practices affected health behaviours and wellbeing. Participants reported sitting more and moving less due to the diminished need to move away from one's computer when attending to daily work tasks. They also reported a physical and psychological blurring of work and home life boundaries, stemming from the continued presence of work-based visual cues (e.g., work computers) during leisure time, and a tendency to work for longer hours. Perhaps consequently, they reported difficulties 'switching off', and reductions in sleep quality. Dietary behaviour was also disrupted by the home environment, with greater proximity and accessibility of food, and situation-specific habitual home-based behaviours reportedly causing increases in snacking.

Interventions are needed to support health behaviour and work-related wellbeing when working from home. Yet, at the time that we designed the present study (July 2020), to our

knowledge no evidence-based interventions or initiatives existed to promote health behaviours and wellbeing for normally-office-based workers when working from home. Drawing on Study 1, Chapter 2, we developed an intervention (during the Covid pandemic of 2020) to promote work practices that facilitate (or at least do not hinder) achievement of work-related goals, while also incidentally shielding or improving health behaviour and work-related wellbeing. Our intervention aimed to emphasise the importance of health and wellbeing beneficial home-working practices. Our aim was to design an intervention for delivery by employers as an onboarding tool for new staff, and as annual refresher training for existing staff. The present study, data for which were collected during the Covid pandemic (Jan-Feb 2021), was designed to assess and explore the feasibility and acceptability of prototype content for this intervention among normally-office-based workers who were working from home due to the pandemic.

Intervention feasibility captures whether an intervention can be delivered as intended (Bowen et al., 2009), and acceptability broadly encapsulates whether potential recipients are willing and able to receive and adhere to the intervention (see Sekhon et al., 2017). Feasibility and acceptability are precursors of intervention effectiveness; an intervention that cannot feasibly be implemented, or is unacceptable to the target audience, is unlikely to be effective. Feasibility and acceptability assessments are important for informing decisions about whether to progress to subsequent phases of the intervention development process (Proctor et al., 2011). The present study, which employed a mixed methods design, was designed to inform a decision about whether to progress to a more rigorous evaluation trial.

5.4 Method

5.4.1 Participants & Procedure

An uncontrolled, single-arm mixed-methods trial design was employed. The project was run as a postgraduate research project during the Covid pandemic (2020-21), the time and financial constraints of which prompted us to trial intervention content in a different context (i.e., delivered individually to workers) to that in which we envisaged the full intervention being implemented (i.e., delivered by employers). Participants were recruited during January and February 2021 via a study advert published on social media (Twitter, LinkedIn), and in an internal circular email to staff at an inner-city university in the south of England. A £20 Amazon voucher was offered as an incentive for completing the 1-week study. Participants were eligible to take part if they were: aged 18 or above; full time employed; working from home at the time of the study; with no caring responsibilities for pre-teen children or older adults. The study advert contained a survey link to a questionnaire where participants self-declared eligibility and completed measures capturing demographic information (age, gender & average hours worked¹) and self-reported health-related behaviour and work-related wellbeing. With 35 participants deemed an adequate sample size for assessing feasibility and acceptability among study completers (Lancaster, 2015), a total of 42 participants were consented in anticipation of 20% attrition.

Next, participants arranged a time to take part in an online 'think aloud' interview. The interview involved participants talking aloud as they read over the intervention document for the first time, followed by some brief semi-structured questions to probe their responses. Participants had full and continual access to the intervention document after the 'think aloud' interview. One week after the 'think aloud' interview, participants were sent an email that included a link to a set of follow-up health behaviour and wellbeing measures, and an invitation to attend a semi-structured follow-up interview.

5.4.2 Intervention

The intervention was developed between August-October 2020, based on theory and evidence around how adaptations to work practices, made in response to having to work from

¹ 'Average hours worked' was not successfully measured and therefore was not included in the analysis.

home during the early days of the Covid-19 pandemic, had shaped office workers' health behaviour and wellbeing (Study 1, Chapter 2; See too Rudnicka et al., 2020). For example, in Study 1, Chapter 2, UK office workers reported that the removal of the daily commute had reduced their physical activity, and prevented them from psychologically transitioning from work to leisure time, which made it difficult to 'switch off' from work demands. Similarly, a shift to digital forms of work-related communication, and a greater perceived frequency of online meetings, reportedly prolonged increased time and limited opportunities for breaks.

We developed our intervention in line with the COM-B model (Michie et al., 2011, 2014), which proposes three fundamental determinants of behaviour: capability, opportunity, motivation. Guided by emerging research on experiences during the pandemic (Study 1, Chapter 2), we conducted an informal 'behavioural diagnosis' to identify which of the three determinants posed significant barriers to health-conducive work practices, and so should be targeted by our intervention (Michie et al., 2014). We assumed that during the pandemic, normally-office-based workers retained sufficient physical and psychological capacity (i.e., *capability*) to engage in work practices conducive to health behaviours and wellbeing, but failed to identify or capitalise on the *opportunities* available to enact such behaviours in the home environment. We also identified *motivation* as problematic, because previous research suggests that workers viewed the goal of protecting health behaviour and wellbeing as conflicting with prioritised productivity goals when working from home (Hadgraft, Brakenridge, et al., 2016; e.g. Study 1, Chapter 2; ten Broeke et al., 2022). Our intervention therefore sought to *motivate* home-workers by highlighting example specific home-working practices that support health behaviour and wellbeing while also facilitating (or at least not hindering) productivity, and to identify and seize *opportunities* to engage in such behaviours in the home-work environment.

Recommendations included in the intervention were drawn from previous evidence-based guidance for home-working practice (Rudnicka et al., 2020), and strategies experienced by home-workers as useful for promoting health behaviour and protecting wellbeing (Study 1, Chapter 2). Example *motivational* strategies included: creating a dedicated workspace to psychologically separate home and work tasks; bookending working hours with physical activity (i.e., a 'mock commute') to allow psychological transitioning between home and work activities; planning working hours and adopting strict timekeeping to ensure consistent start

and stop times, so minimising overworking and protecting work-life balance; and making distractions and snacks less physically accessible, to maintain focus and minimise unhealthy snacking. Example strategies promoting *opportunities* included: taking movement breaks (e.g., brief walks) to allow contemplation of difficult tasks while reducing sitting and promote physical activity; taking walks when attending online meetings, to encourage physical activity; and identifying work tasks that can be undertaken while standing, to reduce sitting time.

An interactive PDF delivery format was chosen because this is a widely used, familiar information delivery format among office workers, often used during staff onboarding, orientation, or refresher training (Miruna, 2019). We anticipated that the PDF format would therefore be more conducive to embedding into existing organisational practice. Throughout the intervention document, participants were able to click on icons, giving them access to information which sequentially extended from the core intervention content. Icon information included relevant research examples, quotations, and behaviour change tips.

Appendix G provides a comprehensive overview of intervention content as mapped to behaviour change techniques from the Behaviour Change Technique Taxonomy v1 (Michie et al., 2013), with example screenshots presented in Appendix H.

5.4.3 Data collection

5.4.3.1 Quantitative data.

All measures were self-reported. Unless stated otherwise, all behaviour and wellbeing measures referred to the previous 7 days.

5.4.3.1.1 Health behaviour.

Physical activity was measured using the moderate physical activity (MPA) and walking items from the IPAQ short form, which has been shown to be reliable across many previous studies (Lee et al., 2011). The standardised physical activity definitions of the IPAQ short form were presented for comprehension. These items prompted participants to identify on how many days in a working week they engaged in MPA or walking (e.g., “On how many workdays did you do moderate physical activities?”). For any answers above zero, participants were prompted to report the average hours/minutes spent in these activities per day (e.g., “How much time did you usually spend doing moderate physical activities on one of those workdays?”).

Sedentary behaviour was measured utilising one item from the IPAQ short form, relating to time spent sitting during workdays (“How much time did you spend sitting on a workday?”).

Sleep quality was assessed using two items adapted from the Leeds Sleep Evaluation Questionnaire (LSEQ; Hindmarch & Parrott, 1978), a reliable measure that has been validated against objective sleep markers (Tarrasch et al., 2003). One item measured ‘getting to sleep’ (GTS; “Over the last 7 days, how would you describe the way you currently fall asleep in comparison to usual?”; “More difficult than usual” [0] to “Easier than usual” [10]) and one assessed ‘overall sleep quality’ (SQ; “Over the last 7 days, how would you describe the quality of your sleep in comparison to usual?”; “More restless than usual” [0] to “Calmer than usual” [10]).

Snacking frequency was assessed through a single item, adapted from Pavey & Churchill (2014): “How often did you eat high calorie snacks on an average workday?” (‘Not at all’ [1] to ‘Very often’ [5]).

5.4.3.1.2 Wellbeing.

Work-related wellbeing was assessed using the second short form version of The Copenhagen Psychosocial Questionnaire (COPSOQ II short form; Pejtersen et al., 2010), which has been shown to reliably assess four domains of wellbeing (Dicke et al., 2018). ‘Work life conflict’ was assessed using a single item (“Do you feel that your work drains so much of your energy that it has a negative effect on your private life?”; ‘Yes, certainly’ [1] to ‘No, not at all’ [4]). ‘Burnout’ was assessed by two items (e.g., “How often have you felt worn out?” [Burnout I] & “How often have you been emotionally exhausted?” [Burnout II]; ‘All the time’ [1] to ‘Not at all’ [5]). ‘Stress’ was assessed via a single item (e.g., “How often have you been stressed?”; ‘All the time’ [1] to ‘Not at all’ [5]). ‘Job satisfaction’ was assessed by a single item (“How pleased are you with your job as a whole, everything taken into consideration?”; ‘Very satisfied’ [1] to ‘Very unsatisfied’ [4]).

5.4.3.2 Qualitative data collection.

5.4.3.2.1 Think aloud interview.

Think aloud methods, here, are instrumental for evaluating intervention feasibility and acceptability by capturing participant’s perceptions through real time commentary informing insights relating to comprehension and navigation of the presented intervention (Eccles, 2020; Eccles & Aarsal, 2017). By vocalising thoughts while interfacing with the E-module, participants reveal potential misunderstandings, response, and implementation problems, thereby underlining components of the intervention that present as a threat to feasibility and acceptability. This approach minimizes recall bias and enhances data validity by capturing immediate reactions and authentic feedback (Alhadreti & Mayhew, 2018; Stone et al., 1998). The method's utility in documenting comprehension issues and informing iterative improvements is well-supported in various contexts, including sports psychology and health behaviour questionnaire evaluation (Calmeiro & Tenenbaum, 2011; Gardner, Louca, et al., 2020).

Each ‘think aloud’ interview was conducted by one of three undergraduate research students (two female, one male) trained by a senior qualitative researcher (author BG). To assure the data collection protocol was followed correctly, the first two interviews run by each student were observed by SK, a male doctoral research student. Participants met online (via Microsoft Teams, Skype, or Zoom) with researchers where they were briefed on the ‘think aloud’ concept before seeing the intervention. During the online meeting, participants were sent the intervention document and asked to share their screens. Participants were explicitly instructed to read through the information out loud in chronological order whilst offering their thoughts and impressions of the information presented to them (See Appendix I). Following the ‘think aloud’ task, participants were asked questions designed to further probe their impressions of the intervention, specifically relating to informational content, format, comprehension, and perceived areas in need of improvement.

5.4.3.2 Follow up interview.

In the one-week follow-up interview, which was conducted online or by phone, participants were asked whether and how they made changes to their working practices based on the information presented to them during the think-aloud interview. Topics included experiences of implementation, adherence, how the intervention document was used, and views on the intended use of the digital document in organisational settings (see Appendix J for follow up interview schedule). All follow up interviews were conducted by SK.

5.4.3.3 Feasibility and acceptability assessment and analyses.

5.4.3.3.1 Quantitative data.

Feasibility was assessed via criteria relating to expressions of interest in participating in the intervention study, and sequential attrition during the one-week study period. Acceptability was assessed via observed changes between baseline and one week follow-up for the behavioural and wellbeing measures.

Established sampling and attrition thresholds currently do not exist within the acceptability literature (Perski & Short, 2021). In accordance with suggested sample sizes for studies assessing feasibility (Lancaster, 2015; Teare et al., 2014), we set a threshold of at least 35 *expressions of*

interest received within a week of publishing the study advert to indicate adequate study feasibility (Schulz & Grimes, 2002).

Attrition was described via percentage dropouts calculated at each stage of the study procedure (see figure 6). An overall attrition of $\geq 20\%$ signalled feasibility issues.

Potential for harm was assessed via inspection of behaviour and wellbeing changes between baseline and follow-up. Specifically, we visually inspected behavioural and work-related wellbeing measures and treated the intervention as acceptable if there was no apparent decline in any behaviour or wellbeing measure between baseline and follow-up. Given the small sample size and likely minimal statistical power, our analysis of pre-post changes solely aimed to describe potential trends, rather than establish statistical significance. Nonetheless, for comprehensiveness, pre and post mean comparisons were conducted via paired samples t-tests. Effect size (*Cohen's d*) were also reported to infer directionality of relationship, whereby effect sizes ≥ 0.2 were interpreted as an indicator of potential change that could occur in more adequately powered samples.

5.4.3.3.2 Qualitative data.

Digital audio of think-aloud and follow-up interviews was automatically transcribed using Otter.ai (Corrente & Bourgeault, 2022). Transcripts were manually error checked by SK. All qualitative analyses were organised using Nvivo 12 (Nvivo, 2018).

For the think-aloud interviews, acceptability was explored using 'codebook' thematic analysis (Braun & Clarke, 2021). Analysis followed a five-stage process of familiarisation, coding, theme extraction, theme review and theme naming (Braun & Clarke, 2013). The 'codebook' method involved authors SK and BG independently coding three transcripts and through comparative discussion, establishing an initial thematic framework, which was subsequently applied and refined by SK to the remaining transcripts (Braun & Clarke, 2021). Through regular supervision and discussion, the thematic framework was iteratively developed whilst SK analysed the remaining transcripts. 'Codebook' methods were adopted because they were deemed most

pragmatic, given time constraints on the project, as they allowed for initial insights from analysis to be drawn on throughout subsequent coding (Braun & Clarke, 2021).

We intended to analyse follow up interviews using thematic analysis procedures to understand details of participant behavioural adherence. However, during familiarisation, it transpired that the interview data lacked the 'thick description' required for an in-depth analysis (Geertz, 1973). In response, a method of summative content analysis was employed to draw indications of guidance adherence from the follow up interview data (Humble & Mozelius, 2022). Reports of engaging in behaviours recommended by the intervention were identified, counted, and descriptively summarised using frequencies and percentages. Presented data identified particular behaviour change recommendations that demonstrated acceptability through reported adherence during the one-week follow up period.

5.5 Results

5.5.1 Quantitative

5.5.1.1 Expression of interest.

Within one week of recruitment going live, a total of 85 individuals expressed their interest to take part in the advertised intervention study. This surpassed our target of 35 expressions of interest, so met our feasibility criterion.

5.5.1.2 Sample description and attrition.

As seen in Figure 6, 42 participants consented to take part and completed baseline (T1) measures (26 females [62%], 16 males [38%]; age range 22 – 63 years, $M = 33$, $SD = 9$). Of the 42, seven (17%) failed to respond when arranging the ‘think aloud’ protocol, and one (2%) stated they did not have the time to take part. Thirty-four individuals (21 females [62%], 13 males [38%], age range 22 – 63, $M = 35$, $SD = 9$) successfully arranged and attended the ‘think aloud’ protocol session. Of the 34, three (9%) failed to respond when arranging the follow up interview session, and two (6%) completed the follow up measures multiple times and inconsistently, so were removed from analysis. A total of 29 participants (18 females, 11 males; age range 22 – 63, $M = 34$, $SD = 9$) belonging to a range of industries (e.g. finance, communications, higher education, public health, recruitment, and charity) successfully attended and completed all stages of the acceptability study.

Attrition between baseline and follow-up was 31%, which exceeded the 20% threshold. This feasibility criterion was not met.

5.5.1.3 Behavioural & work-related wellbeing changes.

As table 9 indicates, there were no visible detriments in any of the observed variables. Whilst we cannot confidently draw inference from the presented non-significant difference testing and p-values (minimum $p = .24$), effect size estimates (Cohen’s d) may provide insight toward the directionality of relationship. Specifically, among the effect sizes observed above absolute values of 0.20, reported minutes / week spent engaging in moderate physical activity ($d = 0.297$) and walking ($d = 0.222$), ease of falling asleep ($d = 0.241$), and sleep quality ($d = 0.217$)

displayed small positive effect sizes. Each of these effect sizes indicate a favourable direction of change. However, among the remaining notable effect size estimates, work family conflict ($d = 0.267$) and one of the burnout measurement items (“How often have you felt worn out?”; $d = 0.299$) also displayed a positive small effect size, thereby indicating an unfavourable direction of change. A level of caution should however be maintained when interpreting these inferences. Measurement between T1 and T2 should only be evaluated in terms of informing the presence of any possible detriments occurring as a result of the intervention, thereby informing primarily feasibility and not effectiveness.

Figure 6

Participant flow

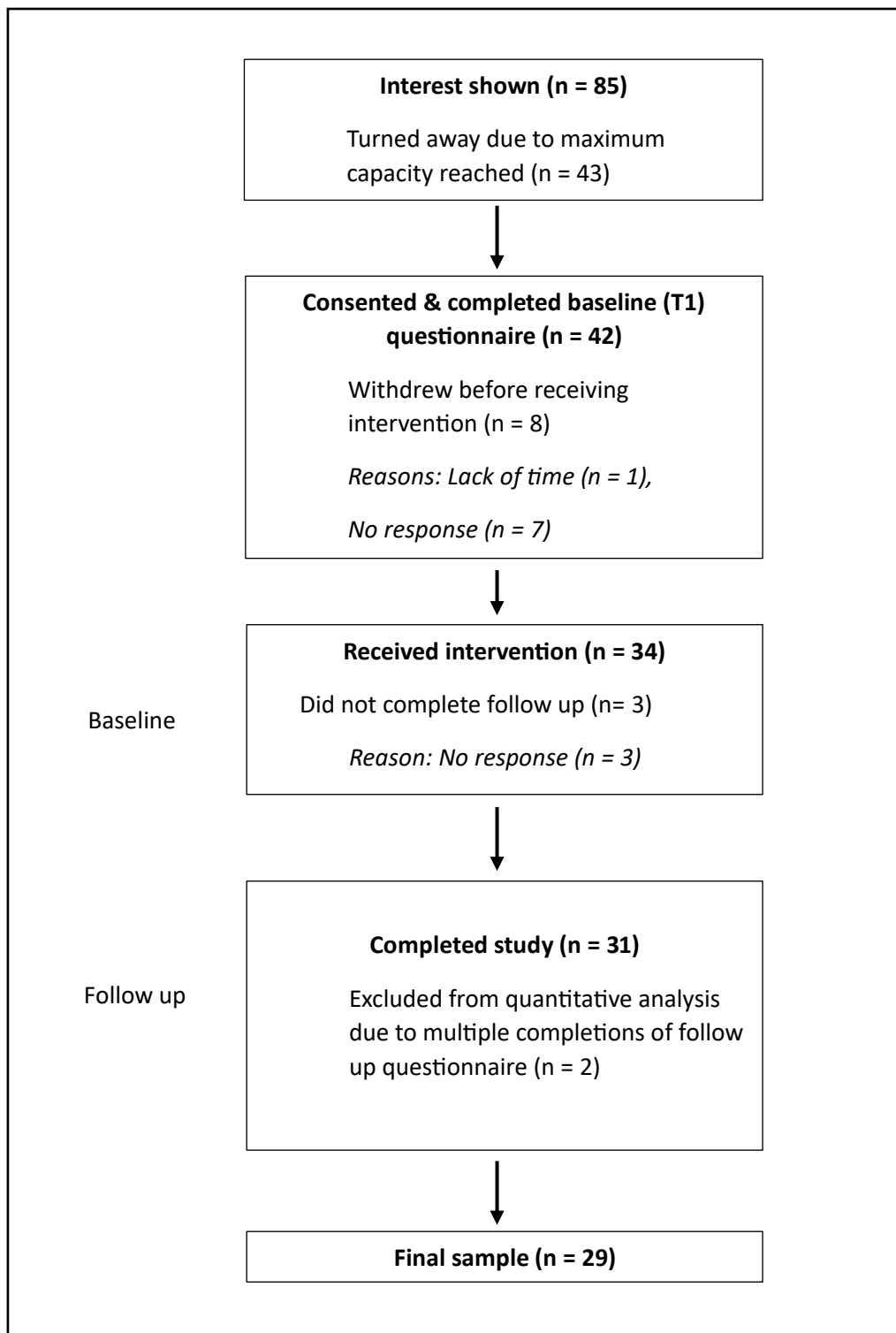


Table 9

Self-report physical activity, sedentary behaviour, sleep, diet, and work-related wellbeing mean and median scores (n=29) from pre (T1) to post (T2), paired samples t-test t scores, p-values, and effect sizes (Cohen's d).

	T1 Mean (SD)	T2 Mean (SD)	T1 Median (Range)	T2 Median (Range)	T (p-value)	Effect size (d)
Physical Activity						
MPA (IPAQ) days / week	2.41 (2.29)	2.52(2.08)	3 (7)	2 (7)	0.32 (0.751)	0.059
MPA (IPAQ) mins / week	28.28 (24.06)	37.59 (28.9)	30 (60)	40 (120)	1.597 (0.121)	0.297
Walking (IPAQ) days / week	3.76 (2.43)	4.03 (2.32)	4 (7)	4 (7)	0.812 (0.424)	0.151
Walking (IPAQ) mins / week	56.31 (43.24)	65.34 (48.37)	61 (150)	60 (180)	1.193 (0.243)	0.222
Sitting (IPAQ) mins / week	1017.69 (1117.54)	1033.97 (1358.14)	630 (4440)	600 (5700)	0.063 (0.95)	0.012
Sleep						
LSEQ Ease of falling asleep	4.41 (1.722)	5 (1.69)	5 (7)	5 (8)	1.3 (0.204)	0.241
LSEQ Sleep quality	4.38 (1.72)	4.90 (1.68)	5 (8)	5 (7)	1.168 (0.253)	0.217
Snacking frequency						
Average snacking per day	3 (1.1)	3.07 (0.96)	3 (4)	3 (4)	0.402 (0.691)	0.075
Work-related Wellbeing						
COPSOQ - WFC	2.45 (0.99)	2.66 (0.936)	2 (3)	3 (3)	1.440 (0.161)	0.267
COPSOQ - Burnout I	3.03 (1.27)	3.31 (1.17)	3 (4)	4 (4)	1.612 (0.118)	0.299
COPSOQ - Burnout II	3.28 (1.22)	3.38 (1.21)	3 (4)	4 (4)	0.550 (0.586)	0.102
COPSOQ - Stress	3.28 (1.16)	3.17 (1.14)	3 (4)	3 (4)	0.571 (0.573)	-0.106
COPSOQ - Job satisfaction	2.41 (0.95)	2.38 (0.82)	2 (3)	2 (3)	0.273 (0.787)	-0.051

Note. MPA = Moderate Physical Activity; IPAQ = International Physical Activity Questionnaires; LSEQ = Leeds Sleep Evaluation Questionnaire; COPSOQ = Copenhagen Psychosocial Questionnaire; Effect size was estimated using Cohen's d.

5.5.2 Qualitative data

5.5.2.1 Think aloud.

Three acceptability-related themes were identified: 'Acceptance and elaboration', 'Resistance to content', and 'Effectiveness of intervention communication'.

5.5.2.1.1 Theme 1: Acceptance and elaboration on content.

Several participants appeared to agree with the information and behavioural guidance, indicating that it was personally relevant:

"Yeah, I agree with that. Commuting means less physical activity. I normally walk to work. So I like to start my day with a walk. Go out and get some fresh air."; P31

Think-aloud reactions to the intervention information often produced anecdotal confirmations of the home-working behavioural health risks presented:

"Think that's really, really true. Especially for me being sat at home all day, just working. The only sort of activity I do around the house is going to the kitchen to make lunch or to make a coffee. I think we really do miss out on extra physical activities like commuting and moving around the office"; P7

Some participants found the content and the behavioural guidance novel, offering them new insights related to home-working:

"[Creating your workspace your work zone and trying to break your workday] [...], going for a walk before you start work or doing something you know, to mark the end of your working day. So those things I haven't really thought about before"; P18

Many participants expressed a willingness to implement suggested behaviours into their own working patterns:

"Ah I never even think about. For online meetings. I'm always sat in exactly the same position. Same with taking phone calls. I could easily be moving about when I'm talking.";

P25

Participants also described personal experiences that built upon the guidance provided, offering up similar alternatives to suggested behaviours:

“[I] totally agree with [the tip about creating your own personal space by plugging in headphones and listening to music]. I use another weird thing [...] because I don't like listening to music whilst while I'm working. Because I get distracted by that and focus too much on music. So I just put earplugs in.”; P14

Participants reported that they were already engaging in many of the behaviours recommended by the intervention. They also referred to specific contexts in which they had already experienced benefits that the guidance aimed to offer:

“100% agree [...] Putting [time to focus on specific tasks] in your calendar, it helps. But it's not just that, what does help is when it's in your calendar on outlook is the little box that comes up to remind you in 15 minutes. And it's kind of like “Wow, I've been working on this so long”, and that this meant that “Okay, I get a break in a minute, I have to move on to this other task in 15 minutes”. So I agree with that”; P30

For some participants, the guidance was deemed helpful because it reinforced the need for actions that they were already taking:

“[Putting your work stuff away at the end of the day, creating time that you can kind of fake commute and walk in the morning in the evening], just to kind of shut down for the day or start your day. I've been doing that recently in the past few weeks and I can really relate to that and found it a benefit to myself. [...] That was a really good example of something that I've really benefited from.”; P13

5.5.2.1.2 Theme 2: Resistance to intervention.

Several responses indicated a lack of acceptability of the information provided as well as for some of the suggested behaviour change methods. For example, some doubted the plausibility of intervention content relating to greater day time standing and movement:

I can't do any work tasks while standing. And my headphones, so when I take calls, some of my calls are through Teams. So I have a headset which literally ties me to my computer. So it's not likely that I can walk around and quite often I need to see what is on the screen.; P32

Participants thought that some of the guidance lacked applicability to personal and specific circumstances or situations. For example, some participants highlighted that the limited access to physical space or desk based equipment in their homes meant that the guided information was not applicable to them:

"It's difficult to create a work zone when you only have one living room and one bedroom.;" P29

[Keep your lower back properly supported. Adjust your seat, you should be able to use the keyboard with wrists and forearms straight and level with the floor.] "That's impossible because my table's too small and I don't have a proper chair but okay.;" P19

Participants also sometimes rejected tips that were deemed to lack credibility in adjusting unhealthy behaviours, such as taping cupboard doors shut to reduce daily snacking:

"I wasn't keen on [the recommendation to lock tempting foods away]. I don't know if it's practical. I couldn't put a lock on any of my cupboards [...], and taping them just seems a bit, I don't know, like, a bit harsh"; P12

Some participants felt that the guidance was not practical to follow alongside their daily working practices and perceived recommendations as a burden to their productivity:

"if I [stood up], I wouldn't get two hours more work done. And then I'd be under more pressure and stress from my, the stakeholders I report into because they wouldn't be happy that things weren't getting done. And it's that fine balance between looking after yourself and being in a position where you feel like you can do that.;" P21

Participants' comments generally suggested that they felt the guidance lacked novelty for them (*"I don't think I learned anything new"*; P2), as they already knew much of it. Many participants felt that the guidance was being provided 'too late', given their months of experience of working from home during the pandemic:

"I'm not sure if there's many people who haven't already thought of this. I guess maybe at the beginning of the pandemic, when we were all sent home, this is the kind of stuff that people might have found useful"; P9

5.5.2.1.3 Theme 3: Effectiveness of communication.

Responses indicated various ways in which the information could have been more clearly presented and so communicated.

Most participants expressed a favourable response to the intervention design and content presentation. Specifically, participants positively described the layout, length, format, and functionality of the interactive PDF document (*"It was good. It was really easy to navigate. And the top tips were useful because it gave a bit more information, but in quite a clear and accessible way"*; P10), whilst others favoured the document's length with regards to their realistic and expected ability to engage with the document:

"It doesn't contain too much of useless information, like some of them do,[...] and it's written in a clear and easy language, which is another positive aspect, because our workload and mental workload is already kind of exhausted."; P14

The inclusion of a page count on the intervention document was, however, discouraging for some, as it suggested that the document was prohibitively long:

"I'm on page 18 and it says 'out of 42'. And I thought, "Oh no it's going to take forever". So that was a bit of a distraction. A little bit, but then I realized it wasn't 42 slides."; P30²

Some participant responses indicated difficulties in accessing the information as intended. Specifically, the digital intervention document was designed with interactive pop out

² Participants were misled because the PDF viewer for the intervention included all document pages, inclusive of the pop out pages. Therefore displaying a total of 42 pages, when in fact the true page count of the intervention was 15.

functionality (when clicked on), allowing participants to view further information (e.g. behavioural tips, quotes, and study references). Participants however commonly sped through the document without clicking on these pop outs, leaving a significant portion of the guidance unseen:

“I just felt like I was forgetting to click on some of the top tips and things. So I don't know. Yeah, that was probably I may have missed some information, just because I forgot to click on those.”; P22

5.5.2.2 Follow up interview - Summative Content Analysis.

As seen in table 10, of the 29 participants who completed the follow-up interview, 18 (62%) described having made changes to their behaviour in response to one or more of nine specific intervention recommendations. The three most popular behaviour change recommendations with reported adherence indicated participant's acceptance with attempts to increase daily physical movement, initiate more breaks when working, and a proclivity towards ways of drinking more water during the day. Whilst posture appeared to be addressed by some, the remaining five intervention recommendations were only reported to be attempted by one or two participants.

Table 10

Specific recommendations that reportedly led to behaviour change, among those reporting changing their behaviour (N = 18; 62% of sample)

Specific recommendation	Quotation example	N reporting following recommendation	% Of participants reporting changed behaviour (N = 18)	% Of all participants (N = 29)
<i>Make moving a habit</i>	<i>"it's definitely made me more cognizant of the amount of time spent sitting for out the day yet made an active effort to just get up and break up those prolonged periods. of sitting."</i>	5	28%	17%
<i>Take breaks</i>	<i>"I've been taking regular breaks throughout the day."</i>	5	28%	17%
<i>Stay hydrated</i>	<i>"one thing I have been one thing I have been really trying hard to do is, the tip about getting up and getting a small glass of water. So then. So then you have to keep getting up to refill it."</i>	4	22%	14%
<i>Posture</i>	<i>"One of the main things I've definitely taken away from it was posture. And I'm quite for that I kind of realised quite quickly that I'm slouched over, my legs are crossed. So over the past week, I've just been a little more mindful"</i>	3	17%	10%
<i>Going into sleep mode</i>	<i>"I think the one other thing I was able to do was to try and limit phone use like half an hour before bed"</i>	2	11%	7%
<i>Creating work boundaries</i>	<i>"Well, I really tried, actually, to switch off my computer at half five, you know, eight hours after I started work."</i>	2	11%	7%

Specific recommendation	Quotation example	N reporting following recommendation	% Of participants reporting changed behaviour (N = 18)	% Of all participants (N = 29)
<i>Add it to the calendar</i>	<i>"The calendar aspect of booking into certain things to do at certain points of day, so I can kind of stick to a routine [...] it's kind of reinvigorated me to stick to my calendar"</i>	1	6%	3%
<i>Create a work only space</i>	<i>"We had a bedroom that became free, because our daughter went back to uni. So and because of that, and also the conversation, I've moved the, the kind of work and office into the bedroom."</i>	1	6%	3%
<i>Marked start and end of day</i>	<i>"I will remember that it said that by and I, like I was going for morning walks before, and I think I've stuck to them a little bit better."</i>	1	6%	3%

5.6 Discussion

This mixed method study explored the feasibility and acceptability of an intervention designed to promote ways of working effectively at home while protecting health behaviour and wellbeing. The intervention met some, but not all, feasibility and acceptability criteria. Specifically, there were sufficient expressions of interest in participating in the study, and no detriments were observed in quantitative health behaviour and wellbeing indicators, and there was some tentative indication of a tendency towards greater MVPA and walking one week after receiving the intervention. Overall attrition, however, exceeded our target threshold of 20%. Furthermore, qualitative data suggested that, while participants concurred with the gist of the information presented, and some adopted some of the recommended behaviours, many had already spontaneously adopted such behaviours during the Covid-19 pandemic, so the guidance lacked novelty. Overall, acceptability was mixed. Further development work may be required to enhance the novelty and appeal of the intervention prior to undertaking more rigorous evaluation work.

We assessed acceptability and feasibility quantitatively against three criteria - intervention demand, attrition, and the absence of detriments in health behaviour and wellbeing outcomes – and used qualitative data to explore experiences of and reflections on the intervention. Intervention demand was high; we received far more expressions of interest in response to the study advert than we aimed for, exceeding our target threshold of 35. Additionally, health behaviour and wellbeing did not decline following the intervention. However, 31% of participants dropped out of the study over the one-week study period. While there are no standardised thresholds for assessing acceptability (Perski & Short, 2021), and evidence suggests attrition rates of around 50% are standard for web-based interventions (Broekhuizen et al., 2012; Kelders et al., 2012), our findings indicate that around a third of those exposed to our intervention study disengaged. It should be noted however that most participants dropped out after consenting but prior to receiving the intervention. Only three (9%) participants dropped out after receiving the intervention, indicating a potentially acceptable level of intervention engagement.

Our think aloud data, obtained as participants read through the intervention information for the first time, offered potential reasons for lack of engagement. Although participants indicated agreement and demonstrated a clear comprehension of the intervention material,

some of the recommendations appeared to lack novelty. We drew on insights from research conducted in the Spring 2020 pandemic regarding how office workers had adapted to home-working, and so expected our intervention to be timely, novel and informative. Yet, participants appeared to have accrued home-working experience during the Covid-19 pandemic to a degree that the knowledge and guidance offered by the intervention was all too familiar and perceived to have been delivered too late. A lack of informational novelty has been shown to reduce engagement with behaviour change suggestions in interventions (Fletcher-Miles et al., 2020).

Additionally, many indicated that they would find it difficult to engage in some of the guided advice, because it failed to recognise practical barriers to adherence. For example, recommendations to use physical space for work-life demarcation were deemed unfeasible by those with smaller homes. Evidence suggests that those who do not have dedicated workspaces at home are at a higher risk of negative health and wellbeing behavioural outcomes (Xiao et al., 2021). This underlines the necessity for home-working advice to acknowledge space constraints and to offer clearer applied examples of implementation which better emphasise the benefits of the space management strategies presented. It may be helpful and more acceptable for guidance to be tailored to users' circumstances.

Some participants felt that adopting some of the intervention recommendations would be burdensome and would inhibit their productivity. For example, the suggestion that workers should stand for a total of two hours per day was dismissed as impractical by some. This suggests that some recommendations failed to achieve our aim of promoting health behaviours and wellbeing in a way congruent with the pursuit of daily work goals (Abraham & Sheeran, 2003). It may however be that these same recommendations would be more credible if delivered by employers, as a means of encouraging and advocating work practice changes required to promote their health and wellbeing.

Our long-term aim was to develop an intervention for delivery by employers as part of an interactive training resource for new employees, and as refresher training for existing employees, who at least occasionally work from home. However, resource constraints and the circumstances of the pandemic led us to assess the content of our intervention as delivered on an individual basis by undergraduate students, with no employer endorsement. We were therefore unable to assess acceptability and feasibility of our intervention content as delivered

in the intended setting. The lack of employer endorsement may have been notable in this regard, because organisational buy-in can enhance the acceptability and effectiveness of health-related behavioural interventions among employees (Healy et al., 2016; Keyworth et al., 2018; Mansfield et al., 2018). For example, employees worry that management will think that if they are standing up more, or sitting less, they will be less productive (see Gardner et al., 2017). Organisational endorsement may allay these fears (Mansfield et al., 2018). A home-working guidance document conceptually similar to ours, launched after we designed our intervention, contains individual-level recommendations while also emphasising the importance of involving managers and supervisors in the delivery of employee health initiatives (Kinman et al., 2020). The importance of management involvement in the development and delivery of employee behaviour change interventions is increasingly being acknowledged (Mackenzie, 2021).

5.6.1 Limitations

Limitations of the intervention, and the study more broadly, must be acknowledged. Our aim was to develop an interactive e-learning module, but given time and resource pressures on the project, the clickable-PDF format that we adopted was less interactive than we had hoped. Ideally, future iterations of the intervention would feature greater interactivity, such as quizzes and additional consolidatory learning strategies, to sustain engagement. We investigated elements of acceptability – i.e., adherence and attrition – over a one-week period, but these data are unlikely to capture patterns of engagement and enthusiasm for the intervention over the longer-term.

We opted to assess the acceptability of our intervention only among people who we felt were likely to have sufficient autonomy over their home-working practices to implement our recommendations. We therefore excluded people with caring responsibilities (e.g., parents of young children), on the basis that caring for others while working from home may limit the extent to which participants could modify their work practices as we suggested (Del Boca et al., 2020). However, considering that one in seven workers have caring responsibilities of some sort (Graham, 2019), we recognise the importance of assessing its acceptability among, and

potentially further developing our intervention to address the needs of, a more diverse body of office workers.

We drew on theory and evidence to guide intervention content (Study 1, Chapter 2; Michie et al., 2014), offering recommendations that we felt would motivate home-workers to adopt better work practices and highlight opportunities to incorporate such practices into everyday home-working routines. The strategies that we recommended may however have lacked motivational impact or offered opportunities of little value to participants. Indeed, data were collected ten months after UK stay-home lockdown conditions were imposed (March 2020), so our participants are likely to have had accrued extensive experience of spontaneously learning and adapting their working practices whilst working from home. This may have significantly lessened the impact and acceptability of our intervention content.

Lastly, we delivered the intervention independently of participants' employers. Although we assumed that our participants had sufficient autonomy to implement our recommendations, the lack of endorsement from employers may have led some participants to question whether the recommended work practice changes were compatible with their work-related goals. It is possible that the same intervention content may have appeared more acceptable when delivered in the intended context (i.e., as an employer-provided staff training module).

5.6.2 Conclusions

Our intervention aimed to provide guidance on how to work effectively in a way that also shields or improves health behaviours and wellbeing. Participants recognised the need for and value of this information but, likely owing to having spontaneously adapted to working from home during the Covid pandemic, found the information lacked novelty and personal applicability. Adjustments are needed to this intervention to further improve its acceptability prior to progressing to a more rigorous trial. We intend to remove what participants felt was less credible behavioural advice and deliver the remaining guidance elements as part of a broader organisational strategy promoting health when working from home.

6 General Discussion

6.1 Thesis summary & key findings

Advancements in technology and the influence of the COVID-19 pandemic have significantly increased the prevalence of home-working (Kingma, 2019). This shift to ‘working from home’ has had societal (Sutton-Parker, 2021), organisational (Marcinkowski & Brandmeier, 2023), and psychosocial (Charalampous et al., 2019) consequences for workers and organisations. Although there has been research on the impact of working on-site on health behaviour and wellbeing, the possibility that health-related behaviour might be impacted by working from home has not yet been fully explored. This thesis aimed to investigate the potential impact of working from home on health-related behaviour and associated wellbeing consequences among normally-office-based workers. The overarching purpose of the four empirical research studies was to identify whether and how health behaviour and wellbeing might be affected by home-working practices and, if so, in turn develop and assess the acceptability and feasibility of a behaviour change intervention to support the health and wellbeing of home-workers through the promotion of more health-conducive working practices.

The research reported in this thesis was undertaken during the COVID-19 pandemic, co-occurring with three national pandemic lockdowns in the UK (lockdown 1: 23rd March – 23rd June 2020; lockdown 2: 5th November – 2nd December 2020; lockdown 3: January 6th – 12th April 2021), and a tiered system first introduced on 14th October 2020, which determined varying degrees of regionally allocated restrictions (Brown et al., 2021). The onset of the pandemic and the first of the lockdowns triggered a dramatic shift for office-based workers to work from home. Although later lockdowns were less restrictive, office-based workers were still advised to work from home where possible. After the lifting of all lockdown regulations in July 2021, organisations commonly embraced a hybrid work approach, a prevailing work distribution model that persists today. Despite data collection for all four studies taking place during the COVID-19 pandemic, the results of this thesis have the potential to make a substantial contribution to knowledge surrounding the health-related behaviours and associated wellbeing outcomes of home-working outside of the pandemic context. As we will

outline below, this thesis has the potential to inform organisational practices, shape policy, and guide the development of interventions.

The first study in this thesis (Study 1; Chapter 2) aimed to explore the experiences of office-based workers that were instructed to work from home during the first UK pandemic lockdown (March-June 2020). Twenty-seven one-to-one semi structured qualitative interviews, conducted during April-May 2020, were undertaken to understand how home-workers modified their working practices, and whether they also experienced changes to their health-related behaviours and wellbeing. Thematic analyses underlined several key adaptations that participants made to home-working practices and environments and highlighted notable changes to health behaviour and wellbeing. Findings indicated that home-working increased workers' flexibility and time available in the day, which granted opportunities to spend more time preparing nutritious meals and to engage in purposeful exercise. However, findings also suggest that the home-working environment imposed constraints on workers' opportunity to engage in physical activity while working, and a shift towards almost solely relying on digital interfaces to work from home appeared to contribute to a rise in sedentary behaviours. Similarly, features of the home-working context had the potential to increase snacking behaviours, due to greater proximity, access, and cues to food in the home. Working at home was also reported to have blurred work and home boundaries, with participants reporting potentially damaging effects on their work intensity, work-life balance, and sleep. Although experiences during the initial UK COVID-19 lockdown may not have perfectly represented a typical home-working scenario, the insights derived from Study 1 (Chapter 2) provided valuable perspectives on potential health and wellbeing consequences of working from home that transcend the context of the pandemic.

Study 1 (Chapter 2) identified experiences of home-working and potential detriments in health behaviour and wellbeing, but as a qualitative study, did not directly show that home-working adaptations caused declines in health behaviour or wellbeing. Statistical modelling methods were needed to investigate potential causal directions. Prior to undertaking such modelling however, it was necessary to first develop quantitative measures of the home-working adaptations and responses. Drawing on a systematic, mixed-method scale development approach, Study 2 (Chapter 3) aimed to develop quantitative measures of home-working practices informed by the qualitative findings of Study 1. In Study 2 (Chapter 3), an initial set

of 105 quantitative item statements derived from the qualitative analyses reported in Study 1 were systematically refined, using robust psychometric procedures. This produced a final set of 25 valid and reliable items assessing 10 discrete psychological responses to home-working practices. The development of these measures permitted us to quantitatively model the relationships between home-working, health behaviour, and wellbeing in Study 3 (Chapter 4). Study 3 sought to statistically model and explore weighted relationships between psychological responses to home-working practices and validated self-report measures of health-related behaviour and wellbeing. Given the complex potential interplay of psychological responses to home-working practices and the potential connections between workers' health-related behaviours and wellbeing, a Network Analysis approach was employed. Two key findings emerged. First, four discrete clusters of psychological responses to home-working were identified: perceptions of independence when working at home, the psychological transition between home and work, perceived work pressure, and forecasting the workday. These represented distillations of the concepts first identified qualitatively in Study 1, and psychometrically refined using quantitative data in Studies 2 and 3. Second, indicators of the four clusters were identified to play impactful roles in a network of health-related behaviour and wellbeing outcomes. In particular, home-working autonomy influenced break frequency, impacting work-time sedentary behaviour and physical activity. The manageability of work-related demands had the potential to affect work-time sedentary behaviour, work-life conflict, and burnout. The ability to psychologically detach from work impacted work-life conflict, burnout, and sleep quality among home-workers. Additionally, workers who planned and organised their workday experienced greater job satisfaction, overall wellbeing, and reduced sedentary behaviours in both work and non-work settings. Findings point toward a potential complex system of interconnecting home-working determinants of health and wellbeing.

Together, Studies 1 (Chapter 2) and 3 (Chapter 4) showed that home-workers' health-related behaviours and wellbeing can be impacted by the way in which work tasks are undertaken in the home environment. From a theoretical perspective, the findings can be understood as showing that, when working from home, workers tend to prioritise the pursuit of work-related goals over health (ten Broeke et al, 2022). When working at the worksite (i.e., not from home), work-related goals often align with health-related goals; for example, many workers engage

in at least some physical activity to commute to the workplace (e.g., Smith et al, 2015), and commuting to (and especially from) work provides a psychological transition that can help workers to detach from a work mindset and so prevent rumination during non-work time (Jachimowicz et al., 2021). When working at home, however, physical activity and commuting lose their instrumental value for meeting work-related goals; that is, work goals can be attained without accruing steps during active travel, or by commuting. Consequently, home-working can impact the health-related behaviours and wellbeing of those working from home by devaluing and thereby removing some of the health-conducive activities required by onsite working (ten Broeke et al., 2022). The findings of Studies 1 and 3 not only reinforce the narrative of home-working to omit instrumental health behaviours, but begin to reveal complex systems of goal directed health-related behaviours surrounding home-working, which are not necessarily pursued explicitly for work-related purposes. For example, extended bouts of sitting emerge from engaging with digital work interfaces and communications, and increased incidental physical activity and greater seated interruptions stem from regular autonomous break taking. Our findings inform possible ways in which responses to work practices and settings may be modified to support and promote the health and wellbeing of those working from home, especially toward compensating for the absence of workplace-incurred physical activity and the demarcation between work and home-life. Insights specifically point to the need to develop health and wellbeing conducive work-practice policies or interventions that can preserve work-related productivity, therefore offering sustainable behaviour change that supports or promotes the health and wellbeing of home-workers.

Study 4 (Chapter 5) presented an intervention acceptability study that drew on the insights derived from Study 1 (Chapter 2), and the empirical evidence that was available at the time. While ideally, we would have undertaken Study 4 after completing Studies 1-3, to generate an optimally evidence-informed intervention, Study 4 was undertaken opportunistically, in response to funding available to develop an intervention to help workers to transition into hybrid working following the first Covid lockdown (March-June 2020). Over July-September 2020, we designed a digital information-based intervention, intended for administration as an e-learning module in an organisation with staff who at least occasionally work from home, to support workers to adopt home-working practices conducive to health and wellbeing. In Study

4, we assessed the acceptability and feasibility of a digital self-led home-working health and wellbeing guidance document. Data was gathered using mixed methods between January – February 2021. We assessed acceptability qualitatively, by gauging user impressions and experiences of the intervention, derived from think-aloud sessions and interviews conducted one week after exposure to the intervention. Feasibility was determined by quantitative measures of attrition and assessments for potential harm, indicated by baseline and follow up changes in health behaviour and wellbeing. Results showed that participants acknowledged the need for home-working health and wellbeing guidance, but their responses suggested that the content of our intervention required refinement. Specifically, participants were concerned that the recommendations we provided could potentially compromise their productivity. Participants also felt that, given the experiences of home-working that they had accrued during the pandemic, the intervention lacked novelty and appeal, and some behaviour change suggestions were deemed to be impractical. Overall, the feasibility and acceptability of the intervention was satisfactory but, although we did not assess intervention effectiveness, it seemed likely that adjustments would be needed for the intervention to bring about intended behaviour change. One possibility is that the information we provided does hold promise, but that it was lacked apparent acceptability and feasibility because it targeted workers individually, with no acknowledgement of the organisational culture or context in which those workers were located. It may be that, if championed by employers, or supplemented by policy supporting employee health, information-based initiatives would show greater promise for promoting health-conducive home working practices.

Overall, the findings of this thesis collectively indicate that home-working practices can influence health-related behaviours and wellbeing among people who at least occasionally working from home. Although the self-guidance resource we developed did not appear to offer the most promising behaviour change strategy, there is apparent scope to improve the health and wellbeing of home-workers through interventions to modify work practices. Given the growing prevalence and research emphasis on home-working, this thesis plays an important role in reinforcing the growing evidence-based understanding of the health and wellbeing effects of working from home. Insights from this thesis may be drawn on to inform more supportive health-related organisational policy, and to develop further interventions to

promote the health and wellbeing of home-workers, while preserving work-related productivity.

6.2 Does home-working impact on health behaviour and wellbeing?

At the outset of the work reported in this Thesis, there was reason to suspect that home-working may affect health behaviour and wellbeing. Evidence from studies of on-site workers suggested that health-beneficial goal-directed behaviours were incidentally incurred by working on-site; for example, commuting to work incurs physical activity (Smith et al., 2015). Such benefits were presumed to be absent for those working from home, implying that home-working could potentially have detrimental health behaviour impacts for home-workers. For example, the absence of the daily commute meant that individuals working from home were expected to forego the incidental physical activity gained from traveling to and from the office (Smith et al., 2015). Yet, the existing literature on home-working overlooked the potential unique impact of working in the home environment – rather than simply ‘not working on-site’ – on health behaviour and wellbeing (Allen et al., 2015; Charalampous et al., 2019) This thesis aimed to understand whether home-working did indeed impact home-workers’ health behaviours and wellbeing, and if this were the case, to develop and inform ways of addressing the identified behavioural problem. Results revealed that the impact could not solely be attributed to the absence of goal-directed behaviours observed in on-site work. Instead, working from home emerged as a distinct and potentially intricate context with unique health and wellbeing behavioural impacts.

Study 1 (Chapter 2) was to our knowledge, at the time of investigation, the first study to explore how working from home may affect worker’s health behaviours and associated wellbeing. The findings of this novel research showed that the way in which workers attend to work-related practices whilst home-working may impact their health behaviours and wellbeing. For example, home-working displayed a featured shift toward a digital work interface, which compounded the absence of physical activity as a means of travelling to and from work by diminishing the need for physical movement to accomplish daily work-related tasks, and incurring extended bouts of computer-based sitting. Such indications mirror that of larger scale longitudinal studies of home-workers, which have shown that home-working can

result in decreased physical activity and increased bouts of sedentary behaviour (Fukushima et al., 2021; Loef et al., 2022; Rapisarda et al., 2021; Xiao et al., 2021). Post-pandemic evidence has since confirmed that home-workers, as compared to office-based workers, display significantly more objectively measured prolonged sedentary behaviours, and engage in significantly fewer steps during the workday (Holmes et al., 2023). Study 1 showed that the time saved by working from home was sometimes reported to facilitate healthier food preparation and engagement in exercise, but more often was used to engage in behaviours that could potentially compromise health or wellbeing, such as working more intensively or for longer hours. The findings of Study 1 (Chapter 2) also highlighted that how home-workers navigate the physical crossover between work and home life may impact workers' sense of work-life balance, their capability to psychologically detach from work, and the quality of their sleep. Findings supported the understanding of how demarcations between work and home life may determine work-life balance (Kniffin et al., 2021; Rothbard et al., 2021), and showed that digital work interfaces can interfere with this (Hellemans & Vayre, 2022; Y. A. Park et al., 2020; Perlow, 2012), potentially leading to difficulties with sleep (Mikołajczyk et al., 2023).

Together, the findings from Study 1 indicated that the way work is carried out in a home setting may have the potential to shape worker's health behaviours and wellbeing. Yet, Study 1 used qualitative methods and a small sample. Study 2 (Chapter 3) aimed to systematically derive quantitative items from the findings of Study 1 (Chapter 2), to enable work in Study 3 (Chapter 4) to develop a statistical model to test the indicated relationships. Study 2 sought to quantify specific home-work practices (i.e., behavioural adaptations to home-working) that might shape health behaviour and wellbeing, and psychological responses to these adaptations: i.e., perceptions of control over engagement in these behaviours, and perceived social pressures to engage in these behaviours. Interestingly, through the systematic refinement process reported in Study 2 (Chapter 3), measures that were retained and fed forward into Study 3 tended to focus on *psychological responses to* home-working practices, rather than the home-working practices themselves. This suggests that psychological responses to home-working practices may be more impactful than the home-working practices themselves; for example, the extent to which people feel able to control whether they work the same hours as colleagues seemed more meaningful than whether they actually did work the same hours as colleagues. These findings developed the insights gleaned from Study 1 (Chapter 2), by

pointing to psychological factors as potentially more important for health behaviour and wellbeing than adaptations to working practices.

Using measures derived through Study 2 (Chapter 3), Study 3 (Chapter 4) confirmed that the way in which workers psychologically respond to specific home-working practices plays a complex role in determining workers' health behaviours and wellbeing. For example, findings suggested that home-workers who perceived a greater degree of autonomy over their workday subsequently engaged in regular break taking, so benefitted from more frequent interruptions to sitting and incidentally engaged in more physical activity. This specific finding echoed previous research that has found that perceived job autonomy predicts a tendency for micro-break taking (Kim et al., 2022), which in turn fosters more frequent physical movement during work-time. Study 3 also found that home-workers' perceptions of autonomy appeared to be negatively influenced by perceived pressures to attend meetings and to coordinate work schedules with colleagues. This may suggest a perceived necessity to stay at one's home workstation, underscoring a possible hesitancy to interrupt prolonged sitting with breaks, thereby leading to a decrease in the amount of physical activity undertaken throughout the workday. Findings appear consistent with research that underlines increased bouts of sitting to arise from worries about digital surveillance and social pressures to be present at one's desk during working hours (Niven et al., 2023).

As another example, Study 3 (Chapter 4) indicated that heightened perceived work pressure when home-working can potentially determine health behaviour and wellbeing. Specifically, home-workers struggling against what they feel to be unmanageable workloads may engage in more intense and prolonged work, leading to extended periods of work-centric sitting (Hallman et al., 2021; Mumenthaler et al., 2021; Tejero et al., 2021), greater conflicts between work and home life (Cropley & Zijlstra, 2011b), and also feelings of burnout (Vandevala et al., 2017). Workload pressures were observed to interfere with worker's rest and recovery, whereby the manageability of one's workload displayed impacts for home-worker's capability to psychologically detach from work-related matters at the end of the workday. Findings emphasise possible subsequent impacts that indicate home-workers who struggle to 'switch off' from work, to experience more conflicts between work and home life, issues with sleep, and a greater potential to experience burnout. This cascade of affect shows consistency with evidence showing that work-related rumination can interfere with worker's ability to rest and

recover, thereby resulting in sleep disturbances (Berset et al., 2011; Cropley et al., 2006; Querstret & Cropley, 2012) and burnout (Bisht, 2019; Clarke & Janssen, 2021; Snyder & Chang, 2019).

6.3 How should we intervene to improve home-workers' health behaviour and wellbeing?

According to intervention development frameworks, an evidence-based understanding of why people do the behaviours they do, and how to support them to change those behaviours, is required to inform the design and development of effective behaviour change interventions (e.g., Fernandez et al., 2019; Skivington et al., 2021; Yardley et al., 2015). The results of Studies 1-3 (Chapters 2-4) support a goal-based perspective on health behaviour and wellbeing in the workplace (Austin & Vancouver, 1996; ten Broeke et al., 2022; Vallacher & Wegner, 1987). All three studies suggested, at least implicitly, that home-workers were typically prioritising their work over all other goals, so engaging in behaviours that most effectively facilitate the achievement of their work-related goals, largely regardless of their conduciveness to health or wellbeing. Findings illustrated that adaptations of work practices to the home setting could incidentally introduce health-risk behaviours, such as prolonged and extended computer-based sitting stemming from digital interfacing with work. Health-risk behaviours also appeared to arise from perceived pressures to engage in certain practices (e.g., to be seen to be available to colleagues for long periods, including outside of normal work times), and a lack of perceived control over these practices. Taken together, findings from Studies 1-3 not only illustrated that people adapted their work practices at home, but also offered some insights into how these behaviours may be modified – for example, by training employees in how to resist 'always on' culture – and thereby contribute towards the development of behavioural interventions.

Informed by the findings of Study 1 (Chapter 2), and other existing sources of evidence (e.g., Rudnicka et al., 2020), we developed a digital guidance document for administration to home-workers. This digital guidance document provided information on home-working practices, with the aim of motivating and guiding home-workers to adopt working practices that support health behaviours and wellbeing, while facilitate (or at least not hindering) work-related productivity. The acceptability and feasibility of the intervention was assessed in Study 4 (Chapter 5), conducted among normally-office-based workers adjusting to hybrid working in early 2021. Findings provided valuable insights to inform the future development and

implementation of home-worker health behaviour and wellbeing interventions. Specifically, feedback from participants suggested that the guiding information lacked novelty, which in this case may be because participants had worked from home for months during the pandemic lockdowns, so had established patterns of home-working. While we did not formally evaluate effectiveness, pre-post quantitative data suggested that, if the intervention were to have been evaluated more rigorously, using a controlled trial design, it may have lacked effectiveness. Nonetheless, participants generally viewed the intervention positively. These findings suggest that, while providing information to individual workers about how to change home-working practices may not hold strong promise as a behaviour change method, there is appetite among home-workers for guidance on how to engage with home-working in health and wellbeing conducive ways. Future work is needed to understand how best to intervene to promote health-conducive home-working practices. It is possible that our intervention lacked acceptability because it contained suboptimal content; for example, the suggestion that people should use a dedicated workspace may simply have had little impact on participants' perceptions or behaviours. Additional work is needed to establish the most proximal determinants of home-workers health behaviour and wellbeing, which in turn could be targeted via behaviour change interventions. It is also possible that our intervention lacked acceptability because it was delivered directly to individual workers, outside of the organisational context. Previous studies show that organisational buy-in can be important for shaping effective interventions (Keyworth et al., 2018; Mansfield et al., 2018). This may also be important for communicating approval from management for engaging in health-protective behaviours that may seem to undermine productivity, such as taking breaks; several studies suggest that workers are reluctant to take breaks because they fear being seen to be unproductive (Hadgraft et al., 2016, 2018). Alternatively, support might be provided as part of organisational policy, with home-working rules, policies and procedures developed to prioritise and better protect home-workers' health and wellbeing. Managers might, for example, explicitly encourage workers to minimise time spent in meetings, and issue guidance on core working times, to alleviate perceived pressures to work long hours, at the same time as colleagues. Evidence underlines that behaviour change interventions in the context of occupational health are most effective when there is a clear advocacy stemming from the organisations themselves (Keyworth et al., 2018; Mansfield et al., 2018). Achieving sustainable behaviour change may hinge on workers' perception that adopting the recommended changes

not only improves (or at least maintains) work productivity but is also explicitly endorsed by colleagues and supervisors.

6.4 Limitations and Future Research

The research outlined in this thesis has several important limitations that need to be acknowledged. First, the studies took place during the COVID-19 pandemic. One could contend that observations made during this period may not accurately reflect the prevailing conditions of home-working beyond the pandemic. For example, research underlines that those working from home during the COVID-19 pandemic experienced a spike in regularity of work-day meetings (Waizenegger et al., 2020), which was later observed to typically decrease in frequency, as organisations and employees adapted to the situation (DeFilippis et al., 2020). Study 1 (Chapter 2) was conducted soon after the first pandemic lockdown, so may reflect experiences of home-working before participants had fully adjusted to working from home. If the findings of Study 1 lack generalisability outside of the context of the first pandemic lockdown, then this causes problems for Studies 2, 3 and 4, all of which were informed by results that emerged from Study 1. However, while the experiences of participants in Study 1 may be atypical of home-workers during the pandemic, the pandemic has nonetheless caused some persisting shifts in working behaviour; since the pandemic, home-workers have been shown to continue to engage in more meetings as compared to before (Šmite et al., 2023). Our findings thus retain relevance beyond the pandemic. Moreover, while the pandemic may have been atypical, a strength of Study 1 is that it was conducted following an unprecedented mass shift to home-working, in response to the COVID-19 pandemic lockdown. Study 1 thus seized on a valuable opportunity to understand how normally-office-based workers may experience the transition to at-least-occasional home-working. We would expect insights from this study to retain relevance for understanding how normally-office-based workers, for whatever reason, transition to home-working, and the implications of doing so for their health behaviour and wellbeing.

Although the research conducted within this thesis adopted a systematic approach intending to uncover whether home-working was impactful to worker's health and wellbeing and to understand the underlying behavioural mechanisms which may determine such health and

wellbeing consequences, the COVID-19 pandemic circumstances called for pragmatism. The uncertain progression of the COVID-19 pandemic, and of associated lockdowns and other restrictions on worker movement, limited the time, resources, and opportunities available for research on home-working. Agile thinking was required, and the moment-by-moment decision making employed in planning the research led to some notable limitations, and some such decisions on earlier studies had knock-on effects across subsequent studies. For example, the objective of Study 2 (Chapter 3; conducted Spring 2021) was to generate valid and reliable quantitative items to capture qualitative findings that emerged from Study 1 (Chapter 2; conducted Spring-Summer 2020), ready for statistical modelling in subsequent Study 3 (Chapter 4; conducted Spring 2021). Given the lifting of lockdown restrictions in Spring 2021, we sought to minimise the time lapse between Studies 2 and 3. While we adopted a systematic method, to ensure swift progress, the item generation process reported in Study 2 (Chapter 3) did not include an external review panel to assess the content validity of items. Items generated in Study 2 (Chapter 3) were thus based solely on the interpretation of SK and BG, who respectively undertook and supervised analyses of qualitative data in Study 1. Any problems arising from not securing external researcher input in the item generation process will have had cascading impacts on the credibility of Study 3. Specifically, the initial conversion of qualitative findings to quantitative items and the subsequent refinement of psychometric items may have resulted in the inadvertent exclusion of meaningful home-working determinants of health behaviour and wellbeing. While Study 3 nonetheless uncovered novel insights regarding the health behaviour and wellbeing impacts of psychological responses to home-working practices, future research should adopt a more rigorous and robust methodological approach, to more comprehensively capture relationships between responses to home-working, health behaviour and wellbeing. Such an approach would require deriving quantitative items from qualitative insights more systematically, involving external experts in the item derivation process to avoid findings being overly influenced by preconceptions among researchers who analysed the qualitative data. Cognitive interviews, whereby people ‘think aloud’ while interacting with a questionnaire survey (e.g., Gardner & Tang, 2014), might also be undertaken with external experts and home-workers alike, to uncover likely interpretations among interpretations, thereby ensuring both construct and content validity.

Further limitations relate to the statistical process of translating insights from our qualitative interview study (Study 1; Chapter 2) to the statistical modelling study (Study 3; Chapter 4). In Study 2 (Chapter 3), we derived 105 tentative quantitative items from the thematic findings of Study 1 (Chapter 2), and subjected these to a rigorous psychometric evaluation process. The aim was to establish reliable and valid constructs, but with minimal items. Through this process, the 105 items were reduced to 25 items, measuring 10 psychological responses to home-working practices. The statistical process for removing items was robust, based on identifying and removing items deemed not to clearly contribute to the underlying construct over and above neighbouring items. Whilst this process achieved relative parsimony across the construct measures, many items were discarded at an early stage in the psychometric evaluation process. Nonetheless, the removal of 80 items that were originally deemed potentially indicative of important concepts is problematic. Future research might adopt methods to verify the redundancy of the items discarded from analysis to ensure that meaningful concepts are not being overlooked.

Study design was also a potential limitation. Specifically, while Study 3 began to underline specific home-working determinants of health behaviour and wellbeing in home-working contexts, findings are based on cross-sectional designs that cannot establish causal relationships. To better understand the complex interactions between home-working, health behaviour, and wellbeing, future research should employ prospective longitudinal methods. For example, studies might be undertaken among people starting a new job, who are working from home (at least occasionally) for the first time. Collecting data at multiple time points not only improves the ability to detect causal directions but also enhances the capacity to identify potentially confounding variables. Additionally, Study 1 would also benefit from a longitudinal qualitative approach. Longitudinal qualitative studies could provide valuable insights into how home-working practices and experiences evolve over time (Audulv et al., 2022). This approach would enable researchers to examine how changes in the work environment and incremental adjustments to work practices impact health and wellbeing behaviours, providing a more nuanced and dynamic understanding. By tracking individuals who transition between office-based and home-working environments for the first time, such research could shed light on how health behaviours and wellbeing adapt and shift in response to new working conditions.

A further cause for concern relates to the reliance on self-report data. This poses issues for the validity of psychological responses to home-working practices developed in Study 2 (Chapter 3), and the measures of self-reported health-related behaviours and wellbeing which were examined comparatively with home-working in Study 3 (Chapter 4). Typically, when participants self-report, they may be influenced by social desirability biases, resulting in overestimation of engagement in health-promoting behaviours and underestimation of health-risk behaviours. This may arise from efforts to engage in *impression management*, where participants deliberately guide their responses toward what they believe will be positively evaluated by others (Paulhus, 2002). This bias can also stem from *self-deception*, whereby an unconscious tendency to depict oneself favourably may also produce under or over reporting on measures (Tourangeau & Yan, 2007; Yan, 2021). Additionally, people often experience difficulty reflecting on sitting time, as sitting is typically done outside of conscious awareness (Gardner et al., 2019; Gardner, Louca, et al., 2020). Caution must therefore be exercised when interpreting reported engagement in health-related behaviours in our data. Although the correspondence of our findings around the apparent impact of adapting to home-work practices on health behaviour and wellbeing, across two studies using different methods (i.e., Studies 1 and 3) gives us confidence that the insights we generated are valid, objective measures of health behaviour would have boosted this confidence further. We were unable to use objective measures in our studies due to constraints imposed by the COVID-19 pandemic, which prohibited or discouraged face-to-face contact during the time that these studies were being undertaken. Future research should use objective measures of health-related behaviours, such as wearable devices containing accelerometers, which are capable of measuring physical activity, sedentary behaviours, and sleep (De Craemer & Verbestel, 2022).

Broader limitations must also be acknowledged. The studies in this thesis adopted a psychological approach to understanding home-working, focusing at the individual level. In doing so, these investigations neglected the potential impact of organisational, social, and societal elements on home-working, health behaviour, health and wellbeing. For example, Study 1 (Chapter 2) focused on the home-working experiences of individual workers, and while novel insights emerged regarding individual-level experiences, we did not formally account for organisational influences, such as managers' endorsement of, or organisations' wider policy surrounding, home-working practices. Similarly, while the statistical model

established in Study 3 (Chapter 4) focused on workers' perceptions of their social environment, it did not include any direct measures of potential organisational, managerial, or social influences on home-workers' experiences, health behaviour or wellbeing. Yet, social norms stemming from workplace structures, managerial influences, and overall organizational cultures are known to affect health-related behaviours, including the perceived acceptability of interrupted sitting or moving around the office (De Cocker et al., 2015; Hadgraft et al., 2018). For example, qualitative studies show that office-based employees find the idea of taking breaks from sitting acceptable but worry that managers will equate taking breaks with being unproductive (Gardner et al., 2017). This concern was echoed by some participants in response to the e-module intervention evaluated in Study 4 (Chapter 5). The intervention focused on informing individual workers on how to adapt their working practices, but there was no organisational involvement in the design or delivery of the intervention, and we overlooked whether and how the amendments to home-working practices that we recommended to participants might be integrated into existing work cultures. Although this intervention was deemed generally acceptable by participants in Study 4 (Chapter 5), it is unlikely to be effective. Future research into home-working should move beyond an individual-level approach, and recognise and incorporate explicit organisational involvement, advocacy, and policy change (Burke, 2016). Organisations must advocate for health-conducive home-working, and demonstrate managerial buy-in, which signals to employees that they have permission to pursue health-promoting practices (Mackenzie, 2021). Intervention designers might also fruitfully move beyond approaches designed to boost motivation to pursue health-conducive work practices. Home-workers might alternatively be targeted through environmental or design solutions that 'nudge' people into, for example, being more active while working (e.g., providing elliptical cycles for use under desks; Choi et al., 2016). Such solutions can support behaviour change

The socio-political climate surrounding home-working was also neglected in the studies presented in this thesis. All four studies were undertaken during the COVID-19 pandemic, during which the UK Government enforced lockdowns that mandated working from home. However, since the pandemic, there has been marked reluctance across Government and industry to encourage working from home, based on concerns around productivity and effectiveness of home-working. For example, many companies have initiated return-to-office

mandates, compelling employees to return to pre-pandemic working routines. This political climate has likely created a degree of concern among employees as to the acceptability of home-working, and potentially created stigma around working from home. Caution must be exercised in extrapolating the findings of this thesis to contexts in which home-working is discouraged. Future research should acknowledge macro-level influences on home-working, including political, organisational and employee sentiments towards home-working, and how these may influence working practices, health-related behaviours, and wellbeing.

6.5 Conclusion

This thesis set out to understand whether and how home-working might impact on workers' health behaviours and wellbeing. The work coincided with the COVID-19 pandemic, and capitalised on the unique opportunity that lockdown restrictions offered for understanding how office-based workers adapt to working from home. Together, the first three studies indicated that home-working has consequences for health behaviour and wellbeing, though the reliance on cross-sectional, self-report data calls for future, more rigorous research to support and develop these conclusions. Our studies suggest that the impact of home-working on health-behaviour results not only from the absence of health and wellbeing conducive behaviours when working onsite, but also from psychological responses to work practices and settings unique to the home environment. Our findings call for interventions to support and promote the health and wellbeing of those working from home. These interventions should align with home-workers' and their employers' work-related goals, rather than promoting health in a way that compromises the pursuit of productivity. We attempted to do this via an information-based intervention, which we developed based on the qualitative findings of the first study in this thesis, but while our intervention generally showed acceptability to home-working employees, it lacked novelty, suggesting that more sophisticated intervention approaches are needed. Insights from existing research into health support interventions for employees suggest that the promotion of health behaviour and wellbeing should be embedded into organisational policy and procedures, with clear support from employers, to maximise effectiveness.

7 References

- Abgeller, N., Bachmann, R., Dobbins, T., & Anderson, D. (2022). Responsible autonomy: The interplay of autonomy, control and trust for knowledge professionals working remotely during COVID-19. *Economic and Industrial Democracy*. <https://doi.org/10.1177/0143831X221140156>
- Abraham, C., & Sheeran, P. (2003). Implications of goal theories for the theories of reasoned action and planned behaviour. In *Current Psychology* (Vol. 22, Issue 3). <https://doi.org/10.1007/s12144-003-1021-7>
- Adam, E. K., Quinn, M. E., Tavernier, R., McQuillan, M. T., Dahlke, K. A., & Gilbert, K. E. (2017). Diurnal cortisol slopes and mental and physical health outcomes: A systematic review and meta-analysis. In *Psychoneuroendocrinology* (Vol. 83). <https://doi.org/10.1016/j.psyneuen.2017.05.018>
- Adisa, T. A., Ogbonnaya, C., & Adekoya, O. D. (2021). Remote working and employee engagement: a qualitative study of British workers during the pandemic. *Information Technology and People*. <https://doi.org/10.1108/ITP-12-2020-0850>
- Ahmed, A., Ishaque, A., Nawaz, T., Ali, Y., & Hayat, F. (2014). Telecommuting: Impact on productivity of telecommuters. *ICMIT 2014 - 2014 IEEE International Conference on Management of Innovation and Technology*. <https://doi.org/10.1109/ICMIT.2014.6942423>
- Ahrentzen, S. B. (1990). Managing conflict by managing boundaries: How Professional Homeworkers Cope With Multiple Roles at Home. *Environment and Behavior*, 22(6). <https://doi.org/10.1177/0013916590226001>
- Alhadreti, O., & Mayhew, P. (2018). Rethinking thinking aloud: A comparison of three think-aloud protocols. *Conference on Human Factors in Computing Systems - Proceedings, 2018-April*. <https://doi.org/10.1145/3173574.3173618>
- Allen, T. D., Golden, T. D., & Shockley, K. M. (2015). How effective is telecommuting? Assessing the status of our scientific findings. *Psychological Science in the Public Interest*, 16(2). <https://doi.org/10.1177/1529100615593273>
- Alshaikh, F., Ramzan, F., Rawaf, S., & Majeed, A. (2014). Social network sites as a mode to collect health data: A systematic review. In *Journal of Medical Internet Research* (Vol. 16, Issue 7). <https://doi.org/10.2196/jmir.3050>
- Ammons, S. K., & Markham, W. T. (2004). Working at home: Experiences of skilled white collar workers. *Sociological Spectrum*, 24(2). <https://doi.org/10.1080/02732170490271744>
- Archer, M. S. (1995). *Realist social theory: The morphogenetic approach*. Cambridge university press.
- Argus, M., & Pääsuke, M. (2021). Effects of the COVID-19 lockdown on musculoskeletal pain, physical activity, and work environment in Estonian office workers transitioning to working from home. *Work*, 69(3), 741–749. <https://doi.org/10.3233/WOR-210033>
- Armstrong, M., & Taylor, S. (2014). Armstrong's Handbook of Human Resource Management 13th Edition. In *Armstrong's Handbook of Human Resource Management*.

- Arora, T., & Grey, I. (2020). Health behaviour changes during COVID-19 and the potential consequences: A mini-review. In *Journal of Health Psychology* (Vol. 25, Issue 9, pp. 1155–1163). SAGE Publications Ltd. <https://doi.org/10.1177/1359105320937053>
- Atieno OP. (2009). An analysis of the strengths and limitation of qualitative and quantitative research paradigms. *Problems of Education in the 21st Century*, 13.
- Audulv, Å., Hall, E. O. C., Kneck, Å., Westergren, T., Fegran, L., Pedersen, M. K., Aagaard, H., Dam, K. L., & Ludvigsen, M. S. (2022). Qualitative longitudinal research in health research: a method study. *BMC Medical Research Methodology*, 22(1). <https://doi.org/10.1186/s12874-022-01732-4>
- Austin, J. T., & Vancouver, J. B. (1996). Goal Constructs in Psychology: Structure, Process, and Content. *Psychological Bulletin*, 122(3). <https://doi.org/10.1037//0033-2909.120.3.338>
- Bakker, A. B., & Demerouti, E. (2017). Job demands-resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, 22(3). <https://doi.org/10.1037/ocp0000056>
- Baranwal, N., Yu, P. K., & Siegel, N. S. (2023). Sleep physiology, pathophysiology, and sleep hygiene. In *Progress in Cardiovascular Diseases* (Vol. 77). <https://doi.org/10.1016/j.pcad.2023.02.005>
- Barber, L. K., & Jenkins, J. S. (2014). Creating technological boundaries to protect bedtime: Examining work-home boundary management, psychological detachment and sleep. *Stress and Health*, 30(3). <https://doi.org/10.1002/smi.2536>
- Barrero, J. M., Bloom, N., & Davis, S. J. (2020). Why Working From Home Will Stick. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3741644>
- Barsness, Z. I., Diekmann, K. A., & Seidel, M. D. L. (2005). Motivation and opportunity: The role of remote work, demographic dissimilarity, and social network centrality in impression management. In *Academy of Management Journal* (Vol. 48, Issue 3). <https://doi.org/10.5465/AMJ.2005.17407906>
- Bartholomew-Eldredge LK, Ruiter RA, Fernandez ME, Kok G, & Parcel G. (2016). *Planning Health Promotion Programs: An Intervention Mapping Approach* (4th ed.). Jossey Bass.
- Bartlett, M. S. (1954). A note on multiplying factors for various chi-squared approximations. *Journal of the Royal Statistical Society*, 16(Series B).
- Baruch, Y. (2000). Teleworking: benefits and pitfalls as perceived by professionals and managers. *New Technology, Work and Employment*, 15(1), 34–49.
- Basile, K. A., & Beauregard, T. A. (2016). Strategies for successful telework: how effective employees manage work/home boundaries. *Strategic HR Review*, 15(3). <https://doi.org/10.1108/shr-03-2016-0024>
- Baskin, E., Gorlin, M., Chance, Z., Novemsky, N., Dhar, R., Huskey, K., & Hatzis, M. (2016). Proximity of snacks to beverages increases food consumption in the workplace: A field study. *Appetite*, 103, 244–248. <https://doi.org/https://doi.org/10.1016/j.appet.2016.04.025>
- Beauregard, T. A., Basile, K. A., & Canonico, E. (2019). Telework: Outcomes and facilitators for employees. In *The Cambridge Handbook of Technology and Employee Behavior*. <https://doi.org/10.1017/9781108649636.020>

- Beauregard, T. A., & Henry, L. C. (2009). Making the link between work-life balance practices and organizational performance. *Human Resource Management Review*, 19(1).
<https://doi.org/10.1016/j.hrmr.2008.09.001>
- Bell, A. S., Rajendran, D., & Theiler, S. (2012). Job stress, wellbeing, work-life balance and work-life conflict among Australian academics. *E-Journal of Applied Psychology*, 8(1).
<https://doi.org/10.7790/ejap.v8i1.320>
- Bentley, T. A., Teo, S. T. T., McLeod, L., Tan, F., Bosua, R., & Gloet, M. (2016). The role of organisational support in teleworker wellbeing: A socio-technical systems approach. *Applied Ergonomics*, 52.
<https://doi.org/10.1016/j.apergo.2015.07.019>
- Berawi, M. A., Suwartha, N., Asvial, M., Harwahyu, R., Suryanegara, M., Setiawan, E. A., Surjandari, I., Zagloel, T. Y. M., & Maknun, I. J. (2020). Digital Innovation: Creating Competitive Advantages. *International Journal of Technology*, 11(6). <https://doi.org/10.14716/ijtech.v11i6.4581>
- Berset, M., Elfering, A., Lüthy, S., Lüthi, S., & Semmer, N. K. (2011). Work stressors and impaired sleep: Rumination as a mediator. *Stress and Health*, 27(2). <https://doi.org/10.1002/smi.1337>
- Beutel, M. E., Klein, E. M., Brähler, E., Reiner, I., Jünger, C., Michal, M., Wiltink, J., Wild, P. S., Münzel, T., Lackner, K. J., & Tibubos, A. N. (2017). Loneliness in the general population: Prevalence, determinants and relations to mental health. *BMC Psychiatry*, 17(1).
<https://doi.org/10.1186/s12888-017-1262-x>
- Bhaskar, R. (2013). A realist theory of science. In *A Realist Theory of Science*.
<https://doi.org/10.4324/9780203090732>
- Białek-Dratwa, A., Szczepańska, E., Grajek, M., Całyniuk, B., & Staśkiewicz, W. (2022). Health Behaviors and Associated Feelings of Remote Workers During the COVID-19 Pandemic—Silesia (Poland). *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.774509>
- Bisht, N. S. (2019). A Study on the Role of Work-related Rumination in the Relationship between Job Characteristics and Burnout. *South Asian Journal of Management*, 26(2).
- Bloom, N., Liang, J., Roberts, J., & Ying, Z. J. (2015). Does working from home work? Evidence from a chinese experiment. *Quarterly Journal of Economics*, 130(1).
<https://doi.org/10.1093/qje/qju032>
- Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quiñonez, H. R., & Young, S. L. (2018). Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer. In *Frontiers in Public Health* (Vol. 6). <https://doi.org/10.3389/fpubh.2018.00149>
- Borsboom, D., Deserno, M. K., Rhemtulla, M., Epskamp, S., Fried, E. I., McNally, R. J., Robinaugh, D. J., Perugini, M., Dalege, J., Costantini, G., Isvoranu, A. M., Wysocki, A. C., van Borkulo, C. D., van Bork, R., & Waldorp, L. J. (2021). Network analysis of multivariate data in psychological science. In *Nature Reviews Methods Primers* (Vol. 1, Issue 1). <https://doi.org/10.1038/s43586-021-00055-w>
- Bosua, R., Kurnia, S., Gloet, M., & Mendoza, A. (2019). Telework Impact on Productivity and Well-Being. In *Social Inclusion and Usability of ICT-Enabled Services*.
<https://doi.org/10.4324/9781315677316-10>

- Boubekri, M., Cheung, I. N., Reid, K. J., Wang, C. H., & Zee, P. C. (2014). Impact of windows and daylight exposure on overall health and sleep quality of office workers: A case-control pilot study. *Journal of Clinical Sleep Medicine, 10*(6). <https://doi.org/10.5664/jcsm.3780>
- Bouziri, H., Smith, D. R. M., Descatha, A., Dab, W., & Jean, K. (2020). Working from home in the time of COVID-19: how to best preserve occupational health? *Occupational and Environmental Medicine, 77*(7), 509. <https://doi.org/10.1136/oemed-2020-106599>
- Bowen, D. J., Kreuter, M., Spring, B., Cofta-Woerpel, L., Linnan, L., Weiner, D., Bakken, S., Kaplan, C. P., Squiers, L., Fabrizio, C., & Fernandez, M. (2009). How We Design Feasibility Studies. In *American Journal of Preventive Medicine* (Vol. 36, Issue 5). <https://doi.org/10.1016/j.amepre.2009.02.002>
- Braun, V., & Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners*. sage.
- Braun, V., & Clarke, V. (2021). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology, 18*(3). <https://doi.org/10.1080/14780887.2020.1769238>
- Broekhuizen, K., Jelsma, J. G. M., Van Poppel, M. N. M., Koppes, L. L. J., Brug, J., & Van Mechelen, W. (2012). Is the process of delivery of an individually tailored lifestyle intervention associated with improvements in LDL cholesterol and multiple lifestyle behaviours in people with Familial Hypercholesterolemia? *BMC Public Health, 12*(1). <https://doi.org/10.1186/1471-2458-12-348>
- Brown, J., Kirk-Wade, E., Baker, C., & Barber, S. (2021). *Coronavirus: A history of English lockdown laws*.
- Buckley, J. P., Hedge, A., Yates, T., Copeland, R. J., Loosemore, M., Hamer, M., Bradley, G., & Dunstan, D. W. (2015). The sedentary office: An expert statement on the growing case for change towards better health and productivity. *British Journal of Sports Medicine, 49*(21). <https://doi.org/10.1136/bjsports-2015-094618>
- Burke, R. J. (2016). The Fulfilling Workplace. In *The Fulfilling Workplace*. <https://doi.org/10.4324/9781315557953>
- Burr, H., Berthelsen, H., Moncada, S., Nübling, M., Dupret, E., Demiral, Y., Oudyk, J., Kristensen, T. S., Llorens, C., Navarro, A., Lincke, H. J., Bocéréan, C., Sahan, C., Smith, P., & Pohrt, A. (2019). The Third Version of the Copenhagen Psychosocial Questionnaire. *Safety and Health at Work, 10*(4). <https://doi.org/10.1016/j.shaw.2019.10.002>
- Calmeiro, L., & Tenenbaum, G. (2011). Concurrent verbal protocol analysis in sport: Illustration of thought processes during a golf-putting task. *Journal of Clinical Sport Psychology, 5*(3). <https://doi.org/10.1123/jcsp.5.3.223>
- Campbell, J., & Ehlert, U. (2012). Acute psychosocial stress: Does the emotional stress response correspond with physiological responses? In *Psychoneuroendocrinology* (Vol. 37, Issue 8). <https://doi.org/10.1016/j.psyneuen.2011.12.010>
- Candido, C., Thomas, L., Haddad, S., Zhang, F., Mackey, M., & Ye, W. (2019). Designing activity-based workspaces: satisfaction, productivity and physical activity. *Building Research & Information, 47*(3), 275–289. <https://doi.org/10.1080/09613218.2018.1476372>
- Cañibano, A. (2019). Workplace flexibility as a paradoxical phenomenon: Exploring employee experiences. *Human Relations, 72*(2). <https://doi.org/10.1177/0018726718769716>

- Cañibano, A., & Avgoustaki, A. (2022). To telework or not to telework: Does the macro context matter? A signalling theory analysis of employee interpretations of telework in times of turbulence. *Human Resource Management Journal*. <https://doi.org/10.1111/1748-8583.12457>
- Carers UK. (2022, June 27). *Key facts and figures*. Carersuk.Org. <https://www.carersuk.org/policy-and-research/key-facts-and-figures/>
- Carl J. Caspersen, Kenneth E. Powell, & Gregory M. Christenson. (1985). Physical Activity, Exercise, and Physical Fitness: Definitions and Distinctions for Health-Related Research Synopsis. *Public Health Reports*, 100(2).
- Carruthers, C., & Hood, C. D. (2004). The power of the positive: Leisure and well-being. *Therapeutic Recreation Journal*, 38(2), 225–245.
- Cavazotte, F., Heloisa Lemos, A., & Villadsen, K. (2014). Corporate smart phones: Professionals' conscious engagement in escalating work connectivity. *New Technology, Work and Employment*, 29(1). <https://doi.org/10.1111/ntwe.12022>
- Chaput, J. P., Dutil, C., Featherstone, R., Ross, R., Giangregorio, L., Saunders, T. J., Janssen, I., Poitras, V. J., Kho, M. E., Ross-White, A., & Carrier, J. (2020). Sleep duration and health in adults: an overview of systematic reviews. *Applied Physiology, Nutrition, and Metabolism = Physiologie Appliquee, Nutrition et Metabolisme*, 45(10). <https://doi.org/10.1139/apnm-2020-0034>
- Charalampous, M., Grant, C. A., Tramontano, C., & Michailidis, E. (2019). Systematically reviewing remote e-workers' well-being at work: a multidimensional approach. *European Journal of Work and Organizational Psychology*, 28(1), 51–73. <https://doi.org/10.1080/1359432X.2018.1541886>
- Chatterjee, K., Chng, S., Clark, B., Davis, A., De Vos, J., Ettema, D., Handy, S., Martin, A., & Reardon, L. (2020). Commuting and wellbeing: a critical overview of the literature with implications for policy and future research. *Transport Reviews*, 40(1), 5–34. <https://doi.org/10.1080/01441647.2019.1649317>
- Chen, J., & Chen, Z. (2008). Extended Bayesian information criteria for model selection with large model spaces. *Biometrika*, 95(3). <https://doi.org/10.1093/biomet/asn034>
- Cheng, Y. P., Shen, P. Di, Hung, M. L., Tsai, C. W., Lin, C. H., & Hsu, L. C. (2021). Applying Online Content-Based Knowledge Awareness and Team Learning to Develop Students' Programming Skills, Reduce their Anxiety, and Regulate Cognitive Load in a Cloud Classroom. *Universal Access in the Information Society*. <https://doi.org/10.1007/s10209-020-00789-6>
- Chesley, N. (2014). Information and communication technology use, work intensification and employee strain and distress. *Work, Employment and Society*, 28(4). <https://doi.org/10.1177/0950017013500112>
- Choi, W., Song, A., Edge, D., Fukumoto, M., & Lee, U. (2016). Exploring user experiences of active workstations: A case study of under desk elliptical trainers. *UbiComp 2016 - Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing*. <https://doi.org/10.1145/2971648.2971756>
- Clark, S. C. (2000). Work/family border theory: A new theory of work/family balance. *Human Relations*, 53(6). <https://doi.org/10.1177/0018726700536001>

- Clarke, A. E., & Janssen, I. (2021). A compositional analysis of time spent in sleep, sedentary behaviour and physical activity with all-cause mortality risk. *International Journal of Behavioral Nutrition and Physical Activity*, 18(1). <https://doi.org/10.1186/s12966-021-01092-0>
- Clemes, S. A., O'Connell, S. E., & Edwardson, C. L. (2014). Office workers' objectively measured sedentary behavior and physical activity during and outside working hours. *Journal of Occupational and Environmental Medicine*, 56(3). <https://doi.org/10.1097/JOM.000000000000101>
- Clohessy, S., Walasek, L., & Meyer, C. (2019). Factors influencing employees' eating behaviours in the office-based workplace: A systematic review. *Obesity Reviews*, 20(12), 1771–1780. <https://doi.org/https://doi.org/10.1111/obr.12920>
- Çokluk, Ö., & Koçak, D. (2016). Using Horn's parallel analysis method in exploratory factor analysis for determining the number of factors. *Kuram ve Uygulamada Eğitim Bilimleri*, 16(2). <https://doi.org/10.12738/estp.2016.2.0328>
- Collier, A. (1994). *Critical realism: an introduction to Roy Bhaskar's philosophy*.
- Cooley, P., Mainsbridge, C., Cruickshank, V., Guan, H., Ye, A., & Pedersen, S. (2022). Peer champions responses to nudge-based strategies designed to reduce prolonged sitting behaviour: lessons learnt and implications from lived experiences of non-compliant participants. *AIMS Public Health*, 9(3), 574–588.
- Cooper, C. D., & Kurland, N. B. (2002). Telecommuting, professional isolation, and employee development in public and private organizations. *Journal of Organizational Behavior*, 23(4), 511–532. <https://doi.org/https://doi.org/10.1002/job.145>
- Cooper, R., Kelly, D., Hermanstein, D., & Hewlett, K. H. (2021). Post Covid: Good Practice in Workplace Adjustments. *AchieveAbility*, 1, 13–20. <https://wfda.org.uk/wp-content/uploads/2022/01/AchieveAbility2.pdf>
- Corrente, M., & Bourgeault, I. (2022). Innovation in Transcribing Data: Meet Otter.ai. *SAGE Research Methods Cases*.
- Costantini, G., Epskamp, S., Borsboom, D., Perugini, M., Mõttus, R., Waldorp, L. J., & Cramer, A. O. J. (2015). State of the aRt personality research: A tutorial on network analysis of personality data in R. *Journal of Research in Personality*, 54. <https://doi.org/10.1016/j.jrp.2014.07.003>
- Cox, T., & Griffiths, A. (2010). *Work-related stress: a theoretical perspective*.
- Crain, T. L., Brossoit, R. M., & Fisher, G. G. (2018). Work, Nonwork, and Sleep (WNS): a Review and Conceptual Framework. *Journal of Business and Psychology*, 33(6). <https://doi.org/10.1007/s10869-017-9521-x>
- Crain, T. L., Hammer, L. B., Bodner, T., Kossek, E. E., Moen, P., Lilienthal, R., & Buxton, O. M. (2014). Work-family conflict, family-supportive supervisor behaviors (FSSB), and sleep outcomes. *Journal of Occupational Health Psychology*, 19(2). <https://doi.org/10.1037/a0036010>
- Crawford, J. O., MacCalman, L., & Jackson, C. A. (2011). The health and well-being of remote and mobile workers. In *Occupational Medicine* (Vol. 61, Issue 6). <https://doi.org/10.1093/occmed/kqr071>

- Creagh, R., McGann, S., Tye, M., Jancey, J., & Babb, C. (2017). Green Star is not a physical activity star. *Facilities*, 35(1–2). <https://doi.org/10.1108/F-12-2015-0092>
- Cropley, M., Dijk, D. J., & Stanley, N. (2006). Job strain, work rumination, and sleep in school teachers. *European Journal of Work and Organizational Psychology*, 15(2). <https://doi.org/10.1080/13594320500513913>
- Cropley, M., & Zijlstra, F. R. H. (2011a). *Handbook of Stress in the Occupations*. Edward Elgar Publishing. <https://doi.org/10.4337/9780857931153.00060>
- Cropley, M., & Zijlstra, F. R. H. (2011b). Work and rumination. In *Handbook of stress in the occupations*. (pp. 487–501). Edward Elgar Publishing. <https://doi.org/10.4337/9780857931153.00061>
- Crutzen, R., & Peters, G. J. Y. (2017). Scale quality: alpha is an inadequate estimate and factor-analytic evidence is needed first of all. *Health Psychology Review*, 11(3). <https://doi.org/10.1080/17437199.2015.1124240>
- Daryabeygi-Khotbehsara, R., Dunstan, D. W., Shariful Islam, S. M., Rhodes, R. E., Hojjatinia, S., Abdelrazek, M., Hekler, E., Markides, B., & Maddison, R. (2024). A control system model of capability-opportunity-motivation and behaviour (COM-B) framework for sedentary and physical activity behaviours. *DIGITAL HEALTH*, 10, 20552076241255656. <https://doi.org/10.1177/20552076241255658>
- Davenport, T., Jarvenpaa, S., & Beers, M. (1996). Improving knowledge work processes. *Sloan Management Review*, 37.
- Day, A., Paquet, S., Scott, N., & Hambley, L. (2012). Perceived information and communication technology (ICT) demands on employee outcomes: The Moderating effect of organizational ICT support. *Journal of Occupational Health Psychology*, 17(4). <https://doi.org/10.1037/a0029837>
- De Clercq, B., Clays, E., Janssens, H., De Bacquer, D., Casini, A., Kittel, F., & Braeckman, L. (2015). Health behaviours as a mechanism in the prospective relation between workplace reciprocity and absenteeism: A bridge too far? *PLoS ONE*, 10(11). <https://doi.org/10.1371/journal.pone.0141608>
- De Cocker, K., Veldeman, C., De Bacquer, D., Braeckman, L., Owen, N., Cardon, G., & De Bourdeaudhuij, I. (2015). Acceptability and feasibility of potential intervention strategies for influencing sedentary time at work: Focus group interviews in executives and employees. *International Journal of Behavioral Nutrition and Physical Activity*, 12(1). <https://doi.org/10.1186/s12966-015-0177-5>
- De Craemer, M., & Verbestel, V. (2022). Comparison of outcomes derived from the actigraph GT3X+ and the axivity AX3 accelerometer to objectively measure 24-hour movement behaviors in adults: A cross-sectional study. *International Journal of Environmental Research and Public Health*, 19(1). <https://doi.org/10.3390/ijerph19010271>
- De Macêdo, T. A. M., Cabral, E. L. D. S., Silva Castro, W. R., De Souza Junior, C. C., Da Costa Junior, J. F., Pedrosa, F. M., Da Silva, A. B., De Medeiros, V. R. F., De Souza, R. P., Cabral, M. A. L., & Másculo, F. S. (2020). Ergonomics and telework: A systematic review. In *Work* (Vol. 66, Issue 4). <https://doi.org/10.3233/WOR-203224>

- De Spiegelaere, S., Van Gyes, G., & Van Hootegem, G. (2016). Not All Autonomy is the Same. Different Dimensions of Job Autonomy and Their Relation to Work Engagement & Innovative Work Behavior. *Human Factors and Ergonomics In Manufacturing, 26*(4).
<https://doi.org/10.1002/hfm.20666>
- Deci, E. L., & Ryan, R. M. (2008). Hedonia, eudaimonia, and well-being: An introduction. *Journal of Happiness Studies, 9*(1). <https://doi.org/10.1007/s10902-006-9018-1>
- DeFilippis, E., Impink, S., Singell, M., Polzer, J. T., & Sadun, R. (2020). Collaborating During Coronavirus: The Impact of COVID-19 on the Nature of Work. *SSRN Electronic Journal*.
<https://doi.org/10.2139/ssrn.3654470>
- Del Boca, D., Oggero, N., Profeta, P., & Rossi, M. (2020). Women's and men's work, housework and childcare, before and during COVID-19. *Review of Economics of the Household, 18*(4).
<https://doi.org/10.1007/s11150-020-09502-1>
- Delanoëije, J., & Verbruggen, M. (2019). The use of work-home practices and work-home conflict: Examining the role of volition and perceived pressure in a multi-method study. *Frontiers in Psychology, 10*(OCT). <https://doi.org/10.3389/fpsyg.2019.02362>
- Derks, D., & Bakker, A. B. (2014). Smartphone Use, Work-Home Interference, and Burnout: A Diary Study on the Role of Recovery. *Applied Psychology, 63*(3). <https://doi.org/10.1111/j.1464-0597.2012.00530.x>
- Dicke, T., Marsh, H. W., Riley, P., Parker, P. D., Guo, J., & Horwood, M. (2018). Validating the Copenhagen Psychosocial Questionnaire (COPSOQ-II) using set-ESEM: Identifying psychosocial risk factors in a sample of school principals. *Frontiers in Psychology, 9*(APR).
<https://doi.org/10.3389/fpsyg.2018.00584>
- Diener, E., Pressman, S. D., Hunter, J., & Delgado-Chase, D. (2017). If, Why, and When Subjective Well-Being Influences Health, and Future Needed Research. *Applied Psychology: Health and Well-Being, 9*(2). <https://doi.org/10.1111/aphw.12090>
- Diener, E., & Ryan, K. (2009). Subjective well-being: A general overview. *South African Journal of Psychology, 39*(4). <https://doi.org/10.1177/008124630903900402>
- Dimitrova, D. (2003). Controlling teleworkers: Supervision and flexibility revisited. *New Technology, Work and Employment, 18*(3). <https://doi.org/10.1111/1468-005X.00120>
- Donnelly, N., & Proctor-Thomson, S. B. (2015). Disrupted work: Home-based teleworking (HbTW) in the aftermath of a natural disaster. *New Technology, Work and Employment, 30*(1).
<https://doi.org/10.1111/ntwe.12040>
- Dunstan, D. W., Thorp, A. A., Owen, N., & Neuhaus, M. (2011). Sedentary Behaviors and Subsequent Health Outcomes in Adults A Systematic Review of Longitudinal Studies, 1996-2011. *American Journal of Preventive Medicine, 41*(2).
- Dutta, N., Koepp, G. A., Stovitz, S. D., Levine, J. A., & Pereira, M. A. (2014). Using sit-stand workstations to decrease sedentary time in office workers: A randomized crossover trial. *International Journal of Environmental Research and Public Health, 11*(7).
<https://doi.org/10.3390/ijerph110706653>

- Dwyer, M. J., Pasini, M., De Dominicis, S., & Righi, E. (2020). Physical activity: Benefits and challenges during the COVID-19 pandemic. In *Scandinavian Journal of Medicine and Science in Sports* (Vol. 30, Issue 7). <https://doi.org/10.1111/sms.13710>
- Eccles, D. W. (2020). Verbal Reports of Cognitive Processes. In *Measurement in Sport and Exercise Psychology*. <https://doi.org/10.5040/9781492596332.ch-011>
- Eccles, D. W., & Aarsal, G. (2017). The think aloud method: what is it and how do I use it? *Qualitative Research in Sport, Exercise and Health*, 9(4). <https://doi.org/10.1080/2159676X.2017.1331501>
- Edmunds, S., Stephenson, D., & Clow, A. (2013). The effects of a physical activity intervention on employees in small and medium enterprises: A mixed methods study. *Work*, 46, 39–49. <https://doi.org/10.3233/WOR-121523>
- Edwards, P., & Ramirez, P. (2016). When should workers embrace or resist new technology? *New Technology, Work and Employment*, 31(2). <https://doi.org/10.1111/ntwe.12067>
- Eisinga, R., Grotenhuis, M. Te, & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *International Journal of Public Health*, 58(4). <https://doi.org/10.1007/s00038-012-0416-3>
- Engelen, L. (2020). Does active design influence activity, sitting, wellbeing and productivity in the workplace? A systematic review. In *International Journal of Environmental Research and Public Health* (Vol. 17, Issue 24). <https://doi.org/10.3390/ijerph17249228>
- Engelen, L., Dhillon, H. M., Chau, J. Y., Hespe, D., & Bauman, A. E. (2016). Do active design buildings change health behaviour and workplace perceptions? *Occupational Medicine*, 66(5). <https://doi.org/10.1093/occmed/kqv213>
- Epskamp, S., Borsboom, D., & Fried, E. I. (2018a). Estimating psychological networks and their accuracy: A tutorial paper. *Behavior Research Methods*, 50(1). <https://doi.org/10.3758/s13428-017-0862-1>
- Epskamp, S., Borsboom, D., & Fried, E. I. (2018b). Package “bootnet.” *Behavior Research Methods*, 50(1).
- Epskamp, S., & Fried, E. I. (2018). A tutorial on regularized partial correlation networks. *Psychological Methods*, 23(4). <https://doi.org/10.1037/met0000167>
- Evans, H. (2018). *The influence of personality traits and ICT use on the boundary management of home-based teleworkers*. https://repository.lboro.ac.uk/articles/thesis/The_influence_of_personality_traits_and_ICT_use_on_the_boundary_management_of_home-based_teleworkers/9496310
- Ezzati, M., & Riboli, E. (2013). Behavioral and Dietary Risk Factors for Noncommunicable Diseases. *New England Journal of Medicine*, 369(10). <https://doi.org/10.1056/nejmra1203528>
- Fabrigar, L. R., MacCallum, R. C., Wegener, D. T., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. In *Psychological Methods* (Vol. 4, Issue 3). <https://doi.org/10.1037/1082-989X.4.3.272>
- Felstead, A. (2022). Remote Working: A Research Overview. In *Remote Working: A Research Overview*. <https://doi.org/10.4324/9781003247050>

- Felstead, A., & Henseke, G. (2017). Assessing the growth of remote working and its consequences for effort, well-being and work-life balance. *New Technology, Work and Employment*, 32(3), 195–212. <https://doi.org/https://doi.org/10.1111/ntwe.12097>
- Felstead, A., & Reuschke, D. (2020). Homeworking in the UK: before and during the 2020 lockdown. In *WISERD Report* (Issue August).
- Fernandez, M. E., Ruiter, R. A. C., Markham, C. M., & Kok, G. (2019). Intervention mapping: Theory- and evidence-based health promotion program planning: Perspective and examples. *Frontiers in Public Health*, 7(AUG). <https://doi.org/10.3389/fpubh.2019.00209>
- Figueiro, M. G., & Rea, M. S. (2016). Office lighting and personal light exposures in two seasons: Impact on sleep and mood. *Lighting Research and Technology*, 48(3). <https://doi.org/10.1177/1477153514564098>
- Figueiro, M. G., Steverson, B., Heerwagen, J., Kampschroer, K., Hunter, C. M., Gonzales, K., Plitnick, B., & Rea, M. S. (2017). The impact of daytime light exposures on sleep and mood in office workers. *Sleep Health*, 3(3). <https://doi.org/10.1016/j.sleh.2017.03.005>
- Fleetwood, S. (2007). Why work-life balance now? *International Journal of Human Resource Management*, 18(3). <https://doi.org/10.1080/09585190601167441>
- Fletcher-Miles, H., Gammon, J., Williams, S., & Hunt, J. (2020). A scoping review to assess the impact of public education campaigns to affect behavior change pertaining to antimicrobial resistance. In *American Journal of Infection Control* (Vol. 48, Issue 4). <https://doi.org/10.1016/j.ajic.2019.07.011>
- Fonner, K. L., & Roloff, M. E. (2010). Why Teleworkers are More Satisfied with Their Jobs than are Office-Based Workers: When Less Contact is Beneficial. *Journal of Applied Communication Research*, 38(4), 336–361. <https://doi.org/10.1080/00909882.2010.513998>
- Fonner, K. L., & Roloff, M. E. (2012). Testing the Connectivity Paradox: Linking Teleworkers' Communication Media Use to Social Presence, Stress from Interruptions, and Organizational Identification. *Communication Monographs*, 79(2). <https://doi.org/10.1080/03637751.2012.673000>
- Fonner, K. L., & Stache, L. C. (2012). All in a day's work, at home: teleworkers' management of micro role transitions and the work-home boundary. *New Technology, Work and Employment*, 27(3), 242–257. <https://doi.org/https://doi.org/10.1111/j.1468-005X.2012.00290.x>
- Forte, T., Santinha, G., & Carvalho, S. A. (2021). The covid-19 pandemic strain: Teleworking and health behavior changes in the portuguese context. *Healthcare (Switzerland)*, 9(9). <https://doi.org/10.3390/healthcare9091151>
- Foster, J., Samani, M. N., Campbell, S., & Walsworth, S. (2022). Newbies vs. Old-Timers: University Workers' Differential Experiences of Working from Home During COVID-19. *Workplace: A Journal for Academic Labor*, 33, 11–21.
- Fotiadis, A., Abdulrahman, K., & Spyridou, A. (2019). The mediating roles of psychological autonomy, competence and relatedness on work-life balance and well-being. *Frontiers in Psychology*, 10(MAY). <https://doi.org/10.3389/fpsyg.2019.01267>
- Fowles, J. R., O'Brien, M. W., Wojcik, W. R., D'Entremont, L., & Shields, C. A. (2017). A pilot study: Validity and reliability of the CSEP-PATH PASB-Q and a new leisure time physical activity

- questionnaire to assess physical activity and sedentary behaviours. *Applied Physiology, Nutrition and Metabolism*, 42(6). <https://doi.org/10.1139/apnm-2016-0412>
- Foygel, R., & Drton, M. (2010). Extended Bayesian information criteria for Gaussian graphical models. *Advances in Neural Information Processing Systems 23: 24th Annual Conference on Neural Information Processing Systems 2010, NIPS 2010*.
- Francis, J. J., Johnston, M., Robertson, C., Glidewell, L., Entwistle, V., Eccles, M. P., & Grimshaw, J. M. (2010). What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology and Health*, 25(10). <https://doi.org/10.1080/08870440903194015>
- Frauley, J., & Pearce, F. (2007). Critical realism and the social sciences: Heterodox elaborations. In *Critical Realism and the Social Sciences: Heterodox Elaborations*. <https://doi.org/10.1177/009430610903800253>
- Friedman, J., Hastie, T., & Tibshirani, R. (2008). Sparse inverse covariance estimation with the graphical lasso. *Biostatistics*, 9(3). <https://doi.org/10.1093/biostatistics/kxm045>
- Friedman, J., Hastie, T., & Tibshirani, R. (2014). *glasso: Graphical lasso-estimation of Gaussian graphical models (R package version 1.8.)*[Computer software]. Retrieved from [Http://CRAN.R-Project.Org/Package= Glasso](http://CRAN.R-Project.Org/Package=Glasso).
- Frone, M. R. (2003). Work-family balance. In *Handbook of occupational health psychology*. (pp. 143–162). American Psychological Association. <https://doi.org/10.1037/10474-007>
- Froud, E., Harris, B., Lewis, B., & Vizard, T. (2023). Public opinions and social trends, Great Britain: working arrangements. In *Office for National Statistics*. <https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/datasets/publicopinionsandsocialtrendsgreatbritainworkingarrangements>
- Fuglseth, A. M., & Sørrebø, Ø. (2014). The effects of technostress within the context of employee use of ICT. *Computers in Human Behavior*, 40. <https://doi.org/10.1016/j.chb.2014.07.040>
- Fukushima, N., Machida, M., Kikuchi, H., Amagasa, S., Hayashi, T., Odagiri, Y., Takamiya, T., & Inoue, S. (2021). Associations of working from home with occupational physical activity and sedentary behavior under the COVID-19 pandemic. *Journal of Occupational Health*, 63(1), e12212. <https://doi.org/https://doi.org/10.1002/1348-9585.12212>
- Gajendran, R. S., & Harrison, D. A. (2007). The Good, the Bad, and the Unknown About Telecommuting: Meta-Analysis of Psychological Mediators and Individual Consequences. *Journal of Applied Psychology*, 92(6). <https://doi.org/10.1037/0021-9010.92.6.1524>
- Gajendran, R. S., Harrison, D. A., & Delaney-Klinger, K. (2015). Are Telecommuters Remotely Good Citizens? Unpacking Telecommuting's Effects on Performance Via I-Deals and Job Resources. *Personnel Psychology*, 68(2). <https://doi.org/10.1111/peps.12082>
- Gangwisch, J. E. (2014). Work-life Balance. *Sleep*, 37(7), 1159–1160. <https://doi.org/10.5665/sleep.3826>
- Ganster, D. C., & Rosen, C. C. (2013). Work Stress and Employee Health: A Multidisciplinary Review. In *Journal of Management* (Vol. 39, Issue 5). <https://doi.org/10.1177/0149206313475815>

- Gao, Z. K., Small, M., & Kurths, J. (2016). Complex network analysis of time series. In *EPL* (Vol. 116, Issue 5). <https://doi.org/10.1209/0295-5075/116/50001>
- Gardner, B. (2015). A review and analysis of the use of 'habit' in understanding, predicting and influencing health-related behaviour. *Health Psychology Review, 9*(3). <https://doi.org/10.1080/17437199.2013.876238>
- Gardner, B., Flint, S., Rebar, A. L., Dewitt, S., Quail, S. K., Whall, H., & Smith, L. (2019). Is sitting invisible? Exploring how people mentally represent sitting. *International Journal of Behavioral Nutrition and Physical Activity, 16*(1), 85. <https://doi.org/10.1186/s12966-019-0851-0>
- Gardner, B., Lally, P., & Rebar, A. L. (2020). Does habit weaken the relationship between intention and behaviour? Revisiting the habit-intention interaction hypothesis. *Social and Personality Psychology Compass, 14*(8), e12553. <https://doi.org/https://doi.org/10.1111/spc3.12553>
- Gardner, B., Louca, I., Mourouzis, D., Calabrese, A., Fida, A., & Smith, L. (2020). How do people interpret and respond to self-report sitting time questionnaires? a think-aloud study. *Psychology of Sport and Exercise, 50*. <https://doi.org/10.1016/j.psychsport.2020.101718>
- Gardner, B., Smith, L., & Mansfield, L. (2017). How did the public respond to the 2015 expert consensus public health guidance statement on workplace sedentary behaviour? A qualitative analysis. *BMC Public Health, 17*(1). <https://doi.org/10.1186/s12889-016-3974-0>
- Gardner, B., & Tang, V. (2014). Reflecting on non-reflective action: An exploratory think-aloud study of self-report habit measures. *British Journal of Health Psychology, 19*(2). <https://doi.org/10.1111/bjhp.12060>
- Garnier, S., Ross, N., Rudis, R., Camargo, A. P., Sciaini, M., & Scherer, C. (2021). Rvision - Colorblind-Friendly Color Maps for R. *R Package Version 0.6.1*.
- Geaney, F., Kelly, C., Greiner, B. A., Harrington, J. M., Perry, I. J., & Beirne, P. (2013). The effectiveness of workplace dietary modification interventions: A systematic review. In *Preventive Medicine* (Vol. 57, Issue 5). <https://doi.org/10.1016/j.ypmed.2013.06.032>
- Geertz, C. (1973). *The interpretation of cultures* (Vol. 5019). Basic books.
- Gibbs, M., Mengel, F., & Siemroth, C. (2023). Work from Home and Productivity: Evidence from Personnel and Analytics Data on Information Technology Professionals. *Journal of Political Economy Microeconomics, 1*(1). <https://doi.org/10.1086/721803>
- Giuntoli, L., Conдини, F., Ceccarini, F., Huta, V., & Vidotto, G. (2021). The Different Roles of Hedonic and Eudaimonic Motives for Activities in Predicting Functioning and Well-Being Experiences. *Journal of Happiness Studies, 22*(4). <https://doi.org/10.1007/s10902-020-00290-0>
- Glenn Dutcher, E. (2012). The effects of telecommuting on productivity: An experimental examination. The role of dull and creative tasks. *Journal of Economic Behavior and Organization, 84*(1). <https://doi.org/10.1016/j.jebo.2012.04.009>
- Golden, T. D. (2012). Altering the Effects of Work and Family Conflict on Exhaustion: Telework During Traditional and Nontraditional Work Hours. *Journal of Business and Psychology, 27*(3). <https://doi.org/10.1007/s10869-011-9247-0>

- Golden, T. D., & Veiga, J. F. (2005). The impact of extent of telecommuting on job satisfaction: Resolving inconsistent findings. *Journal of Management*, 31(2).
<https://doi.org/10.1177/0149206304271768>
- Golden, T. D., Veiga, J. F., & Dino, R. N. (2008). The Impact of Professional Isolation on Teleworker Job Performance and Turnover Intentions: Does Time Spent Teleworking, Interacting Face-to-Face, or Having Access to Communication-Enhancing Technology Matter? *Journal of Applied Psychology*, 93(6). <https://doi.org/10.1037/a0012722>
- Golden, T. D., Veiga, J. F., & Simsek, Z. (2006). Telecommuting's differential impact on work-family conflict: Is there no place like home? *Journal of Applied Psychology*, 91(6).
<https://doi.org/10.1037/0021-9010.91.6.1340>
- Golino, H. F., & Epskamp, S. (2017). Exploratory graph analysis: A new approach for estimating the number of dimensions in psychological research. *PLoS ONE*, 12(6).
<https://doi.org/10.1371/journal.pone.0174035>
- González, K., Fuentes, J., & Márquez, J. L. (2017). Physical inactivity, sedentary behavior and chronic diseases. In *Korean Journal of Family Medicine* (Vol. 38, Issue 3).
<https://doi.org/10.4082/kjfm.2017.38.3.111>
- Gorman, E., Ashe, M. C., Dunstan, D. W., Hanson, H. M., Madden, K., Winkler, E. A. H., McKay, H. A., & Healy, G. N. (2013). Does an 'Activity-Permissive' Workplace Change Office Workers' Sitting and Activity Time? *PLOS ONE*, 8(10), e76723-. <https://doi.org/10.1371/journal.pone.0076723>
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, 37(6). [https://doi.org/10.1016/S0092-6566\(03\)00046-1](https://doi.org/10.1016/S0092-6566(03)00046-1)
- Graham, R. (2019). *Facts about carer*. Carersuk.
- Grant, C. A., Wallace, L. M., & Spurgeon, P. C. (2013). An exploration of the psychological factors affecting remote e-worker's job effectiveness, well-being and work-life balance. *Employee Relations*, 35(5). <https://doi.org/10.1108/ER-08-2012-0059>
- Grawitch, M. J., Ballard, D. W., & Erb, K. R. (2017). Work and wellbeing: Creating a psychologically healthy workplace. In *The Routledge Companion to Wellbeing at Work*.
<https://doi.org/10.4324/9781315665979>
- Grawitch, M. J., Barber, L. K., & Justice, L. (2010). Rethinking the work-life interface: It's not about balance, it's about resource allocation. *Applied Psychology: Health and Well-Being*, 2(2).
<https://doi.org/10.1111/j.1758-0854.2009.01023.x>
- Green, D. D., & Roberts, G. E. (2010). Personnel implications of public sector virtual organizations. *Public Personnel Management*, 39(1). <https://doi.org/10.1177/009102601003900103>
- Greenhaus, J. H., Collins, K. M., & Shaw, J. D. (2003). The relation between work-family balance and quality of life. *Journal of Vocational Behavior*, 63(3). [https://doi.org/10.1016/S0001-8791\(02\)00042-8](https://doi.org/10.1016/S0001-8791(02)00042-8)
- Greenhill, A., & Wilson, M. (2006). Haven or hell? Telework, flexibility and family in the e-society: A Marxist analysis. In *European Journal of Information Systems* (Vol. 15, Issue 4).
<https://doi.org/10.1057/palgrave.ejis.3000632>

- Griffin, M. A., & Clarke, S. (2011). Stress and well-being at work. In *APA handbook of industrial and organizational psychology, Vol 3: Maintaining, expanding, and contracting the organization*. (pp. 359–397). American Psychological Association. <https://doi.org/10.1037/12171-010>
- Groff, R. P., & Morgan, J. (2023). Philosophy, metaphilosophy and ideology-critique: an interview with Ruth Porter Groff. *Journal of Critical Realism*, 22(2). <https://doi.org/10.1080/14767430.2022.2101342>
- Grzywacz, J. G., & Bass, B. L. (2003). Work, family, and mental health: Testing different models of work-family fit. *Journal of Marriage and Family*, 65(1). <https://doi.org/10.1111/j.1741-3737.2003.00248.x>
- Guseva Canu, I., Marca, S. C., Dell’Oro, F., Balázs, Á., Bergamaschi, E., Besse, C., Bianchi, R., Bislumovska, J., Bjelajac, A. K., Bugge, M., Busneag, C. I., Çağlayan, Ç., Cernitanu, M., Pereira, C. C., Hafner, N. D., Droz, N., Eglite, M., Godderis, L., Gündel, H., ... Wahlen, A. (2021). Harmonized definition of occupational burnout: A systematic review, semantic analysis, and Delphi consensus in 29 countries. *Scandinavian Journal of Work, Environment and Health*, 47(2). <https://doi.org/10.5271/sjweh.3935>
- Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: test of a theory. *Organizational Behavior and Human Performance*, 16(2). [https://doi.org/10.1016/0030-5073\(76\)90016-7](https://doi.org/10.1016/0030-5073(76)90016-7)
- Hackman, J. R., & Oldham, G. R. (1980). Work redesign. Reading,. In *Organization development*.
- Hadgraft, N. T., Brakenridge, C. L., Dunstan, D. W., Owen, N., Healy, G. N., & Lawler, S. P. (2018). Perceptions of the acceptability and feasibility of reducing occupational sitting: Review and thematic synthesis. In *International Journal of Behavioral Nutrition and Physical Activity* (Vol. 15, Issue 1). <https://doi.org/10.1186/s12966-018-0718-9>
- Hadgraft, N. T., Brakenridge, C. L., LaMontagne, A. D., Fjeldsoe, B. S., Lynch, B. M., Dunstan, D. W., Owen, N., Healy, G. N., & Lawler, S. P. (2016). Feasibility and acceptability of reducing workplace sitting time: a qualitative study with Australian office workers. *BMC Public Health*, 16(1), 933. <https://doi.org/10.1186/s12889-016-3611-y>
- Hadgraft, N. T., Healy, G. N., Owen, N., Winkler, E. A. H., Lynch, B. M., Sethi, P., Eakin, E. G., Moodie, M., LaMontagne, A. D., Wiesner, G., Willenberg, L., & Dunstan, D. W. (2016). Office workers’ objectively assessed total and prolonged sitting time: Individual-level correlates and worksite variations. *Preventive Medicine Reports*, 4, 184–191. <https://doi.org/https://doi.org/10.1016/j.pmedr.2016.06.011>
- Hafner, M., Stepanek, M., Taylor, J., Troxel, W., & Stolk, C. (2017). Why sleep matters -- the economic costs of insufficient sleep: A cross-country comparative analysis. In *Why sleep matters -- the economic costs of insufficient sleep: A cross-country comparative analysis*. <https://doi.org/10.7249/rr1791>
- Hager, F. W. (2018). LINKS BETWEEN TELECOMMUTING, SOCIAL SUPPORT AND MENTAL WELL-BEING AMONG TELEWORKERS – A LITERATURE REVIEW. *International Journal of Business and Management*, VII(2). <https://doi.org/10.20472/bm.2018.6.2.003>
- Hall, J., Kay, T., McConnell, A., & Mansfield, L. (2019). “Why would you want to stand?” an account of the lived experience of employees taking part in a workplace sit-stand desk intervention. *BMC Public Health*, 19(1), 1692. <https://doi.org/10.1186/s12889-019-8038-9>

- Hallman, D. M., Januario, L. B., Mathiassen, S. E., Heiden, M., Svensson, S., & Bergström, G. (2021). Working from home during the COVID-19 outbreak in Sweden: effects on 24-h time-use in office workers. *BMC Public Health*, *21*(1). <https://doi.org/10.1186/s12889-021-10582-6>
- Hartmann, C., Siegrist, M., & Van Der Horst, K. (2013). Snack frequency: Associations with healthy and unhealthy food choices. *Public Health Nutrition*, *16*(8). <https://doi.org/10.1017/S1368980012003771>
- Haslam, S. A., Jetten, J., Postmes, T., & Haslam, C. (2009). Social identity, health and well-being: An emerging agenda for applied psychology. *Applied Psychology*, *58*(1). <https://doi.org/10.1111/j.1464-0597.2008.00379.x>
- Healy, G., Goode, A., Schultz, D., Lee, D., Leahy, B., Dunstan, D. W., Gilson, N., & Eakin, E. G. (2016). The BeUpstanding Program™: Scaling up the Stand Up Australia workplace intervention for translation into practice. *AIMS Public Health*, *3*(2), 341–347.
- Hellemans, C., & Vayre, É. (2022). “Spillover” Work via Technology: Organizational Antecedents and Health Impacts. In *Digitalization of Work: New Spaces and New Working Times: Volume 5* (Vol. 5). <https://doi.org/10.1002/9781119988434.ch1>
- Henderson, L., & Knight, T. (2012). Integrating the hedonic and eudaimonic perspectives to more comprehensively understand wellbeing and pathways to wellbeing. *International Journal of Wellbeing*, *2*(3). <https://doi.org/10.5502/ijw.v2i3.3>
- Hevey, D. (2018). Network analysis: A brief overview and tutorial. *Health Psychology and Behavioral Medicine*, *6*(1). <https://doi.org/10.1080/21642850.2018.1521283>
- Hill, E. J., Ferris, M., & Mårtinson, V. (2003). Does it matter where you work? A comparison of how three work venues (traditional office, virtual office, and home office) influence aspects of work and personal/family life. *Journal of Vocational Behavior*, *63*(2). [https://doi.org/10.1016/S0001-8791\(03\)00042-3](https://doi.org/10.1016/S0001-8791(03)00042-3)
- Hindmarch, I., & Parrott, A. C. (1978). The effect of a sub-chronic administration of three dose levels of a 1,5-benzodiazepine derivative, clobazam, on subjective assessments of sleep and aspects of psychomotor performance the morning following night time medication. *Arzneimittel-Forschung/Drug Research*, *28*(11).
- Hoch, J. E., & Kozlowski, S. W. J. (2014). Leading virtual teams: Hierarchical leadership, structural supports, and shared team leadership. *Journal of Applied Psychology*, *99*(3). <https://doi.org/10.1037/a0030264>
- Hoehner, C. M., Barlow, C. E., Allen, P., & Schootman, M. (2012). Commuting distance, cardiorespiratory fitness, and metabolic risk. *American Journal of Preventive Medicine*, *42*(6). <https://doi.org/10.1016/j.amepre.2012.02.020>
- Hoert, J., Herd, A. M., & Hambrick, M. (2018). The Role of Leadership Support for Health Promotion in Employee Wellness Program Participation, Perceived Job Stress, and Health Behaviors. *American Journal of Health Promotion*, *32*(4). <https://doi.org/10.1177/0890117116677798>
- Hollands, G. J., Shemilt, I., Marteau, T. M., Jebb, S. A., Kelly, M. P., Nakamura, R., Suhrcke, M., & Ogilvie, D. (2013). Altering choice architecture to change population health behavior: a large-scale conceptual and empirical scoping review of interventions within micro-environments. *BMC Public Health*, *13*(December).

- Holmes, A. J., Quinn, T. D., Conroy, M. B., Paley, J. L., Huber, K. A., & Barone Gibbs, B. (2023). Associations of Physical and Social Workplace Characteristics with Movement Behaviors at Work. *Translational Journal of the American College of Sports Medicine*, 8(2). <https://doi.org/10.1249/tjx.0000000000000225>
- Holton, M. K., Barry, A. E., & Chaney, J. D. (2016). Employee stress management: An examination of adaptive and maladaptive coping strategies on employee health. *Work*, 53(2). <https://doi.org/10.3233/WOR-152145>
- Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, 30(2). <https://doi.org/10.1007/BF02289447>
- Howard, M. C. (2016). A Review of Exploratory Factor Analysis Decisions and Overview of Current Practices: What We Are Doing and How Can We Improve? *International Journal of Human-Computer Interaction*, 32(1). <https://doi.org/10.1080/10447318.2015.1087664>
- Howarth, A., Quesada, J., Silva, J., Judycki, S., & Mills, P. R. (2018). The impact of digital health interventions on health-related outcomes in the workplace: A systematic review. *DIGITAL HEALTH*, 4. <https://doi.org/10.1177/2055207618770861>
- Howe, C. A., Corrigan, R. J., de Faria, F. R., Johanni, Z., Chase, P., & Hillman, A. R. (2021). Impact of covid-19 stay-at-home restrictions on employment status, physical activity, and sedentary behavior. *International Journal of Environmental Research and Public Health*, 18(22). <https://doi.org/10.3390/ijerph182211935>
- Humble, N., & Mozelius, P. (2022). Content analysis or thematic analysis. In *European Conference on Research Methodology for Business and Management Studies*, 21(1), 76–81.
- Hünefeld, L., Gerstenberg, S., & Hüffmeier, J. (2020). Job satisfaction and mental health of temporary agency workers in Europe: a systematic review and research agenda. In *Work and Stress* (Vol. 34, Issue 1). <https://doi.org/10.1080/02678373.2019.1567619>
- Hunter, E. M., & Wu, C. (2016). Give me a Better break: Choosing workday break activities to maximize resource recovery. *Journal of Applied Psychology*, 101(2). <https://doi.org/10.1037/apl0000045>
- Illegems, V., Verbeke, A., & S'Jegers, R. (2001). The organizational context of teleworking implementation. *Technological Forecasting and Social Change*, 68(3). [https://doi.org/10.1016/S0040-1625\(00\)00105-0](https://doi.org/10.1016/S0040-1625(00)00105-0)
- Ingram, J., Maciejewski, G., & Hand, C. J. (2020). Changes in Diet, Sleep, and Physical Activity Are Associated With Differences in Negative Mood During COVID-19 Lockdown. *Frontiers in Psychology*, 11. <https://www.frontiersin.org/article/10.3389/fpsyg.2020.588604>
- Institute for Government. (2021). *Timeline of UK government coronavirus lockdowns and restrictions*. <https://www.instituteforgovernment.org.uk/charts/uk-government-coronavirus-lockdowns>.
- Isvoranu, A. M., Van Borkulo, C. D., Boyette, L., Lou, Wigman, J. T. W., Vinkers, C. H., Borsboom, D., Kahn, R., De Haan, L., Van Os, J., Wiersma, D., Bruggeman, R., Cahn, W., Meijer, C., & Myin-Germeys, I. (2017). A network approach to psychosis: Pathways between childhood trauma and psychotic symptoms. *Schizophrenia Bulletin*, 43(1). <https://doi.org/10.1093/schbul/sbw055>

- Jachimowicz, J. M., Cunningham, J. L., Staats, B. R., Gino, F., & Menges, J. I. (2021). Between home and work: Commuting as an opportunity for role transitions. *Organization Science*, 32(1). <https://doi.org/10.1287/ORSC.2020.1370>
- Jacobsen, H. B., Reme, S. E., Sembajwe, G., Hopcia, K., Stoddard, A. M., Kenwood, C., Stiles, T. C., Sorensen, G., & Buxton, O. M. (2014). Work-Family Conflict, Psychological Distress, and Sleep Deficiency among Patient Care Workers. *Workplace Health & Safety*, 62(7). <https://doi.org/10.1177/216507991406200703>
- Jancey, J. M., McGann, S., Creagh, R., Blackford, K. D., Howat, P., & Tye, M. (2016). Workplace building design and office-based workers' activity: A study of a natural experiment. *Australian and New Zealand Journal of Public Health*, 40(1). <https://doi.org/10.1111/1753-6405.12464>
- Jang, S. J. (2009). The relationships of flexible work schedules, workplace support, supervisory support, work-life balance, and the well-being of working parents. *Journal of Social Service Research*, 35(2). <https://doi.org/10.1080/01488370802678561>
- Jeung, D. Y., Kim, C., & Chang, S. J. (2018). Emotional labor and burnout: A review of the literature. In *Yonsei Medical Journal* (Vol. 59, Issue 2). <https://doi.org/10.3349/ymj.2018.59.2.187>
- Johnson, B. J., & Mabry, J. B. (2022). Remote work video meetings: Workers' emotional exhaustion and practices for greater well-being. *German Journal of Human Resource Management*, 36(3). <https://doi.org/10.1177/23970022221094532>
- Jones, P. (2018). Package "networktools" Title Tools for Identifying Important Nodes in Networks. *Cran.Microsoft.Com*.
- Jones, P. J., Ma, R., & McNally, R. J. (2021). Bridge Centrality: A Network Approach to Understanding Comorbidity. *Multivariate Behavioral Research*, 56(2). <https://doi.org/10.1080/00273171.2019.1614898>
- Kaffashpoor, A., & Sadeghian, S. (2020). The effect of ethical leadership on subjective wellbeing, given the moderator job satisfaction (a case study of private hospitals in Mashhad). *BMC Nursing*, 19(1). <https://doi.org/10.1186/s12912-020-00496-w>
- Kaiser, H. (2016). An index of factorial simplicity. *Psychometrika. Bulletin of the Seismological Society of America*, 106(1).
- Kakkar, S., Kuril, S., Singh, S., Saha, S., & Dugar, A. (2022). The influence of remote work communication satisfaction and CSR association on employee alienation and job satisfaction: a moderated-mediation study. *Information Technology and People*. <https://doi.org/10.1108/ITP-01-2021-0030>
- Kalliath, T., & Brough, P. (2008). Work-life balance: A review of the meaning of the balance construct. In *Journal of Management and Organization* (Vol. 14, Issue 3). <https://doi.org/10.5172/jmo.837.14.3.323>
- Kelders, S. M., Kok, R. N., Ossebaard, H. C., & Van Gemert-Pijnen, J. E. W. C. (2012). Persuasive system design does matter: A systematic review of adherence to web-based interventions. In *Journal of Medical Internet Research* (Vol. 14, Issue 6). <https://doi.org/10.2196/jmir.2104>
- Kelley, K., & Pornprasertmanit, S. (2016). Confidence intervals for population reliability coefficients: Evaluation of methods, recommendations, and software for composite measures. *Psychological Methods*, 21(1). <https://doi.org/10.1037/a0040086>

- Kelliher, C., & Anderson, D. (2010). Doing more with less? flexible working practices and the intensification of work. *Human Relations*, *63*(1). <https://doi.org/10.1177/0018726709349199>
- Kelly, L. M., & Cordeiro, M. (2020). Three principles of pragmatism for research on organizational processes. *Methodological Innovations*, *13*(2). <https://doi.org/10.1177/2059799120937242>
- Kelly, P., Kahlmeier, S., Götschi, T., Orsini, N., Richards, J., Roberts, N., Scarborough, P., & Foster, C. (2014). Systematic review and meta-analysis of reduction in all-cause mortality from walking and cycling and shape of dose response relationship. *International Journal of Behavioral Nutrition and Physical Activity*, *11*(1). <https://doi.org/10.1186/s12966-014-0132-x>
- Keown, M. K., Skeaff, C. M., Perry, T. L., Haszard, J. J., & Peddie, M. C. (2018). Device-measured sedentary behavior patterns in office-based university employees. *Journal of Occupational and Environmental Medicine*, *60*(12). <https://doi.org/10.1097/JOM.0000000000001467>
- Keyes, C. L. M. (1998). Social Well-Being. *Social Psychology Quarterly*, *61*(2), 121–140. <https://doi.org/10.2307/2787065>
- Keyes, C. L. M. (2007). Promoting and Protecting Mental Health as Flourishing: A Complementary Strategy for Improving National Mental Health. *American Psychologist*, *62*(2). <https://doi.org/10.1037/0003-066X.62.2.95>
- Keyes, C. L. M., & Lopez, S. J. (2023). Toward a Science of Mental Health Positive Directions in Diagnosis and Interventions. In *Handbook of Positive Psychology*. <https://doi.org/10.1093/oso/9780195135336.003.0004>
- Keyworth, C., Hart, J., Armitage, C. J., & Tully, M. P. (2018). What maximizes the effectiveness and implementation of technology-based interventions to support healthcare professional practice? A systematic literature review. *BMC Medical Informatics and Decision Making*, *18*(1). <https://doi.org/10.1186/s12911-018-0661-3>
- Kim, S., Cho, S., & Park, Y. A. (2022). Daily Microbreaks in a Self-Regulatory Resources Lens: Perceived Health Climate as a Contextual Moderator via Microbreak Autonomy. *Journal of Applied Psychology*, *107*(1). <https://doi.org/10.1037/apl0000891>
- Kim, S., Kim, Y., Lim, S. S., Ryoo, J. H., & Yoon, J. H. (2019). Long Commute Time and Sleep Problems with Gender Difference in Work–Life Balance: A Cross-sectional Study of More than 25,000 Workers. *Safety and Health at Work*, *10*(4). <https://doi.org/10.1016/j.shaw.2019.08.001>
- Kingma, S. (2019). New ways of working (NWW): work space and cultural change in virtualizing organizations. *Culture and Organization*, *25*(5). <https://doi.org/10.1080/14759551.2018.1427747>
- Kinman, G., Grant, C., Fraser, J., Bell, N., Breslin, G., Colville, T., Kwiatowski, R., Steele, C., Tehrani, N., Thomson, L., Waites, B., Whittaker, L., & MacKey, G. (2020). Working From Home: Healthy Sustainable Working During the Covid-19 Pandemic and Beyond. *British Psychological Society*.
- Kinman, G., & Jones, F. (2005). Lay representations of workplace stress: What do people really mean when they say they are stressed? *Work and Stress*, *19*(2). <https://doi.org/10.1080/02678370500144831>
- Kirchmeyer, C. (2000). Work-life initiatives: Greed or benevolence regarding workers time. In *Trends in organizational behavior*.

- Kitagawa, R., Kuroda, S., Okudaira, H., & Owan, H. (2021). Working from home: Its effects on productivity and mental health. *Covid Economics*, 74.
- Kivimäki, M., & Kawachi, I. (2015). Work Stress as a Risk Factor for Cardiovascular Disease. In *Current Cardiology Reports* (Vol. 17, Issue 9). <https://doi.org/10.1007/s11886-015-0630-8>
- Kniffin, K. M., Narayanan, J., Anseel, F., Antonakis, J., Ashford, S. P., Bakker, A. B., Bamberger, P., Bapuji, H., Bhawe, D. P., Choi, V. K., Creary, S. J., Demerouti, E., Flynn, F. J., Gelfand, M. J., Greer, L. L., Johns, G., Kesebir, S., Klein, P. G., Lee, S. Y., ... Vugt, M. van. (2021). COVID-19 and the workplace: Implications, issues, and insights for future research and action. *American Psychologist*, 76(1). <https://doi.org/10.1037/amp0000716>
- Knowles, D., Brown, K., & Aldrovandi, S. (2020). Exploring the roles of physical effort and visual salience within the proximity effect. *Appetite*, 145. <https://doi.org/10.1016/j.appet.2019.104489>
- Konradt, U., Hertel, G., & Schmook, R. (2003). Quality of management by objectives, task-related stressors, and non-task-related stressors as predictors of stress and job satisfaction among teleworkers. *European Journal of Work and Organizational Psychology*, 12(1). <https://doi.org/10.1080/13594320344000020>
- Kopp, M. S., Stauder, A., Purebl, G., Janszky, I., & Skrabski, Á. (2008). Work stress and mental health in a changing society. *European Journal of Public Health*, 18(3). <https://doi.org/10.1093/eurpub/ckm077>
- Kossek, E. E., Lautsch, B. A., & Eaton, S. C. (2009). "Good teleworking": Under what conditions does teleworking enhance employees' well-being? In *Technology and Psychological Well-being*. <https://doi.org/10.1017/CBO9780511635373.007>
- Kossek, E. E., Valcour, M., & Lirio, P. (2014). The sustainable workforce: Organizational strategies for promoting work-life balance and wellbeing. *Work and Wellbeing: A Complete Reference Guide, Volume III, III*.
- Kröll, C., & Nüesch, S. (2019). The effects of flexible work practices on employee attitudes: evidence from a large-scale panel study in Germany. *International Journal of Human Resource Management*, 30(9). <https://doi.org/10.1080/09585192.2017.1289548>
- Kubicek, B., Paškvan, M., & Bunner, J. (2017). The bright and dark sides of job autonomy. In *Job Demands in a Changing World of Work: Impact on Workers' Health and Performance and Implications for Research and Practice*. https://doi.org/10.1007/978-3-319-54678-0_4
- Kushlev, K., & Dunn, E. W. (2015). Checking email less frequently reduces stress. *Computers in Human Behavior*, 43. <https://doi.org/10.1016/j.chb.2014.11.005>
- Lake, A. A., Smith, S. A., Bryant, C. E., Alinia, S., Brandt, K., Seal, C. J., & Tetens, I. (2016). Exploring the dynamics of a free fruit at work intervention. *BMC Public Health*, 16(1). <https://doi.org/10.1186/s12889-016-3500-4>
- Lancaster, G. A. (2015). Pilot and feasibility studies come of age! In *Pilot and Feasibility Studies* (Vol. 1, Issue 1). <https://doi.org/10.1186/2055-5784-1-1>
- Lang, J., Ochsmann, E., Kraus, T., & Lang, J. W. B. (2012). Psychosocial work stressors as antecedents of musculoskeletal problems: A systematic review and meta-analysis of stability-adjusted

- longitudinal studies. In *Social Science and Medicine* (Vol. 75, Issue 7).
<https://doi.org/10.1016/j.socscimed.2012.04.015>
- Lee, H. (2021). Changes in workplace practices during the COVID-19 pandemic: the roles of emotion, psychological safety and organisation support. *Journal of Organizational Effectiveness*, 8(1).
<https://doi.org/10.1108/JOEPP-06-2020-0104>
- Lee, P. H., Macfarlane, D. J., Lam, T. H., & Stewart, S. M. (2011). Validity of the international physical activity questionnaire short form (IPAQ-SF): A systematic review. In *International Journal of Behavioral Nutrition and Physical Activity* (Vol. 8). <https://doi.org/10.1186/1479-5868-8-115>
- Leonardi, P. M., Treem, J. W., & Jackson, M. H. (2010). The Connectivity Paradox: Using Technology to Both Decrease and Increase Perceptions of Distance in Distributed Work Arrangements. *Journal of Applied Communication Research*, 38(1). <https://doi.org/10.1080/00909880903483599>
- Linton, S. J., Kecklund, G., Franklin, K. A., Leissner, L. C., Sivertsen, B., Lindberg, E., Svensson, A. C., Hansson, S. O., Sundin, Ö., Hetta, J., Björkelund, C., & Hall, C. (2015). The effect of the work environment on future sleep disturbances: A systematic review. In *Sleep Medicine Reviews* (Vol. 23). <https://doi.org/10.1016/j.smr.2014.10.010>
- Ljungblad, C., Granström, F., Dellve, L., & Åkerlind, I. (2014). Workplace health promotion and working conditions as determinants of employee health. *International Journal of Workplace Health Management*, 7(2). <https://doi.org/10.1108/IJWHM-02-2013-0003>
- Lodovici, M. S. (2021). *The impact of teleworking and digital work on workers and society*.
<https://policycommons.net/artifacts/1528237/the-impact-of-teleworking-and-digital-work-on-workers-and-society/2217886/>
- Loef, B., van Oostrom, S. H., & van der Noordt, M. (2022). Working from home during the COVID-19 pandemic and its longitudinal association with physical activity and sedentary behavior. *Safety and Health at Work*, 13, 124–125.
- Lopez, C., Sanchez, M. D., Ponte, L., & Ojeda, L. (2022). Work-family interface on hazardous alcohol use and increased risk for prescription drug misuse among diverse working parents in STEM. *American Journal of Drug and Alcohol Abuse*, 48(1).
<https://doi.org/10.1080/00952990.2021.1992771>
- Lunde, L. K., Fløvik, L., Christensen, J. O., Johannessen, H. A., Finne, L. B., Jørgensen, I. L., Mohr, B., & Vleeshouwers, J. (2022). The relationship between telework from home and employee health: a systematic review. *BMC Public Health*, 22(1). <https://doi.org/10.1186/s12889-021-12481-2>
- Macdonald, B., Janssen, X., Kirk, A., Patience, M., & Gibson, A. M. (2018). An integrative, systematic review exploring the research, effectiveness, adoption, implementation, and maintenance of interventions to reduce sedentary behaviour in office workers. In *International Journal of Environmental Research and Public Health* (Vol. 15, Issue 12).
<https://doi.org/10.3390/ijerph15122876>
- Mackenzie, K. J. (2021). "Sit Less at Work": exploring the contextual factors which influence intervention development, implementation and evaluation. *PhD Thesis, University of Sheffield*.
- Magnusson Hanson, L. L., Åkerstedt, T., Näswall, K., Leineweber, C., Theorell, T., & Westerlund, H. (2011). Cross-lagged relationships between workplace demands, control, support, and sleep problems. *Sleep*, 34(10). <https://doi.org/10.5665/SLEEP.1288>

- Mahmood, A. N. (2002). *Work and home boundaries: Sociospatial analysis of women's live-work environments*. The University of Wisconsin-Milwaukee.
- Mann, S., & Holdsworth, L. (2003). The psychological impact of teleworking: Stress, emotions and health. *New Technology, Work and Employment*, 18(3). <https://doi.org/10.1111/1468-005X.00121>
- Manoochehri, G., & Pinkerton, T. (2003). Managing Telecommuters: Opportunities and Challenges. *American Business Review*, 21(1).
- Mansfield, L., Hall, J., Smith, L., Rasch, M., Reeves, E., Dewitt, S., & Gardner, B. (2018). "Could you sit down please?" A qualitative analysis of employees' experiences of standing in normally-seated workplace meetings. *PLOS ONE*, 13(6), e0198483-. <https://doi.org/10.1371/journal.pone.0198483>
- Marcinkowski, B., & Brandmeier, R. A. (2023). *Digitalization as a Driver for Successful Talent Acquisition and Employee Retention*. https://doi.org/10.1007/978-3-031-26451-1_10
- Marteau, T. M., Hollands, G. J., & Fletcher, P. C. (2012). Changing human behavior to prevent disease: The importance of targeting automatic processes. In *Science* (Vol. 337, Issue 6101). <https://doi.org/10.1126/science.1226918>
- Martínez-Sánchez, A., Pérez-Pérez, M., de-Luis-Carnicer, P., & Vela-Jiménez, M. J. (2007). Telework, human resource flexibility and firm performance. *New Technology, Work and Employment*, 22(3). <https://doi.org/10.1111/j.1468-005X.2007.00195.x>
- Maruyama, T., & Tietze, S. (2012). From anxiety to assurance: Concerns and outcomes of telework. *Personnel Review*, 41(4). <https://doi.org/10.1108/00483481211229375>
- Matusik, S. F., & Mickel, A. E. (2011). Embracing or embattled by converged mobile devices? users' experiences with a contemporary connectivity technology. *Human Relations*, 64(8). <https://doi.org/10.1177/0018726711405552>
- Mazmanian, M., Orlikowski, W. J., & Yates, J. A. (2013). The autonomy paradox: The implications of mobile email devices for knowledge professionals. *Organization Science*, 24(5). <https://doi.org/10.1287/orsc.1120.0806>
- McCartney, G., Popham, F., McMaster, R., & Cumbers, A. (2019). Defining health and health inequalities. In *Public Health* (Vol. 172). <https://doi.org/10.1016/j.puhe.2019.03.023>
- Mellner, C., Kecklund, G., Kompier, M., Sariaslan, A., & Aronsson, G. (2016). Boundaryless work, psychological detachment and sleep: Does working "anytime" anywhere' equal employees are "always on"? In *Advanced Series in Management* (Vol. 16). <https://doi.org/10.1108/S1877-636120160000016003>
- Melo, J. M., Campanini, M. Z., Souza, S. C. S., Andrade, S. M., González, A. D., Jiménez-López, E., & Mesas, A. E. (2021). Work-related rumination and worry at bedtime are associated with worse sleep indicators in schoolteachers: a study based on actigraphy and sleep diaries. *Sleep Medicine*, 80. <https://doi.org/10.1016/j.sleep.2021.01.055>
- Messenger, J. (2017). Working anytime, anywhere: the evolution of telework and its effects on the world of work. In *IUSLabor 3/2017*.

- Meyer, J., McDowell, C., Lansing, J., Brower, C., Smith, L., Tully, M., & Herring, M. (2020). Changes in physical activity and sedentary behavior in response to COVID-19 and their associations with mental health in 3052 US adults. *International Journal of Environmental Research and Public Health*, *17*(6369).
- Michie, S., Atkins, L., & West, R. (2014). The Behaviour Change Wheel: A Guide to Designing Interventions. In *The Behavior Change Wheel: Book Launch Event*.
- Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M. P., Cane, J., & Wood, C. E. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, *46*(1). <https://doi.org/10.1007/s12160-013-9486-6>
- Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*(1). <https://doi.org/10.1186/1748-5908-6-42>
- Mikołajczyk, K., Molek-Winiarska, D., & Kleszewski, E. (2023). “I have to be always on” – managerial role and experience of work-life balance and regeneration practices during remote work. *International Journal of Workplace Health Management, ahead-of-print*(ahead-of-print). <https://doi.org/10.1108/IJWHM-11-2022-0195>
- Miller, C. C., & Rampell, C. (2013). Yahoo Orders Home Workers Back to the Office. *New York Times*, *1*(February 2013).
- Miruna, S. L. (2019). E- LEARNING: AN EFFECTIVE TOOL FOR TRAINING AND DEVELOPMENT. *Nternational Journal Of Creative and Innovative Research In All Studies*, *2*(1), 1–2.
- Mkhitaryan, S., Crutzen, R., Steenaart, E., & de Vries, N. K. (2019). Network approach in health behavior research: how can we explore new questions? *Health Psychology and Behavioral Medicine*, *7*(1). <https://doi.org/10.1080/21642850.2019.1682587>
- Morawski, J. (2022). Impact of working from home on European office rents and vacancy rates. *Zeitschrift Für Immobilienökonomie*, *8*(2). <https://doi.org/10.1365/s41056-022-00057-z>
- Morris, A., Murphy, R., Shepherd, S., & Graves, L. (2018). Multi-stakeholder perspectives of factors that influence contact centre call agents’ workplace physical activity and sedentary behaviour. *International Journal of Environmental Research and Public Health*, *15*(7). <https://doi.org/10.3390/ijerph15071484>
- Morton, S., Fitzsimons, C., Jepson, R., Saunders, D., Sivaramakrishnan, D., & Niven, A. (2022). What works to reduce sedentary behaviour in the office, and could these intervention components transfer to the home working environment?: A rapid review. *OSF Preprints*.
- Mukumbang, F. C. (2023). Retroductive theorizing: a contribution of critical realism to mixed methods research. *Journal of Mixed Methods Research*, *17*(1), 93–114.
- Mullane, S. L., Toledo, M. J. L., Rydell, S. A., Feltes, L. H., Vuong, B., Crespo, N. C., Pereira, M. A., & Buman, M. P. (2017). Social ecological correlates of workplace sedentary behavior. *International Journal of Behavioral Nutrition and Physical Activity*, *14*(1). <https://doi.org/10.1186/s12966-017-0576-x>

- Mumenthaler, J., Knecht, M., & Krause, A. (2021). *Short term effects of workload and extending working hours on exhaustion*.
- Murray, W. C., & Rostis, A. (2007). "Who's Running the Machine?" A Theoretical Exploration of Work Stress and Burnout of Technologically Tethered Workers. *Journal of Individual Employment Rights*, 12(3). <https://doi.org/10.2190/ie.12.3.f>
- Mvududu, N. H., & Sink, C. A. (2013). Factor Analysis in Counseling Research and Practice. *Counseling Outcome Research and Evaluation*, 4(2). <https://doi.org/10.1177/2150137813494766>
- Naczenski, L. M., de Vries, J. D., van Hooff, M. L. M., & Kompier, M. A. J. (2017). Systematic review of the association between physical activity and burnout. In *Journal of Occupational Health* (Vol. 59, Issue 6). <https://doi.org/10.1539/joh.17-0050-RA>
- Nakrošienė, A., Bučiūnienė, I., & Goštautaitė, B. (2019). Working from home: characteristics and outcomes of telework. *International Journal of Manpower*, 40(1). <https://doi.org/10.1108/IJM-07-2017-0172>
- Naughton, F., Ward, E., Khondoker, M., Belderson, P., Marie Minihane, A., Dainty, J., Hanson, S., Holland, R., Brown, T., & Notley, C. (2021). Health behaviour change during the UK COVID-19 lockdown: Findings from the first wave of the C-19 health behaviour and well-being daily tracker study. *British Journal of Health Psychology*, 26(2). <https://doi.org/10.1111/bjhp.12500>
- Nicholls, R., Perry, L., Duffield, C., Gallagher, R., & Pierce, H. (2017). Barriers and facilitators to healthy eating for nurses in the workplace: an integrative review. *Journal of Advanced Nursing*, 73(5), 1051–1065. <https://doi.org/https://doi.org/10.1111/jan.13185>
- Nikolaeva, A., Lin, Y. T., Nello-Deakin, S., Rubin, O., & von Schönfeld, K. C. (2023). Living without commuting: experiences of a less mobile life under COVID-19. *Mobilities*, 18(1). <https://doi.org/10.1080/17450101.2022.2072231>
- Nilsen, C., Andel, R., Fritzell, J., & Kåreholt, I. (2016). Work-related stress in midlife and all-cause mortality: Can sense of coherence modify this association? *European Journal of Public Health*, 26(6). <https://doi.org/10.1093/eurpub/ckw086>
- Niven, A., Baker, G., Almeida, E. C., Fawkner, S. G., Jepson, R., Manner, J., Morton, S., Nightingale, G., Sivaramakrishnan, D., & Fitzsimons, C. (2023). "Are We Working (Too) Comfortably?": Understanding the Nature of and Factors Associated with Sedentary Behaviour When Working in the Home Environment. *Occupational Health Science*, 7(1). <https://doi.org/10.1007/s41542-022-00128-6>
- Nooijen, C. F. J., Kallings, L. V., Blom, V., Ekblom, Ö., Forsell, Y., & Ekblom, M. M. (2018). Common perceived barriers and facilitators for reducing sedentary behaviour among office workers. *International Journal of Environmental Research and Public Health*, 15(4). <https://doi.org/10.3390/ijerph15040792>
- Norwood, M. S., Hughes, J. P., & Amico, K. R. (2016). The validity of self-reported behaviors: methods for estimating underreporting of risk behaviors. *Annals of Epidemiology*, 26(9). <https://doi.org/10.1016/j.annepidem.2016.07.011>
- Novelli, D., Drury, J., Reicher, S., & Stott, C. (2013). Crowdedness mediates the effect of social identification on positive emotion in a crowd: A survey of two crowd events. *PLoS ONE*, 8(11). <https://doi.org/10.1371/journal.pone.0078983>

- Nvivo (12). (2018).
- Nylén, L., Melin, B., & Laflamme, L. (2007). Interference between work and outside-work demands relative to health: Unwinding possibilities among full-time and part-time employees. *International Journal of Behavioral Medicine*, 14(4). <https://doi.org/10.1007/BF03002997>
- O’Cathain, A., Croot, L., Sworn, K., Duncan, E., Rousseau, N., Turner, K., Yardley, L., & Hoddinott, P. (2019). Taxonomy of approaches to developing interventions to improve health: A systematic methods overview. In *Pilot and Feasibility Studies* (Vol. 5, Issue 1). <https://doi.org/10.1186/s40814-019-0425-6>
- Office of National Statistics. (2022). Is hybrid working here to stay? . In *Ons*.
- Oftedal, S., Vandelanotte, C., & Duncan, M. J. (2019). Patterns of diet, physical activity, sitting and sleep are associated with socio-demographic, behavioural, and health-risk indicators in adults. *International Journal of Environmental Research and Public Health*, 16(13). <https://doi.org/10.3390/ijerph16132375>
- Palan, S., & Schitter, C. (2018). Prolific.ac—A subject pool for online experiments. *Journal of Behavioral and Experimental Finance*, 17. <https://doi.org/10.1016/j.jbef.2017.12.004>
- Palumbo, R. (2020). Let me go to the office! An investigation into the side effects of working from home on work-life balance. *International Journal of Public Sector Management*, 33(6–7). <https://doi.org/10.1108/IJPSM-06-2020-0150>
- Panayides, P. (2013). Coefficient alpha: Interpret with caution. *Europe’s Journal of Psychology*, 9(4). <https://doi.org/10.5964/ejop.v9i4.653>
- Park, H. S., Dailey, R., & Lemus, D. (2002). The Use of Exploratory Factor Analysis and Principal Components Analysis in Communication Research. In *Human Communication Research* (Vol. 28, Issue 4). <https://doi.org/10.1093/hcr/28.4.562>
- Park, S., Sung, E., Choi, Y., Ryu, S., Chang, Y., & Gittelsohn, J. (2017). Sociocultural Factors Influencing Eating Practices Among Office Workers in Urban South Korea. *Journal of Nutrition Education and Behavior*, 49(6), 466-474.e1. <https://doi.org/https://doi.org/10.1016/j.jneb.2017.02.005>
- Park, Y. A., Liu, Y., & Headrick, L. (2020). When work is wanted after hours: Testing weekly stress of information communication technology demands using boundary theory. *Journal of Organizational Behavior*, 41(6). <https://doi.org/10.1002/job.2461>
- Parker, S. K., Knight, C., & Keller, A. (2020). Remote Managers Are Having Trust Issues. *Change Management*, 1(1).
- Parker, S. K., Williams, H. M., & Turner, N. (2006). Modeling the antecedents of proactive behavior at work. *Journal of Applied Psychology*, 91(3). <https://doi.org/10.1037/0021-9010.91.3.636>
- Parry, S., & Straker, L. (2013). The contribution of office work to sedentary behaviour associated risk. *BMC Public Health*, 13(1), 296. <https://doi.org/10.1186/1471-2458-13-296>
- Pate, R. R., O’Neill, J. R., & Lobelo, F. (2008). The evolving definition of “sedentary.” In *Exercise and Sport Sciences Reviews* (Vol. 36, Issue 4). <https://doi.org/10.1097/JES.0b013e3181877d1a>

- Patomäki, H., & Morgan, J. (2023). World politics, critical realism and the future of humanity: an interview with Heikki Patomäki, Part 2. *Journal of Critical Realism*, 22(4). <https://doi.org/10.1080/14767430.2023.2188541>
- Paulhus, D. (2002). Socially desirable responding: The evolution of a construct. In *The role of constructs in psychological and ...* (Issue 1958).
- Pavey, L., & Churchill, S. (2014). Promoting the avoidance of high-calorie snacks: Priming autonomy moderates message framing effects. *PLoS ONE*, 9(7). <https://doi.org/10.1371/journal.pone.0103892>
- Payne, J., Cluff, L., Lang, J., Matson-Koffman, D., & Morgan-Lopez, A. (2018). Elements of a Workplace Culture of Health, Perceived Organizational Support for Health, and Lifestyle Risk. *American Journal of Health Promotion*, 32(7), 1555–1567. <https://doi.org/10.1177/0890117118758235>
- Payne, N., Jones, F., & Harris, P. (2012). Employees' perceptions of the impact of work on health behaviours. *Journal of Health Psychology*, 18(7), 887–899. <https://doi.org/10.1177/1359105312446772>
- Pejtersen, J. H., Kristensen, T. S., Borg, V., & Bjorner, J. B. (2010). The second version of the Copenhagen Psychosocial Questionnaire. *Scandinavian Journal of Public Health*, 38(SUPPL. 3). <https://doi.org/10.1177/1403494809349858>
- Perlow, L. A. (2012). *Sleeping with your smartphone: How to break the 24/7 habit and change the way you work*. Harvard Business Press.
- Perski, O., & Short, C. E. (2021). Acceptability of digital health interventions: embracing the complexity. In *Translational Behavioral Medicine* (Vol. 11, Issue 7). <https://doi.org/10.1093/tbm/ibab048>
- Phillips, S. (2020). Working through the pandemic: Accelerating the transition to remote working. In *Business Information Review* (Vol. 37, Issue 3). <https://doi.org/10.1177/0266382120953087>
- Pianese, T., Errichiello, L., & da Cunha, J. V. (2022). Organizational control in the context of remote working: A synthesis of empirical findings and a research agenda. *European Management Review*. <https://doi.org/10.1111/emre.12515>
- Pieper, C., Schröer, S., & Eilerts, A. L. (2019). Evidence of workplace interventions-A systematic review of systematic reviews. In *International Journal of Environmental Research and Public Health* (Vol. 16, Issue 19). <https://doi.org/10.3390/ijerph16193553>
- Pons, P., & Latapy, M. (2006). Computing communities in large networks using random walks. *Journal of Graph Algorithms and Applications*, 10(2). <https://doi.org/10.7155/jgaa.00124>
- Popovici, V., & Popovici, A. L. (2020). Remote work revolution: Current opportunities and challenges for organizations. *Ovidius University Annals: Economic Sciences Series*, XX(1).
- Prince, S. A., Elliott, C. G., Scott, K., Visintini, S., & Reed, J. L. (2019). Device-measured physical activity, sedentary behaviour and cardiometabolic health and fitness across occupational groups: a systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 16(1), 30. <https://doi.org/10.1186/s12966-019-0790-9>
- Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., Griffey, R., & Hensley, M. (2011). Outcomes for implementation research: Conceptual distinctions, measurement

- challenges, and research agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, 38(2). <https://doi.org/10.1007/s10488-010-0319-7>
- Pyöriä, P. (2005). The concept of knowledge work revisited. *Journal of Knowledge Management*, 9(3). <https://doi.org/10.1108/13673270510602818>
- Quante, M., Khandpur, N., Kontos, E. Z., Bakker, J. P., Owens, J. A., & Redline, S. (2019). A Qualitative Assessment of the Acceptability of Smartphone Applications for Improving Sleep Behaviors in Low-Income and Minority Adolescents. *Behavioral Sleep Medicine*, 17(5). <https://doi.org/10.1080/15402002.2018.1432483>
- Querstret, D., & Cropley, M. (2012). Exploring the relationship between work-related rumination, sleep quality, and work-related fatigue. *Journal of Occupational Health Psychology*, 17(3). <https://doi.org/10.1037/a0028552>
- R Core Team. (2021). R core team (2021). In *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org>.
- Ramsden, H. (2017). Walking & talking: making strange encounters within the familiar. *Social & Cultural Geography*, 18(1). <https://doi.org/10.1080/14649365.2016.1174284>
- Rapisarda, V., Loreto, C., De Angelis, L., Simoncelli, G., Lombardo, C., Resina, R., Mucci, N., Matarazzo, A., Vimercati, L., & Ledda, C. (2021). Home working and physical activity during SARS-CoV-2 pandemic: A longitudinal cohort study. *International Journal of Environmental Research and Public Health*, 18(24). <https://doi.org/10.3390/ijerph182413021>
- Ráthonyi, G., Kósa, K., Bács, Z., Ráthonyi-Ódor, K., Füzesi, I., Lengyel, P., & Bácsné Bába, É. (2021). Changes in Workers' Physical Activity and Sedentary Behavior during the COVID-19 Pandemic. *Sustainability*, 13(9524).
- Raubenheimer, J. (2004). An item selection procedure to maximise scale reliability and validity. *SA Journal of Industrial Psychology*, 30(4). <https://doi.org/10.4102/sajip.v30i4.168>
- Reuschke, D. (2019). The subjective well-being of homeworkers across life domains. *Environment and Planning A*, 51(6). <https://doi.org/10.1177/0308518X19842583>
- Rice, V. H. (2002). Theories of stress and it's relationship to health. In *Handbook of stress, coping, and health: implications for nursing research, theory, and practice*.
- Robinaugh, D. J., Millner, A. J., & McNally, R. J. (2016). Identifying highly influential nodes in the complicated grief network. *Journal of Abnormal Psychology*, 125(6). <https://doi.org/10.1037/abn0000181>
- Rodriguez, F. S., Luck, T., & Riedel-Heller, S. G. (2018). Enriched environment at work: Disassociated from stress and burnout. *Work*, 60(1). <https://doi.org/10.3233/WOR-182722>
- Roemer, A., & Harris, C. (2018). Perceived organisational support and well-being: The role of psychological capital as a mediator. *SA Journal of Industrial Psychology*, 44. <https://doi.org/10.4102/sajip.v44i0.1539>
- Rollo, S., Gaston, A., & Prapavessis, H. (2016). Cognitive and Motivational Factors Associated with Sedentary Behavior: A Systematic Review. *AIMS Public Health*, 3(4), 956–984.

- Rothbard, N. P., Beetz, A. M., & Harari, D. (2021). Balancing the Scales: A Configurational Approach to Work-Life Balance. In *Annual Review of Organizational Psychology and Organizational Behavior* (Vol. 8). <https://doi.org/10.1146/annurev-orgpsych-012420-061833>
- Rothmann, S. (2008). Job satisfaction, occupational stress, burnout and work engagement as components of work-related wellbeing. *SA Journal of Industrial Psychology*, *34*(3). <https://doi.org/10.4102/sajip.v34i3.424>
- Rudnicka, A., Cook, D., Cecchinato, M. E., Gould, S. J. J., Newbold, J. W., & Cox, A. L. (2022). The end of the active work break? Remote work, sedentariness and the role of technology in creating active break-taking norms. *ACM International Conference Proceeding Series*. <https://doi.org/10.1145/3533406.3533409>
- Rudnicka, A., Newbold, J. W., Cook, D., Cecchinato, M. E., Gould, S. J. J., & Cox, A. L. (2020). Eworklife: developing effective strategies for remote working during the COVID-19 pandemic. *Social Sciences Research* .
- Rupietta, K., & Beckmann, M. (2018). Working from Home: What is the Effect on Employees' Effort? *Schmalenbach Business Review*, *70*(1). <https://doi.org/10.1007/s41464-017-0043-x>
- Ryan, C. G., Dall, P. M., Granat, M. H., & Grant, P. M. (2011). Sitting patterns at work: objective measurement of adherence to current recommendations. *Ergonomics*, *54*(6), 531–538. <https://doi.org/10.1080/00140139.2011.570458>
- Ryde, G. C., Brown, H. E., Gilson, N. D., & Brown, W. J. (2014). Are We Chained to Our Desks? Describing Desk-Based Sitting Using a Novel Measure of Occupational Sitting. *Journal of Physical Activity and Health*, *11*(7), 1318–1323. <https://doi.org/10.1123/jpah.2012-0480>
- Ryff, C. D. (2013). Psychological well-being revisited: Advances in the science and practice of eudaimonia. *Psychotherapy and Psychosomatics*, *83*(1). <https://doi.org/10.1159/000353263>
- Ryff, C. D., Boylan, J. M., & Kirsch, J. A. (2021). Eudaimonic and Hedonic Well-Being. In *Measuring Well-Being*. <https://doi.org/10.1093/oso/9780197512531.003.0005>
- Sanbonmatsu, D. M., Cooley, E. H., & Butner, J. E. (2021). The Impact of Complexity on Methods and Findings in Psychological Science. In *Frontiers in Psychology* (Vol. 11). <https://doi.org/10.3389/fpsyg.2020.580111>
- Sarbu, M. (2018). The role of telecommuting for work-family conflict among German employees. *Research in Transportation Economics*, *70*. <https://doi.org/10.1016/j.retrec.2018.07.009>
- Sarda, B., Delamaire, C., Serry, A. J., & Ducrot, P. (2022). Changes in home cooking and culinary practices among the French population during the COVID-19 lockdown. *Appetite*, *168*. <https://doi.org/10.1016/j.appet.2021.105743>
- Sardeshmukh, S. R., Sharma, D., & Golden, T. D. (2012). Impact of telework on exhaustion and job engagement: A job demands and job resources model. *New Technology, Work and Employment*, *27*(3). <https://doi.org/10.1111/j.1468-005X.2012.00284.x>
- Sattler, M. C., Jaunig, J., Tösch, C., Watson, E. D., Mokkink, L. B., Dietz, P., & van Poppel, M. N. M. (2020). Current Evidence of Measurement Properties of Physical Activity Questionnaires for Older Adults: An Updated Systematic Review. In *Sports Medicine* (Vol. 50, Issue 7). <https://doi.org/10.1007/s40279-020-01268-x>

- Scambler, G. (2018). Sociology, health and the fractured society: A critical realist account. In *Sociology, Health and the Fractured Society: A Critical Realist Account*. <https://doi.org/10.4324/9781315693767>
- Scanlan, J. N., & Hazelton, T. (2019). Relationships between job satisfaction, burnout, professional identity and meaningfulness of work activities for occupational therapists working in mental health. *Australian Occupational Therapy Journal*, 66(5). <https://doi.org/10.1111/1440-1630.12596>
- Schramme, T. (2023). Health as Complete Well-Being: The WHO Definition and Beyond. *Public Health Ethics*. <https://doi.org/10.1093/phe/phad017>
- Schulte, P., & Vainio, H. (2010). Well-being at work - Overview and perspective. In *Scandinavian Journal of Work, Environment and Health* (Vol. 36, Issue 5). <https://doi.org/10.5271/sjweh.3076>
- Schulz, K. F., & Grimes, D. A. (2002). Sample size slippages in randomised trials: Exclusions and the lost and wayward. In *Lancet* (Vol. 359, Issue 9308). [https://doi.org/10.1016/S0140-6736\(02\)07882-0](https://doi.org/10.1016/S0140-6736(02)07882-0)
- Sekhon, M., Cartwright, M., & Francis, J. J. (2017). Acceptability of healthcare interventions: An overview of reviews and development of a theoretical framework. *BMC Health Services Research*, 17(1). <https://doi.org/10.1186/s12913-017-2031-8>
- Shifrin, N. V., & Michel, J. S. (2022). Flexible work arrangements and employee health: A meta-analytic review. In *Work and Stress* (Vol. 36, Issue 1). <https://doi.org/10.1080/02678373.2021.1936287>
- Shockley, K. M., Gabriel, A. S., Robertson, D., Rosen, C. C., Chawla, N., Ganster, M. L., & Ezerins, M. E. (2021). The fatiguing effects of camera use in virtual meetings: A within-person field experiment. *Journal of Applied Psychology*, 106(8). <https://doi.org/10.1037/apl0000948>
- Shrestha, N. (2021). Factor Analysis as a Tool for Survey Analysis. *American Journal of Applied Mathematics and Statistics*, 9(1). <https://doi.org/10.12691/ajams-9-1-2>
- Singleton, P. A. (2019). Walking (and cycling) to well-being: Modal and other determinants of subjective well-being during the commute. *Travel Behaviour and Society*, 16. <https://doi.org/10.1016/j.tbs.2018.02.005>
- Sirgy, M. J., & Lee, D. J. (2018). Work-Life Balance: an Integrative Review. In *Applied Research in Quality of Life* (Vol. 13, Issue 1). <https://doi.org/10.1007/s11482-017-9509-8>
- Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., Boyd, K. A., Craig, N., French, D. P., McIntosh, E., Petticrew, M., Rycroft-Malone, J., White, M., & Moore, L. (2021). A new framework for developing and evaluating complex interventions: Update of Medical Research Council guidance. *The BMJ*, 374. <https://doi.org/10.1136/bmj.n2061>
- Šmite, D., Moe, N. B., Klotins, E., & Gonzalez-Huerta, J. (2023). From forced Working-From-Home to voluntary working-from-anywhere: Two revolutions in telework. *Journal of Systems and Software*, 195. <https://doi.org/10.1016/j.jss.2022.111509>
- Smith, B., & McGannon, K. R. (2018). Developing rigor in qualitative research: problems and opportunities within sport and exercise psychology. *International Review of Sport and Exercise Psychology*, 11(1), 101–121. <https://doi.org/10.1080/1750984X.2017.1317357>

- Smith, L., Hamer, M., Ucci, M., Marmot, A., Gardner, B., Sawyer, A., Wardle, J., & Fisher, A. (2015). Weekday and weekend patterns of objectively measured sitting, standing, and stepping in a sample of office-based workers: the active buildings study. *BMC Public Health*, *15*(1), 9. <https://doi.org/10.1186/s12889-014-1338-1>
- Smith, L., McCourt, O., Sawyer, A., Ucci, M., Marmot, A., Wardle, J., & Fisher, A. (2016). A review of occupational physical activity and sedentary behaviour correlates. *Occupational Medicine*, *66*(3), 185–192. <https://doi.org/10.1093/occmed/kqv164>
- Snyder, C. K., & Chang, A. M. (2019). Mobile technology, sleep, and circadian disruption. In *Sleep and Health*. <https://doi.org/10.1016/B978-0-12-815373-4.00013-7>
- Soni, P., & Bakhru, K. M. (2019). Understanding triangulated collaboration of work-life balance, personality traits and eudaimonic well-being. *Problems and Perspectives in Management*, *17*(2). [https://doi.org/10.21511/ppm.17\(2\).2019.05](https://doi.org/10.21511/ppm.17(2).2019.05)
- Sonnentag, S. (2003). Recovery, work engagement, and proactive behavior: A new look at the interface between nonwork and work. *Journal of Applied Psychology*, *88*(3). <https://doi.org/10.1037/0021-9010.88.3.518>
- Sonnentag, S., Kuttler, I., & Fritz, C. (2010). Job stressors, emotional exhaustion, and need for recovery: A multi-source study on the benefits of psychological detachment. *Journal of Vocational Behavior*, *76*(3). <https://doi.org/10.1016/j.jvb.2009.06.005>
- Sostero, M., Milasi, S., Hurley, J., Fernandez-Macias, E., & Bisello, M. (2020). *Teleworkability and the COVID-19 crisis: a new digital divide?* (JRC Working Papers on Labour, Education and Technology, Issues 2020–05). Joint Research Centre (Seville site). <https://EconPapers.repec.org/RePEc:ipt:laedte:202005>
- Spence, J. C., Rhodes, R. E., McCurdy, A., Mangan, A., Hopkins, D., & Mummery, W. K. (2021). Determinants of physical activity among adults in the United Kingdom during the COVID-19 pandemic: The DUK-COVID study. *British Journal of Health Psychology*, *26*(2), 588–605. <https://doi.org/https://doi.org/10.1111/bjhp.12497>
- Srivastava, S. C., Chandra, S., & Shirish, A. (2015). Technostress creators and job outcomes: Theorising the moderating influence of personality traits. *Information Systems Journal*, *25*(4). <https://doi.org/10.1111/isj.12067>
- Steidelmuller, C., Meyer, S. C., & Muller, G. (2020). Home-based telework and presenteeism across europe. *Journal of Occupational and Environmental Medicine*, *62*(12). <https://doi.org/10.1097/JOM.0000000000001992>
- Steward, B. (2001). Health trade-offs in teleworking: An exploratory study of work and health in computer home-based working. *The Indexer*, *22*(3). <https://doi.org/10.3828/indexer.2001.22.3.10>
- Stewart-Brown, S., Tennant, A., Tennant, R., Platt, S., Parkinson, J., & Weich, S. (2009). Internal construct validity of the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS): A Rasch analysis using data from the Scottish Health Education Population Survey. *Health and Quality of Life Outcomes*, *7*. <https://doi.org/10.1186/1477-7525-7-15>
- Stone, A. A., Schwartz, J. E., Neale, J. M., Marco, C. A., Shiffman, S., Hickcox, M., Paty, J., Porter, L. S., & Cruise, L. J. (1998). A comparison of coping assessed by ecological momentary assessment

- and retrospective recall. In *Journal of Personality and Social Psychology* (Vol. 74, Issue 6).
<https://doi.org/10.1037/0022-3514.74.6.1670>
- Stranks, J. (2005). *Stress at Work*. Routledge.
- Suh, A., & Lee, J. (2017). Understanding teleworkers' technostress and its influence on job satisfaction. *Internet Research*, 27(1), 140–159. <https://doi.org/10.1108/IntR-06-2015-0181>
- Sullivan, C., & Lewis, S. (2001). Home-based Telework, Gender, and the Synchronization of Work and Family: Perspectives of Teleworkers and their Co-residents. *Gender, Work & Organization*, 8(2).
<https://doi.org/10.1111/1468-0432.00125>
- Sundler, A. J., Lindberg, E., Nilsson, C., & Palmér, L. (2019). Qualitative thematic analysis based on descriptive phenomenology. *Nursing Open*, 6(3). <https://doi.org/10.1002/nop2.275>
- Sutton-Parker, J. (2021). Determining commuting greenhouse gas emissions abatement achieved by information technology enabled remote working. *Procedia Computer Science*, 191.
<https://doi.org/10.1016/j.procs.2021.07.037>
- Szczuka, Z., Kulis, E., Boberska, M., Banik, A., Siwa, M., Zaleskiewicz, H., Knoll, N., Revenson, T. A., & Luszczynska, A. (2022). Dyadic reciprocal associations between self-efficacy and planning predict sedentary behaviour. *British Journal of Health Psychology*.
<https://doi.org/10.1111/bjhp.12633>
- Tabachnick, B. G., & Fidell, L. S. (2014). Principal Components and Factor Analysis - General Purpose and Description. In *Using Multivariate Statistics*.
- Tahavori, Z. (2015). Teleworking in the National Library and Archives of Iran: Teleworkers' attitudes. *Journal of Librarianship and Information Science*, 47(4).
<https://doi.org/10.1177/0961000614532676>
- Tapsell, L. C. (2017). Dietary behaviour changes to improve nutritional quality and health outcomes ☆ . *Chronic Diseases and Translational Medicine*, 3(3).
<https://doi.org/10.1016/j.cdtm.2017.06.005>
- Tarafdar, M., Cooper, C. L., & Stich, J. F. (2019). The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research. In *Information Systems Journal* (Vol. 29, Issue 1). <https://doi.org/10.1111/isj.12169>
- Tarafdar, M., Tu, Q., & Ragu-Nathan, T. (2010). Impact of technostress on end-user satisfaction and performance. *Journal of Management Information Systems*, 27(3).
<https://doi.org/10.2753/MIS0742-1222270311>
- Tarrasch, R., Laudon, M., & Zisapel, N. (2003). Cross-cultural validation of the Leeds sleep evaluation questionnaire (LSEQ) in insomnia patients. In *Human Psychopharmacology* (Vol. 18, Issue 8).
<https://doi.org/10.1002/hup.534>
- Tavares, A. I. (2017). Telework and health effects review. *International Journal of Healthcare*, 3(2).
<https://doi.org/10.5430/ijh.v3n2p30>
- Taylor, H., Florisson, R., & Hooper, D. (2021, April 13). *Making hybrid working inclusive*. Chartered Management Institute. <https://www.managers.org.uk/wp-content/uploads/2021/10/wf-cmi-making-hybrid-inclusive-policy-brief.pdf>

- Teare, M. D., Dimairo, M., Shephard, N., Hayman, A., Whitehead, A., & Walters, S. J. (2014). Sample size requirements to estimate key design parameters from external pilot randomised controlled trials: A simulation study. *Trials*, *15*(1). <https://doi.org/10.1186/1745-6215-15-264>
- Tejero, L. M. S., Seva, R. R., & Fadrilan-Camacho, V. F. F. (2021). Factors associated with work-life balance and productivity before and during work from home. *Journal of Occupational and Environmental Medicine*, *63*(12). <https://doi.org/10.1097/JOM.0000000000002377>
- ten Broeke, P., Gardner, B., Beckers, D. G. J., Geurts, S. A. E., & Bijleveld, E. (2022). Why do people sit? A framework for targeted behavior change. *Health Psychology Review*, *1*–14. <https://doi.org/10.1080/17437199.2022.2143851>
- ter Hoeven, C. L., & van Zoonen, W. (2015). Flexible work designs and employee well-being: examining the effects of resources and demands. *New Technology, Work and Employment*, *30*(3), 237–255. <https://doi.org/https://doi.org/10.1111/ntwe.12052>
- Thivel, D., Tremblay, A., Genin, P. M., Panahi, S., Rivière, D., & Duclos, M. (2018). Physical Activity, Inactivity, and Sedentary Behaviors: Definitions and Implications in Occupational Health. In *Frontiers in Public Health* (Vol. 6). <https://doi.org/10.3389/fpubh.2018.00288>
- Thøgersen-Ntoumani, C., Loughren, E. A., Taylor, I. M., Duda, J. L., & Fox, K. R. (2014). A step in the right direction? Change in mental well-being and self-reported work performance among physically inactive university employees during a walking intervention. *Mental Health and Physical Activity*, *7*(2). <https://doi.org/10.1016/j.mhpa.2014.06.004>
- Thomas, G. F., King, C. L., Baroni, B., Cook, L., Keitelman, M., Miller, S., & Wardle, A. (2006). Reconceptualizing E-mail overload. In *Journal of Business and Technical Communication* (Vol. 20, Issue 3). <https://doi.org/10.1177/1050651906287253>
- Thorp, A. A., Healy, G. N., Winkler, E., Clark, B. K., Gardiner, P. A., Owen, N., & Dunstan, D. W. (2012). Prolonged sedentary time and physical activity in workplace and non-work contexts: A cross-sectional study of office, customer service and call centre employees. *International Journal of Behavioral Nutrition and Physical Activity*, *9*. <https://doi.org/10.1186/1479-5868-9-128>
- Toker, S., & Melamed, S. (2017). Stress, Recovery, Sleep, and Burnout. In *The Handbook of Stress and Health*. <https://doi.org/10.1002/9781118993811.ch10>
- Toniolo-Barrios, M., & Pitt, L. (2021). Mindfulness and the challenges of working from home in times of crisis. In *Business Horizons* (Vol. 64, Issue 2). <https://doi.org/10.1016/j.bushor.2020.09.004>
- Toscano, F., & Zappalà, S. (2020). Social isolation and stress as predictors of productivity perception and remote work satisfaction during the COVID-19 pandemic: The role of concern about the virus in a moderated double mediation. *Sustainability (Switzerland)*, *12*(23). <https://doi.org/10.3390/su12239804>
- Tourangeau, R., & Yan, T. (2007). Sensitive Questions in Surveys. *Psychological Bulletin*, *133*(5). <https://doi.org/10.1037/0033-2909.133.5.859>
- Tremblay, M. S., Aubert, S., Barnes, J. D., Saunders, T. J., Carson, V., Latimer-Cheung, A. E., Chastin, S. F. M., Altenburg, T. M., Chinapaw, M. J. M., Aminian, S., Arundell, L., Hinkley, T., Hnatiuk, J., Atkin, A. J., Belanger, K., Chaput, J. P., Gunnell, K., Larouche, R., Manyanga, T., ... Wondergem, R. (2017). Sedentary Behavior Research Network (SBRN) - Terminology Consensus Project process

- and outcome. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1).
<https://doi.org/10.1186/s12966-017-0525-8>
- Trizano-Hermosilla, I., & Alvarado, J. M. (2016). Best alternatives to Cronbach's alpha reliability in realistic conditions: Congeneric and asymmetrical measurements. *Frontiers in Psychology*, 7(MAY). <https://doi.org/10.3389/fpsyg.2016.00769>
- Tzaneti, E. E. (2021). *Occupational sitting in forced home office during Covid-19 pandemic : a qualitative study among UT employees*. <http://essay.utwente.nl/85586/>
- Vallacher, R. R., & Wegner, D. M. (1987). What Do People Think They're Doing? Action Identification and Human Behavior. *Psychological Review*, 94(1). <https://doi.org/10.1037/0033-295X.94.1.3>
- Van Der Molen, H. F., Nieuwenhuijsen, K., Frings-Dresen, M. H. W., & De Groene, G. (2020). Work-related psychosocial risk factors for stress-related mental disorders: An updated systematic review and meta-analysis. In *BMJ Open* (Vol. 10, Issue 7). <https://doi.org/10.1136/bmjopen-2019-034849>
- Vander Elst, T., Verhoogen, R., Sercu, M., Van Den Broeck, A., Baillien, E., & Godderis, L. (2017). Not Extent of Telecommuting, but Job Characteristics as Proximal Predictors of Work-Related Well-Being. *Journal of Occupational and Environmental Medicine*, 59(10).
<https://doi.org/10.1097/JOM.0000000000001132>
- Vandevala, T., Pavey, L., Chelidoni, O., Chang, N. F., Creagh-Brown, B., & Cox, A. (2017). Psychological rumination and recovery from work in intensive care professionals: Associations with stress, burnout, depression and health. *Journal of Intensive Care*, 5(1).
<https://doi.org/10.1186/s40560-017-0209-0>
- van't Riet, J., Sijtsema, S. J., Dagevos, H., & de Bruijn, G. J. (2011). The importance of habits in eating behaviour. An overview and recommendations for future research. In *Appetite* (Vol. 57, Issue 3).
<https://doi.org/10.1016/j.appet.2011.07.010>
- Vega, R. P., Anderson, A. J., & Kaplan, S. A. (2015). A Within-Person Examination of the Effects of Telework. *Journal of Business and Psychology*, 30(2). <https://doi.org/10.1007/s10869-014-9359-4>
- Viorel, L., Ionut, C., & Andreea-Oana, E. (2018). Analyzing the Link Between Work Flexibility, Job Satisfaction and Job Performance Among Romanian Employees. *"Ovidius" University Annals, Economic Sciences Series, XVIII(2)*.
- Virick, M., DaSilva, N., & Arrington, K. (2010). Moderators of the curvilinear relation between extent of telecommuting and job and life satisfaction: The role of performance outcome orientation and worker type. *Human Relations*, 63(1). <https://doi.org/10.1177/0018726709349198>
- Virtanen, M., Honkonen, T., Kivimäki, M., Ahola, K., Vahtera, J., Aromaa, A., & Lönnqvist, J. (2007). Work stress, mental health and antidepressant medication findings from the Health 2000 Study. *Journal of Affective Disorders*, 98(3). <https://doi.org/10.1016/j.jad.2006.05.034>
- Wahlström, V., Bergman, F., Öhberg, F., Eskilsson, T., Olsson, T., & Järvholm, L. S. (2019). Effects of a multicomponent physical activity promoting program on sedentary behavior, physical activity and body measures: A longitudinal study in different office types. *Scandinavian Journal of Work, Environment and Health*, 45(5). <https://doi.org/10.5271/sjweh.3808>

- Waizenegger, L., McKenna, B., Cai, W., & Bendz, T. (2020). An affordance perspective of team collaboration and enforced working from home during COVID-19. *European Journal of Information Systems, 29*(4). <https://doi.org/10.1080/0960085X.2020.1800417>
- Walker, L., & Flannery, O. (2020). Office cake culture. *International Journal of Workplace Health Management, 13*(1), 95–115. <https://doi.org/10.1108/IJWHM-03-2019-0039>
- Wang, M. L., Pbert, L., & Lemon, S. C. (2014). Influence of family, friend and coworker social support and social undermining on weight gain prevention among adults. *Obesity, 22*(9), 1973–1980. <https://doi.org/https://doi.org/10.1002/oby.20814>
- Warburton, D. E. R., & Bredin, S. S. D. (2017). Health benefits of physical activity: A systematic review of current systematic reviews. In *Current Opinion in Cardiology* (Vol. 32, Issue 5). <https://doi.org/10.1097/HCO.0000000000000437>
- Warttig, S. L., Forshaw, M. J., South, J., & White, A. K. (2013). New, normative, English-sample data for the Short Form Perceived Stress Scale (PSS-4). *Journal of Health Psychology, 18*(12). <https://doi.org/10.1177/1359105313508346>
- Webb, A. (2023, March 28). *Working from home statistics UK [Updated January 2023] — The Home Office Life*. The Home Office Life. <https://thehomeofficelife.com/blog/work-from-home-statistics>
- Weinert, C., Maier, C., & Laumer, S. (2015). Why are teleworkers stressed? An empirical analysis of the causes of telework-enabled stress. *Proceedings Der 12. Internationalen Tagung Wirtschaftsinformatik*.
- Weis, A. H. (2010). Commercialization of the Internet. In *Internet Research* (Vol. 20, Issue 4). <https://doi.org/10.1108/10662241011059453>
- Wepfer, A. G., Allen, T. D., Brauchli, R., Jenny, G. J., & Bauer, G. F. (2018). Work-Life Boundaries and Well-Being: Does Work-to-Life Integration Impair Well-Being through Lack of Recovery? *Journal of Business and Psychology, 33*(6), 727–740. <https://doi.org/10.1007/s10869-017-9520-y>
- Wheatley, D. (2012). Good to be home? Time-use and satisfaction levels among home-based teleworkers. *New Technology, Work and Employment, 27*(3). <https://doi.org/10.1111/j.1468-005X.2012.00289.x>
- Wilms, P., Schröder, J., Reer, R., & Scheit, L. (2022). The Impact of “Home Office” Work on Physical Activity and Sedentary Behavior during the COVID-19 Pandemic: A Systematic Review. *International Journal of Environmental Research and Public Health, 19*(19). <https://doi.org/10.3390/ijerph191912344>
- Wong, K. P., Lee, F. C. H., Teh, P. L., & Chan, A. H. S. (2021). The interplay of socioecological determinants of work–life balance, subjective wellbeing and employee wellbeing. *International Journal of Environmental Research and Public Health, 18*(9). <https://doi.org/10.3390/ijerph18094525>
- Wood, S., Michaelides, G., Inceoglu, I., Niven, K., Kelleher, A., Hurren, E., & Daniels, K. (2022). Satisfaction with one’s job and working at home in the COVID-19 pandemic: A two-wave study. *Applied Psychology*. <https://doi.org/10.1111/apps.12440>
- Xiao, Y., Becerik-Gerber, B., Lucas, G., & Roll, S. C. (2021). Impacts of Working from Home during COVID-19 Pandemic on Physical and Mental Well-Being of Office Workstation Users. *Journal of*

Occupational and Environmental Medicine, 63(3).
<https://doi.org/10.1097/JOM.0000000000002097>

- Yan, T. (2021). Consequences of asking sensitive questions in surveys. In *Annual Review of Statistics and Its Application* (Vol. 8). <https://doi.org/10.1146/annurev-statistics-040720-033353>
- Yang, D., Kelly, E. L., Kubzansky, L. D., & Berkman, L. (2023). Working from Home and Worker Well-being: New Evidence from Germany. *ILR Review*, 00197939221148716.
<https://doi.org/10.1177/00197939221148716>
- Yardley, L., Morrison, L., Bradbury, K., & Muller, I. (2015). The person-based approach to intervention development: Application to digital health-related behavior change interventions. *Journal of Medical Internet Research*, 17(1). <https://doi.org/10.2196/jmir.4055>
- Yoo, B., Yoo, N. D., & Donthu, N. (2001). Developing a Scale to Measure the Perceived Quality of an Internet Shopping Site (SITEQUAL). In *Quarterly Journal of Electronic Commerce* (Vol. 2, Issue 1).
- Zhao, T., Liu, H., Roeder, K., Lafferty, J., & Wasserman, L. (2012). The huge package for high-dimensional undirected graph estimation in R. *Journal of Machine Learning Research*, 13.
- Zheng, C., Kashi, K., Fan, D., Molineux, J., & Ee, M. S. (2016). Impact of individual coping strategies and organisational work–life balance programmes on Australian employee well-being. *International Journal of Human Resource Management*, 27(5).
<https://doi.org/10.1080/09585192.2015.1020447>
- Zhou, Y. (2019). A Mixed Methods Model of Scale Development and Validation Analysis. *Measurement*, 17(1). <https://doi.org/10.1080/15366367.2018.1479088>

8 Appendices

8.1 Appendix A: Study 1 – Interview schedule

- Topic Guide for Semi-Structured Interview -

COVID-19 Interview Study: Experiences of health behaviour while working from home during the lockdown.

Opening comments / ethics etc.

- Make Sure the phone/video line is responsive and both you and the interviewee can hear each other clearly.
 - Thank participant for agreeing to take part in today's interview.
 - Remind participant of aim of discussion.
 - Reminder of ethics (confidentiality, fine to skip any questions if requested, terminate the interview at any point without reason).
 - If on video call - Tell participant that you may look at the recorder (to check it is recording), or make notes as they talk – this does not mean that you are not listening to the participant.
- Before we continue, do you have any questions relating to this interview?

Warm up / surface experience so far

- When did you first start working from home as part of the Coronavirus restrictions?
 - What does your job mainly involve?
 - Have you worked at home before?
- Home environment – Tell me about your home (Garden/outside space)? / Who do you live with / has this changed since the lockdown?
 - Probe - 'home working' environment...
 - What is your setup and where is this in your house?
- Talk me through a typical lockdown day during the working week – What is your routine and experience so far?
 - How have you found working during the lockdown?
 - Probe: effect on work productivity

- Can you tell me what aspect of the enforced lock down you have found the most difficult and why?

- *If the answer relates to any of the 5 health-related behaviours (HRB) – probe and move on to discussion in Section 1, beginning with this specific health-related behaviour.*
 - *If not, move on and start discussion with first HRB*

Section 1: Health-related behaviours and wellbeing outcomes in a WFH/lockdown environment.

- Physical Activity & Sedentary Behaviour
 - What kind of physical activities do you engage in?
 - Do you take breaks from work?
 - What does this involve? - do you get up / leave your house?
 - What reasons are there for you to get up (from your “desk”) during the working day?
 - Sedentary behaviour – if you were to increase your standing during the day – how would you go about doing this? What would hinder / facilitate this?
 - Have you been able to fit much exercise into your routine since the lockdown (exercise/walking/gardening)?
 - Outdoors (parks nearby?) / Indoors (where in the house?)
 - Governmental daily exercise allocation?
 - Are there any aspects of your home that facilitate / hinder your physical activity?
 - Probe facilitators – Talk me through what helps you stay active?
 - Probe hindrances – how could these be improved?
 - Tell me how your physical activity differs from before the lockdown restrictions?
 - What has changed – how have you adapted?
 - Is it working for you?
 - How so? / Why not?

- Dietary behaviour

- Talk me through what your diet typically looks like during these lockdown circumstances -
 - Have there been any significant changes compared to your typical workday diet?
 - If yes – Tell me more - how does your diet differ?
 - Probe – eating routine / missing meals / snacking / eating location (workstation, kitchen etc.) / dietary content / food shopping restrictions
 - On the whole, do you feel that your eating habits have changed for better or for worse during lockdown?
 - Anything you have attempted to change?

- Alcohol / Smoking (check demographic information)
 - Alcohol?
 - If yes:
 - Now let's discuss your alcohol consumption –
 - Compared to before the lockdown, have you noticed that you have been drinking more or less alcohol?
 - What factors do you personally feel have influenced this increase/decrease?
 - Smoke?
 - If yes:
 - repeat questions above focussing on smoking behaviour.

- Sleep
 - How are you sleeping at the moment, during the lock down that is
 - Probe - any changes since the lockdown?
 - If yes – Tell me more – sleep quality / sleep routine (late nights / lie ins)
 - What factors do you feel specifically are affecting your bed/wake up times or sleep quality?
 - Probe - Worrying / lack of routine / motivation
 - Do you feel the lock down has affected your sleeping for better or for worse?

- Personally - Tell me about the most significant change you have made so far, that is, what do you find you are doing more (or doing less) as a direct result of the lockdown?
 - Tell me how this has changed – deliberately?

- In terms of what we have discussed so far, is there anything that stands out for you that has particularly effected your physical or mental health since working from home during the lockdown?

- If you were tasked with encouraging people to be healthier during the lockdown, what would you suggest?
 - Identify and saturate answer category
 - Any particular changes that have worked well for you?
 - Probe the remaining behaviour topics – but don't force an answer.
 - Physical activity / sedentary behaviour
 - Diet
 - Sleep
 - Alcohol / smoking

- Change in social contact – has this had any specific effect on any of your health-related behaviours – decrease / increase?

Section 2: Public health guideline attitudes and responses.

- Public health guidance / advice exposure
 - Are you aware of any advice or guidance for staying healthy during the lockdown?
 - If yes – (If no – what do you think the experts are recommending?)
 - How did you come across this guidance
 - Did you find any particular piece of advice / guidance helpful?
 - What was particularly helpful/unhelpful about this guidance?
 - If you were to improve this guidance / advice – what would you change and why?
 - Probe delivery method / content
 - With regards to staying healthy during lockdown, have you had any particular questions or queries that have led you to seek advice / guidance?
 - Were you successful in finding guidance?
 - Yes / or no – tell me more

- With regards to health promoting behaviours during lockdown, can you tell me what the general guidance is so far?
 - Where have you acquired this information?
 - What do you think of this advice?
 - Helpful?
 - Do you feel that people will follow this guidance?
 - Why and why not?

- What do you think currently stands in the way of encouraging healthy behaviours during lock down?
 - Probe – home environment / delivery /
- What kind of barriers do you think you would be up against if you were trying to encourage people to engage more in healthier behaviours (e.g. PA, healthy diet, decreased alcohol consumption etc.)?

- Is there anything we haven't discussed today that you would like to add?

Close Interview

8.2 Appendix B: Study 1 – Preliminary ‘code book’

Theme 1 - Changes to social interactions

- Increased homebased social drinking – relating to boredom/decrease in social societal ‘rewards’ (e.g. going out with friends etc.).
- Impact of change in surrounding social eating routines
 - Eating together - Positive social influence on dietary content
 - Planning meals together
 - Sharing cooking = eases responsibility
 - Eating later = increased snacking in between meals
- Removal of social accountability (training with someone) = decreased purposeful PA
- Positive social influence on PA – e.g. instigation/ encouragement / activity sharing / accountability
- Lockdown alleviations allowed for more social contact – seen as a reward – positive influence on wellbeing
- Discontinuation of ad-hoc internal organisational communication
 - Increased internal digital comms
 - Longer working hours
 - (Also Theme 3?)
 - Decreased team based productivity
 - Decreased Workplace informal socialisations
 - Less opportunity for mentoring and networking
 - Negative effect on career progression
 - Increased workload
 - Workload taking priority over positive health behaviour
 - Higher workload = longer sitting periods
 - Ignoring fit bit reminders
 - Quieter days elicit more movement and break taking
 - Natural incidental behaviours that accompanied ad-hoc communications in office
 - Break taking
 - Informal chat (‘human connection time’)
 - Decreased productivity (work type dependent)
- Video & Phone-call behaviour
 - VC Etiquette
 - Video on culture
 - requires sitting at the desk
 - No natural break occurs between meetings (office to meeting room movement)
 - Ambiguity - No instruction for video on or not (could create stress for decision and presentation behaviours may not be clear).
 - Senior staff usually have video on
 - Standing / walking around with the video on perceived as weird
 - Size matters – number of people on the call provokes differing behavioural norms

- Smaller groups = video on - higher engagement
 - Larger groups allows for muted/video off – Lower engagement
 - Informal catch up result in natural tendency and preference for video on
- Video call engagement
 - More important meetings require sat down video on
 - Perceived as the most efficient way to engage with a meeting
 - Less important meetings allow for multitasking
 - Existing aversion to walking meetings
 - Seen as non-productive and impractical (signal / audio) (fine for just listening, e.g. webinars)
 - Too distracting
- Video off
 - Allowing for PA during (e.g. dumb bell exercises)
- Phone-call Behaviour (appears to be similar to video call without the visual element)
 - More important calls are still approached by sitting down and engaging
 - Less important calls are usually accompanied with other tasks
 - Possible to move around (less engagement)
- ‘back to back’ calls (phone/video-calls) = increased sitting time (‘forced to sit’)
 - Frequency of calls sometimes doesn’t even allow for natural breaks, e.g. toilet, getting water, snack etc.
 - Non comparable to the office
 - Video on culture disallows for movement during calls

- Increased social support outreach – to both direct and peripheral social networks.
- Circumstantial Increase in proximal social support –
 - Housemates – felt the benefit of having housemates (even if they were not necessarily friends)

Theme 2 - Changes to the work interface

- WFH Presentation behaviours / signalling
 - New ways of working pose challenges to prove a working presence
 - Being late for a phone/video call may be seen as ‘slacking off’
 - Creates concern of leaving workstation
 - Prolonged sitting / increased homebased presenteeism.
 - ‘Online’ culture
- Temporal working routine changes – working earlier/later
 - Benefits/preference for working earlier and finishing earlier than sleeping more and working late.
- **All** work conducted via computer
 - increased screen time
 - Even during informal comms
 - Though, maintaining such informal connection are seen as important

- no reason or minimised environmental cues to get up – longer sitting hours/less health promoting behaviours (drinking water/standing etc.)
- Increased digital organisational communications
 - Organisational / Internal communication fatigue
 - All actions require communication, but initiating digital comms is much more protracted
 - Difficulty balancing real work with ‘uptick’ in digital meetings
 - Increased communications = longer general working hours
 - Easier to work for longer – No movement from workstation
 - Attempt to ‘protect time’ to get work done
 - End of the day calls are difficult to engage in
 - Adaptations to new frequency of calls
 - Stricter with whether the calls are necessary and shortening them as needed
 - Actively preventing call meetings being back to back
- Lack of environmental change/movement during day = need for activity (e.g. walk, run, PA etc.) outside the home
 - Need for mental transition to separate working day with non-working day (leisure time)
- Less incidental PA (commute / office movement / lunch time etc.)

Theme 2.2 - Organisational response / support

- Organisational responses to incidental adjustments were minimal or non-existent – resulting in difficulty in continuation of work on employee side – stressful + longer working hours.
- Perception that shared circumstances benefit employee and organisational adjustments
 - Everyone in the same boat – good for supporting each other.

Theme 3 – Changes to work-life balance

- NWW - Difficulty in managing time and workload
 - Initial struggle leading to working adjustments
 - Stricter and more mindful of accepting meetings
 - Shortening meeting times
- Incidental increase of time in the day from lockdown circumstance (no commute, socialising etc.)
 - Discontinuation in having a ‘busy’ day (e.g. daily routine simplification)
 - More time for sleep
 - Improved sleep benefitting mood & productivity

- allowing for ad hoc food preparation during the day
 - fresher / healthier ingredients
 - Decreased last minute consumption (take out / ready meals).
 - Less spontaneous social life interference
 - Lack of need for day to day organisation causing negative effects
 - Decrease in thoughtful food prep
 - Increase in snacking
- Opportunity for pre or post work PA
- Switch off time is more important now working and home-life boundaries have melded

Theme 4 - Adaptation to a new physical workspace

- WFH environment –
 - No spontaneous breaks instigated by work colleagues = longer sitting periods
 - Coffee / water / toilet breaks only require room changes at home, whereas office required more steps/movement.
 - Lack of home interruptions = lack of natural cues to drink/eat/stand
 - Can incidentally lead to longer working hours – no natural cue for the day to end (e.g. co-workers leaving)
 - More opportunity to smoke (social, regulatory & proximal influences – e.g. requires less effort to leave building and leave smoke free zone)
 - Increased break taking (+)
 - More smoking(-)
 - Home based environmental cues for eating and drinking
 - Snacking – ease of access – requires minimal effort to get snacks
 - Flip side – if not in house – office snacks more accessible (tuk shop)
 - Drinking water – lack of visual cues –
 - effected by variable bottle size? – Linked with break taking (periodic bottle refills + more water = more toilet breaks).
 - Natural break taking occurs more fluently when transitioning between more significant spaces within the home
 - Lunch breaks experienced as more of a ‘real’ break when changing rooms
 - Purposeful break taking
 - Utilising non work tasks/chores to break workday up (e.g. chores).
- Workstation suitability & Behaviour
 - Non suitable workstation equipment – e.g. chair/desk/monitor/keyboard
 - Alternatives – sofa/bed/non suitable dining room set up
 - Musculoskeletal issues?
 - Aversion to standing desk
 - Increased workstation eating
- Space and transforming spaces
 - PA
 - Lack of space designation leaves initiation of PA difficult

- End of day workstation pack up
 - Reduces visual cues of 'working'
- Need for working day transitions – preparation / closure
 - Change of scenery – 'mental break' + 'clears your head'
 - End of work day
 - Represents end of day (similar to commute home?)
 - Start of working day
- Different spaces for different tasks
 - Perception of how busy the day is determines what space is utilised to complete work
 - Bedroom seen as informal environment for 'quieter' days
 - Different rooms provoke differing beh – e.g. break taking – Bedroom may be further from the kitchen/bathroom – instigates 'more of a break'
 - Negative association with working from bedroom
 - Need for environmental change in the day
 - A non-advisable working environment
- Navigating social spaces whilst working from home
 - Negotiating who uses what space each day based on workload / work type
 - Formal productive setting established and shared
 - Private / confidential work = need for privacy
 - Usually results on bedroom working
 - Conflicting work schedules / work types
 - Space sharing can be distracting

Theme 6 – Personal adjustments & Incurred circumstantial struggles

- Recognition of the need for social proximity – leading to relocation
- Adjusting to new routines
 - Integrating old routines & creating new ones
 - Difficulty of trial and error
 - Getting used to working from home
 - Increased productivity over time
 - Effortful maintenance of sticking to work hours and avoiding working bleed
- Boredom + Inactivity
 - Lack of physical exhaustion from the day = harder to fall asleep
 - Increased snacking & alcohol consumption - need for stimulation / treat
 - Inactivity = Increased sensitivity to caffeine
- WFH & Lockdown = more sedentary
 - Less incidental PA (commute / office movement / lunch time etc.)
 - Reduced reason to leave the house (links to greater need for 'forced' PA)
 - House movement requires minimal effort – everything is just 'a few steps away'
- Increased purposeful exercise
 - Increased daytime opportunity
 - Greater need for PA –

- PA as coping mechanism in response to WFH & lockdown difficulties (linked conflict with need for mental transitions)
 - Running – ‘good for you mentally’
 - PA utilised to break up working day – ‘When needed’
 - Mental health and mood benefits
 - Reduce lethargy
 - Improve/maintains productivity
 - Greater need to ‘force’ oneself to engage in ‘normal’ PA (e.g. daily step count)
 - Loss of daily activity = loss of daily PA > now have to really work hard to attain normal levels of movement (PA / Exercise)
- Increased workload & stress levels = decreased break taking + decreased PA
 - In order to gain time to tackle stressors
 - Decreased enjoyment in PA and preference for eating & rest
- Increased stress / lockdown anxiety,
 - Diet – eating as a coping mechanism
 - Increased snacking (comfort eating)
 - Negative experiences are magnified during lockdown
- Loss of regular activities/hobbies (physical engagement and social connections)
 - Difficult to replicate via digital forms of comms – negative impact on mood/mental health
- Increased sedentary behaviour (lack of movement / stimulus change / going outside)
 - Reduced motivation
 - Work
 - Exercise
 - Become ‘brain tired’
 - Decreased productivity
- Lack of human contact / proximal connection
 - Feelings of isolation
 - Virtual connection is not enough
 - Virtual connection does not replace what was valued
 - Digital communication fatigue – Life in lockdown resulting in all activities involving screens
 - Both formal and informal
 - Increase in headaches

8.3 Appendix C: Study 1 – Excerpt theme (Changes to the work interface) breakdown from final thematic ‘code book’ alongside exemplary quotation.

Changes to the work interface

- **Adjusting to new ways of working - organisational and personal**
 - “And I found it really stressful the first few weeks because of the change, because it was so different to my normal job. And so it felt very odd to do what I was doing . And there seemed to be a lot of admin, and a lot of kind of hoops to jump through at first now into a bit of a pattern. And so I know what to expect.”

- **All work conducted via computer at home**
 - **Eating at workstation**
 - “I think actually I'm probably going slowly back towards my old habits which isn't good. So today, for example, there's no time to stop for lunch. And I ended up with a day where there was and this is my departments fault partly as well. They've got flippin department meeting invited through lunch, which is exactly what they do when we're in work because they argue that everybody's free at lunch time to attend the meetings, sorry, against Athena Swan, and everything else it's unbelievable, but so they put a meeting in my diary from 12 till 14:00. So, where's lunch? So Lunch will be sat here eating it. Whilst I'm on mute listening to The managers talk about what's going on in whatever. So that's not good.”

 - **Increased digital organisational communications**
 - “Oh, my God, it's it's really increased. Oh my god. I would say anything between five and seven calls a day and calls, video calls, Sometimes more. Which is a real spike compared to, you know, normal life and also this week.”
 - **All comms on computer**
 - “So we take all our calls on our laptop, so we always have had headsets on. So if I was standing for like an hour and an hour call, I would have to be holding my laptop, which I guess is not the most comfortable thing”
 - **Organisational or Internal communication fatigue**
 - “I mean, in the work context, I don't really have a choice, do we, you know, we have to, we have to still speak to our colleagues. And although, yeah, perhaps not as much as what we do, but anyway, but we don't have a choice really, we work in a collaborative environment, you can't just not speak to people much as I might like to do that. But I do take a bit more control over my use of it in the evenings. So like, lots of friends wanted to do things and video chat and whatever. And I ended up just saying to a lot of people no, a lot of people yes, as well. But a lot of people no because I was finding myself to be so exhausted by the end of the end of the working day when I spent all day like remembering not to pull faces when people said things because they can see you now, whereas previously, you know, and it's just silly things like that.”
 - **Organisational processes – Protracted**
 - “quite a lot if I would say more meetings now than I would normally do in a day, because it's a lot harder to keep in contact with people. So on a regular day, I have maybe five

daily catch ups, and that are kind of every single day so one, a nine one to 10 one a half 11, One at 5, one at 3, ones at 4 you know, so I think A lot more meetings that are all held pretty much over teams. Yeah. or Skype. I say there is definitely an increased prevalence in using video, like video conferencing. Yeah. and I think there's just more meetings because it's, you can't be ad hoc, like you're in an office. There can't be any ad hoc chats or anything. So everything that you are trying to discuss unless somebody just rings you is a meeting spot in your diary.”

- **Balancing real work with increase in comms ‘work’**
 - “Yeah, so I try to use the first one to two hours, like my kind of focus times get kind of work work done properly. And because I find if I'm on calls, you don't really get time to actually do work-work, so I try to get the first two hours done, allocated just for work.”
- **Meeting fatigue**
 - “So I think I'd say the project that I'm on is quite unique in terms of how busy it was especially at the start. So I think that I guess, one thing to bear in mind I am. It was very full on and I found it quite draining. Especially just call after call and your concentration definitely dwindles, especially towards the end of the day and the bigger calls that you're on, the less attention I notice that I pay. Yeah, being totally candid with you”
- **Headaches / increased screen time**
 - “And normally I find myself really running out of steam getting tired and often starting to get a headache by about five o'clock depending on how heavy the day has been. I also wear glasses and contact lenses as well. And I've really noticed an uptick in headaches since I've been working from home. And I think just because of the solid screen time in place, and normally I'll be in meetings and walking around the office, you know, able to break up my view, I guess a bit more.”
- **Lack of movement – removal of environmental cues for natural break taking**
 - “I think because at home now I've got a 1.5 litre bottle that I know that I need to fill up at least once during the day, so I need to have 1.5 litres minimum. Whereas I think in the office, I would just have to work it through. So I would never carry a bottle that size to work that heavy. Whereas now I'm just downstairs. It's nothing to just pump it out on the desk. So I think my bottles were actually smaller at work. So I had to fill them up more frequently. And also where we'd have a kitchen on every floor and I'd be moving between all different floors of our building for meetings. I was always kind of walking past a kitchen a couple of times a day and almost be a nudge to fill up my bottle. And the kitchens were near the toilets as well. So if you like sorry, a web gross, but yeah, you know, you drink water, you go to the bathroom, and then there's a kitchen to refill. So maybe it's kind of linked to that as well.”

- **Less incidental PA surrounding the working day**
 - “Yes, definitely. Well, I'd say it's less overall. Especially in terms of steps, because I had, you know quite well, I guess a normal sized commute. So my commute is normally about an hour and 20 minutes each way. So naturally there are steps involved in that on public transport. And walking around the office and walking to meetings and walking to get lunch. Yeah. And that's obviously a massive change.”
 - “It's a lot of times sat down I've definitely ? for that over the last few weeks. regardless of the physical Activity outside of nine to five, that i'm doing i do feel like I'm you know I'm sat down more you know just little things like my office that I was in you know the toilet for example is a few hundred metres away and I don't drink tea or coffee or drink a lot of water so I tried, that even just getting up, you know, I'm getting a few hundred steps in and just going to the toilet and whereas obviously here you know the bathrooms right next to my bedroom I don't actually feel like I'm drinking as much yeah and for whatever reason so I do feel like a lot of time sat down because other then to get during make lunch have a snack. You know, what else do I really need to get up and move around for?”
 - **Incidental removal of PA + removal of break taking cues**
 - “I think it's increased, definitely. Because when I'm in office, I tend to walk around more and kind of like bump into people I know and just stop and stop by my, like, friends desks and talk to them. Yeah. And like, you know, you go to the kitchen, you'll bump into someone. If like, I have some free time, I'll pop to the shops. Yeah, or like pop down to the canteen or go and get a tea or coffee or something. And it's like it that takes more time. Whereas when I'm in my house, it's literally in the next room. So yeah, I think definitely taking less breaks now that I'm”
- **Temporal working routine changes**
 - “Right, so I have to admit that I don't start at 9am I usually start a bit later, maybe around 10. And then I also go beyond 5pm if needed, and it has a lot more distractions and breaks than you'd have in the office. And definitely, it hasn't been as productive. So I try to spend most of that time, so speaking roughly 10am and five or half five, working. But yeah, there's loads of interruptions and chatting, checking phones and things like that.”
- **Lack of office environment = mismatch in personal and colleague lunch times**
 - “But what I'm really realising is that by working from home, it has become a problem. Okay. Some of my especially my manager, maybe has a different time. So they basically called me every time I have food in my mouth like it's like a sixth that they have. I just tried to find my lunch break. So when I'm lucky, I usually reserve my time from noon to 1pm to 1.30. But often it happens that either I have a meeting with my team, either my manager contacts me, and so I kind of tried to shift that”
- **Differential colleague working capabilities = shift in 'normal' working hours**
 - “so it varies, so definitely two meetings every week, but I have had up to six with different people. And those meetings aren't necessarily during what I

would deem working hours normal work was because some people aren't able to do those times due to childcare. Yeah. Okay. Meetings might be at like seven in the evening.”

- **Work from home presentation behaviours**
 - **All comms on comp**
 - “I suppose at the moment as well your desk I don't so I don't have a work phone obviously I've got no personal one if anyone needs to contact me urgently. But now that's the only way someone's computer is the only way of someone being able to contact me. I suppose if I feel like I have to be near in case anyone needs something which is silly.”
 - **Expected to not venture too far from computer**
 - “It is difficult because I'm kind of expected to be at my desk working. Okay, I kind of, I'm confined to wherever my computer is.”
 - **Organisational response to online culture – Presenteeism warning**
 - “Ah, yes, it gives me a reminder that Yeah, I've been here quite a long time or, you know, I started quite early or whatever. But then, if I know I have a lot to do, so there's some days that you know, I just need to stuff and I know it's not going to be before ate the day finish. That kind of thing can be a little stressful like, Yeah, I know. Go away now!”
- **Increased internal digital comms**
 - “Yeah. and I think there's just more meetings because it's, you can't be ad hoc, like you're in an office. There can't be any ad hoc chats or anything. So everything that you are trying to discuss unless somebody just rings you is a meeting spot in your diary”
 - **Increased workload affecting health behaviours**
 - “Oh, that's that has increased. Since we all started working from home, I think, as an HR team, actually, we were doing daily catch ups every morning. And then a number of meetings throughout the day. There's been days that have had like three hour meetings like back to back. And it's it's hard because like when you're like, at home, if you don't have like, minute or two in between minutes just to go to the bathroom, it can get really, really distracting.”
 - **Increased sitting**
 - “Yeah, I would say getting up for like refreshments. And, you know, meals and stuff is is one. I think it totally depends on workload, I would say Yeah. If it's lighter, then it's easier for me to get up and walk around. You know, take some time away from the desk, but when it's really full on, I just can't do that. So I say the biggest drivers workload”
 - **Longer working hours**
 - “Good question. It's easier to work longer. I would say. It's easier just to kind of like end up being sitting there for the day. I think it's, it's harder to get some stuff done and I think so for example, we were setting up a process and normally just get all of those people in a room and smash out within about three hours. Whereas this took

days because we were creating something then sharing it then they were reviewing and talked about people and then coming back and it just, I think it makes some things take longer.”

- **‘Back to back calls’**
 - **Effecting eating routines**
 - “This is this is an ongoing thing with my job is that I often get pulled into meetings that span across the day. And I get in back to back phone calls all day. This is just an ongoing struggle to find the time to eat.”
 - **Disallowing for break taking**
 - “Oh, that's that has increased. Since we all started working from home, I think, as an HR team, actually, we were doing daily catch ups every morning. And then a number of meetings throughout the day. There's been days that have had like three hour meetings like back to back. And it's hard because like when you're like, at home, if you don't have like, minute or two in between minutes just to go to the bathroom, it can get really, really distracting.”

8.4 Appendix D: Study 3 – Partial correlation matrix for all observed variables prior to regularisation

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	-0.35**														
3	0.30**	-0.26**													
4	0.03	-0.11*	-0.05												
5	0.04	0.04	0.01	0.10*											
6	-0.09	-0.11*	-0.10*	0.15**	0.30**										
7	-0.02	0.07	0.02	0.21**	0.04	0.11*									
8	-0.02	-0.02	0.21**	0.02	0.02	0.02	-0.30**								
9	0.09*	-0.04	0.17**	-0.10*	0.04	-0.08	-0.13**	0.00							
10	0.04	0.07	0.01	-0.11*	0.00	0.16**	-0.08	0.02	0.12**						
11	0.05	-0.04	0.02	-0.25**	-0.03	-0.02	-0.15**	0.11*	-0.05	0.02					
12	0.03	0.09	0.03	0.03	-0.06	-0.02	-0.01	0.00	-0.01	-0.06	0.06				
13	-0.05	0.07	0.00	-0.04	-0.03	0.02	0.07	0.02	0.08	0.16**	-0.15**	0.01			
14	-0.03	0.01	0.05	-0.11*	0.07	0.00	-0.05	0.02	-0.02	0.01	0.19**	0.21**	0.03		
15	-0.03	-0.10*	-0.07	-0.06	0.07	-0.07	0.00	0.00	0.06	0.01	0.07	0.24**	-0.05	0.16**	
16	-0.01	0.00	0.01	0.02	0.12**	-0.12*	0.01	0.03	-0.03	0.07	0.01	-0.23**	0.34**	-0.04	-0.27**
17	0.08	0.07	0.08	0.07	-0.04	-0.03	0.01	-0.08	-0.07	-0.02	0.14**	0.00	0.05	0.07	0.14**
18	-0.02	0.00	0.05	0.00	-0.04	0.08	0.01	-0.03	-0.04	0.09*	-0.07	0.06	0.03	-0.15**	-0.03
19	-0.03	-0.01	-0.06	-0.10*	-0.04	-0.01	0.00	0.08	-0.05	-0.02	0.02	0.11*	0.01	0.19	0.08
20	-0.01	-0.05	-0.03	-0.13**	0.08	-0.12*	0.04	-0.01	-0.04	0.00	0.03	-0.01	0.04	-0.08	-0.11*
21	0.04	0.07	-0.03	0.08	-0.04	0.04	-0.02	0.06	0.01	0.05	-0.02	0.01	-0.01	0.07	0.04
22	-0.09*	-0.08	0.01	-0.05	0.00	-0.09	-0.02	0.03	-0.10*	0.03	0.03	0.02	-0.02	-0.07	-0.04
23	0.10*	0.10*	-0.09*	-0.01	-0.03	0.04	0.10*	0.07	0.10*	0.07	-0.05	0.04	-0.09	0.02	0.01
24	-0.06	-0.06	0.01	0.02	0.00	0.05	0.14**	-0.01	0.05	-0.14**	0.00	-0.03	-0.01	0.02	0.01
25	0.05	-0.06	0.09	-0.03	0.05	-0.04	-0.10*	-0.04	-0.04	-0.02	0.01	-0.07	0.06	0.03	-0.06
26	0.03	0.01	-0.02	-0.01	-0.06	-0.07	-0.10*	0.03	-0.04	0.08	0.06	-0.02	-0.01	0.04	0.02
27	-0.05	0.02	0.05	-0.06	-0.02	0.05	0.01	-0.09	0.02	-0.10*	0.04	0.08	0.03	0.07	0.00
28	-0.02	0.08	-0.02	-0.04	0.13**	-0.04	0.01	0.05	0.07	0.07	-0.02	-0.12**	-0.07	-0.12*	0.06
29	0.04	0.01	-0.07	0.01	0.02	-0.07	0.03	0.02	-0.02	0.04	0.05	0.01	0.03	0.02	-0.05

Partial correlation matrix for all observed variables prior to regularisation (continued)

	16	17	18	19	20	21	22	23	24	25	26	27	28
16													
17	-0.15**												
18	0.11*	-0.03											
19	-0.05	0.07	-0.05										
20	-0.16**	0.04	0.09*	0.00									
21	0.02	0.01	-0.02	0.02	0.23**								
22	-0.06	0.08	0.11*	-0.01	-0.03	0.22**							
23	0.08	-0.05	0.11*	0.01	0.33**	0.03	0.19**						
24	-0.02	-0.01	-0.08	-0.03	-0.03	-0.01	-0.01	0.00					
25	-0.06	-0.05	0.06	0.04	-0.06	-0.03	0.02	-0.06	0.04				
26	0.04	0.02	0.05	-0.06	0.04	-0.05	-0.05	-0.10*	0.30**	0.12**			
27	0.01	0.08	-0.04	-0.06	-0.05	0.02	-0.06	0.03	-0.05	-0.04	0.08		
28	0.01	-0.08	-0.09*	0.11*	-0.10*	-0.01	0.04	-0.06	-0.04	0.01	0.04	0.04	
29	0.04	0.02	0.06	0.07	-0.02	0.04	-0.01	0.01	0.00	-0.07	-0.02	-0.03	0.47**

Note. 1= Pressure to work at same time as colleagues; 2 = Homeworking autonomy; 3 = Pressure to attend meetings; 4 = Ability to switch off from work; 5 = Freedom to transition between home and working environments; 6 = Ability to transform workspaces; 7 = Daily workload manageability; 8 = Perceived excess of daily work meetings; 9 = Video on / off pressure; 10 = Work-day planning & organisation; 11 = Work life conflict; 12 = Cognitive stress; 13 = Job satisfaction; 14 = Burnout; 15 = Stress; 16 = General wellbeing; 17 = Isolation; 18 = Self-rated health; 19 = Sleep trouble; 20 = Vigorous exercise; 21 = Moderate exercise; 22 = Walking; 23 = Work time physical activity; 24 = Overall sedentary behaviour; 25 = Break taking; 26 = Work time sedentary behaviour; 27 = Snacking; 28 = Age; 29 = Job tenure; P values <0.05 = *; P values <0.01 = **.

8.5 Appendix E: Study 3 – Bivariate correlation matrix for all observed variables prior to regularisation

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	-0.54**														
3	0.56**	-0.52**													
4	-0.14**	0.06	-0.23**												
5	-0.08	0.07	-0.13**	0.3**											
6	-0.21**	0.09	-0.26**	0.41**	0.4**										
7	-0.27**	0.24**	-0.34**	0.52**	0.25**	0.38**									
8	0.21**	-0.2**	0.34**	-0.29**	-0.1*	-0.2**	-0.48**								
9	0.27**	-0.2**	0.32**	-0.22**	-0.04	-0.18**	-0.27**	0.19**							
10	-0.03	0.11*	-0.04	-0.04	0.1*	0.13**	-0.02	0.06	0.14**						
11	0.26**	-0.22**	0.31**	-0.56**	-0.27**	-0.37**	-0.54**	0.36**	0.13**	-0.11*					
12	0.15**	-0.09*	0.17**	-0.35**	-0.27**	-0.26**	-0.32**	0.17**	0.05	-0.22**	0.5**				
13	-0.2**	0.21**	-0.17**	0.21**	0.15**	0.18**	0.27**	-0.13**	0	0.29**	-0.41**	-0.38**			
14	0.17**	-0.14**	0.24**	-0.47**	-0.21**	-0.29**	-0.42**	0.26**	0.1*	-0.16**	0.61**	0.61**	-0.35**		
15	0.17**	-0.17**	0.18**	-0.39**	-0.21**	-0.28**	-0.36**	0.2**	0.11*	-0.2**	0.54**	0.64**	-0.44**	0.62**	
16	-0.17**	0.17**	-0.17**	0.33**	0.27**	0.21**	0.31**	-0.14**	-0.05	0.28**	-0.48**	-0.62**	0.57**	-0.54**	-0.66**
17	0.18**	-0.11*	0.19**	-0.25**	-0.22**	-0.23**	-0.24**	0.09	0	-0.18**	0.44**	0.43**	-0.29**	0.45**	0.49**
18	-0.11*	0.1*	-0.11*	0.22**	0.1*	0.2**	0.23**	-0.13**	-0.08	0.22**	-0.35**	-0.28**	0.27**	-0.41**	-0.37**
19	0.05	-0.04	0.07	-0.37**	-0.19**	-0.23**	-0.3**	0.22**	0.03	-0.11*	0.41**	0.44**	-0.26**	0.5**	0.46**
20	-0.01	0.05	-0.07	-0.08	-0.02	-0.06	0.05	-0.01	-0.04	0.05	-0.01	0.02	0	-0.07	-0.07
21	-0.02	0.09	-0.07	-0.01	-0.04	0	-0.02	0.07	-0.03	0.07	0.03	0.08	-0.03	0.06	0.05
22	-0.05	0.01	-0.03	-0.06	-0.07	-0.07	-0.04	0.06	-0.08	0.06	0.04	0.04	-0.05	-0.03	-0.01
23	-0.05	0.16**	-0.17**	0.07	0.03	0.09	0.18**	-0.03	0	0.14**	-0.16**	-0.06	0.06	-0.15**	-0.14**
24	-0.01	-0.08	0.02	0.07	0.01	0.04	0.1*	-0.06	-0.01	-0.18**	0	-0.01	-0.04	0.03	0.03
25	0.18**	-0.2**	0.23**	-0.1*	-0.02	-0.1*	-0.19**	0.08	0.06	-0.02	0.11*	-0.02	-0.02	0.07	0.01
26	0.11*	-0.1*	0.14**	-0.18**	-0.13**	-0.18**	-0.23**	0.12**	0.06	0	0.22**	0.08	-0.08	0.17**	0.13**
27	0.01	0	0.06	-0.15**	-0.09*	-0.06	-0.08	-0.02	0.03	-0.14**	0.18**	0.22**	-0.1*	0.23**	0.2**
28	-0.11*	0.16**	-0.13**	0.02	0.18**	0.02	0.03	0.04	0.05	0.16**	-0.1*	-0.22**	0.07	-0.16**	-0.1*
29	-0.08	0.15**	-0.14**	0.01	0.1*	-0.02	0.04	0.03	0	0.15**	-0.05	-0.13**	0.1*	-0.09	-0.1*

Bivariate correlation matrix for all observed variables prior to regularisation (continued)

	16	17	18	19	20	21	22	23	24	25	26	27	28
16													
17	-0.49**												
18	0.36**	-0.27**											
19	-0.41**	0.33**	-0.29**										
20	-0.06	0.02	0.17**	-0.02									
21	-0.06	0.06	0.04	0.06	0.29**								
22	-0.05	0.06	0.14**	0.02	0.17**	0.27**							
23	0.12**	-0.12**	0.25**	-0.08	0.4**	0.2**	0.25**						
24	-0.04	0.02	-0.11*	-0.04	-0.08	-0.08	-0.09	-0.11*					
25	-0.04	0	-0.01	0.03	-0.1*	-0.1*	-0.03	-0.17**	0.09				
26	-0.08	0.11*	-0.09*	0.05	-0.06	-0.09*	-0.09*	-0.2**	0.28**	0.2**			
27	-0.17**	0.2**	-0.15**	0.09*	-0.06	0	-0.07	-0.07	0	-0.03	0.1*		
28	0.18**	-0.18**	-0.02	0.04	-0.15**	-0.03	-0.01	-0.06	-0.06	-0.03	0	-0.04	
29	0.16**	-0.09*	0.05	0.07	-0.05	0.04	0.02	0.02	-0.07	-0.09*	-0.04	-0.06	0.52**

Note. 1= Pressure to work at same time as colleagues; 2 = Homeworking autonomy; 3 = Pressure to attend meetings; 4 = Ability to switch off from work; 5 = Freedom to transition between home and working environments; 6 = Ability to transform workspaces; 7 = Daily workload manageability; 8 = Perceived excess of daily work meetings; 9 = Video on / off pressure; 10 = Work-day planning & organisation; 11 = Work life conflict; 12 = Cognitive stress; 13 = Job satisfaction; 14 = Burnout; 15 = Stress; 16 = General wellbeing; 17 = Isolation; 18 = Self-rated health; 19 = Sleep trouble; 20 = Vigorous exercise; 21 = Moderate exercise; 22 = Walking; 23 = Work time physical activity; 24 = Overall sedentary behaviour; 25 = Break taking; 26 = Work time sedentary behaviour; 27 = Snacking; 28 = Age; 29 = Job tenure.

8.6 Appendix F: Study 3 – Supplementary materials

8.6.1 Supplementary table 1 (ST1)

Participant Characteristics (N = 491)

Demographic variable	<i>n</i>	%	M	SD
Age (years)	491	100	36.59	10.40
Gender				
Female	272	55.40		
Male	218	44.40		
Non-Binary	1	0.20		
Cohabitation				
Live with others	429	87.37		
Live on own	62	12.63		
Ethnicity				
White - English, Welsh, Scottish, Northern Irish	422	85.95		
Asian/Asian British - Pakistani	13	2.65		
Black, African, Caribbean or Black British	12	2.44		
Asian/Asian British – Indian	11	2.24		
Asian/Asian British – Chinese	8	1.63		
Any other Asian background	6	1.22		
All other ethnicities*	14	3.87		
Occupational Industry				
Finance and Insurance	68	13.85		
Government and Public Administration	54	11.00		
Health Care and Social Assistance	47	9.57		
College, University, and Adult Education	46	9.37		
Information Services and Data Processing	38	7.74		
Manufacturing	23	4.68		
Telecommunications	21	4.28		
Arts, Entertainment, and Recreation	20	4.07		
Software	20	4.07		
All other industries*	154	31.37		
Days worked per week	491	100	5.02	0.40
Job tenure (years)	491	100	5.28	4.98

8.6.2 Supplementary table 2 (ST2)

Itemised and numbered breakdown of measured home-working responses, work-related wellbeing, health, health behaviour, and demographic items

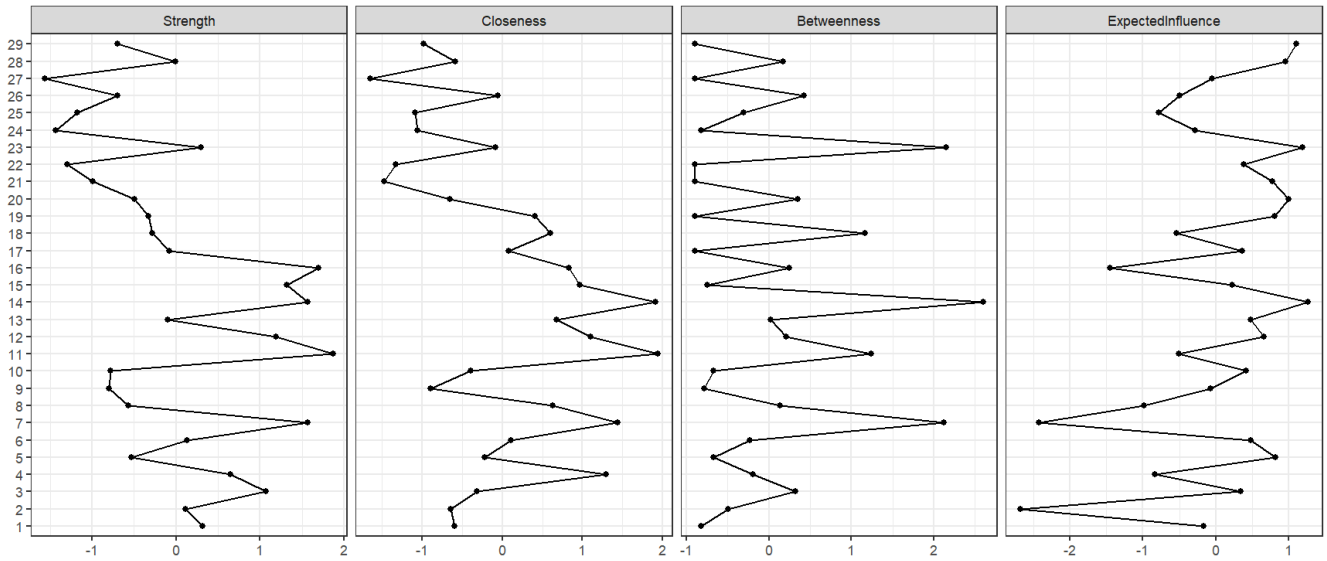
V#	Measure	Mean	Std. Deviation	Pre Npn		Post Npn	
				Skewness	Kurtosis	Skewness	Kurtosis
<i>Home-working responses</i>							
1	Perceived pressure to work at same time as colleagues	4.60	1.50	-0.44	-0.48	-0.04	-0.36
2	Perceived home-working autonomy	3.84	1.54	0.01	-0.77	-0.03	-0.36
3	Perceived pressure to attend meetings	5.06	1.25	-0.62	0.27	-0.06	-0.44
4	Perceived ability to switch off from work	4.27	1.48	-0.13	-0.79	0.03	-0.46
5	Perceived freedom to transition between home & working environments	5.07	1.91	-0.83	-0.56	0.04	-0.39
6	Perceived ability to transform workspaces	4.72	1.71	-0.41	-0.87	-0.27	-0.87
7	Perceived daily workload manageability	4.39	1.52	-0.28	-0.83	-0.10	-0.40
8	Perceived excess of daily meetings	3.68	1.79	0.18	-1.18	0.06	-0.60
9	Perceived 'video-on' pressure in meetings	4.05	1.68	-0.19	-1.00	-0.14	-0.61
10	Workday planning and organisation	4.18	1.48	-0.20	-0.64	-0.02	-0.42
<i>Work-related wellbeing</i>							
11	Work life conflict	28.41	24.90	0.70	-0.21	0.31	-0.59
12	Cognitive stress	35.81	21.93	0.26	-0.61	0.10	-0.39
13	Job satisfaction	64.00	24.67	-0.81	0.16	-0.20	-0.15
14	Burnout	46.79	24.09	0.03	-0.69	0.00	-0.34
15	Stress	6.73	3.09	0.08	-0.25	0.00	-0.21
16	General wellbeing	21.38	3.45	0.73	0.80	0.01	-0.19
17	Isolation	5.24	1.87	0.44	-0.82	0.26	-0.88
<i>Health & Health behaviours</i>							
18	Self-rated health	56.01	23.68	-0.14	-0.44	-0.06	-0.29
19	Sleep trouble	36.00	23.90	0.49	-0.49	0.09	-0.44
20	Vigorous exercise	677.31	1108.25	2.40	7.11	0.89	-0.29
21	Moderate exercise	273.18	484.95	2.53	6.93	0.94	-0.21
22	Walking	613.75	684.18	2.17	6.03	0.21	-0.52
23	Work time physical activity	2.91	1.77	0.52	-1.10	0.35	-0.71
24	Total sedentary behaviour	8.91	1.83	0.20	0.33	-0.07	-0.26
25	Break taking frequency	82.97	50.36	0.73	-0.44	-0.15	-0.66
26	Work time sedentary behaviour	7.64	2.20	1.82	7.55	0.02	-0.03
27	Snacking	11.54	7.75	0.59	-0.56	-0.07	-0.44
<i>Demographics</i>							
28	Age	36.59	10.41	0.78	-0.12	0.01	-0.17

V#	Measure	Mean	Std. Deviation	Pre Npn		Post Npn	
				Skewness	Kurtosis	Skewness	Kurtosis
29	Job tenure	5.28	4.98	1.57	2.64	0.19	-0.45

Note. V# = Variable network number; Npn = Non-parametric transformation.

8.6.3 Supplementary figure 1 (SF1)

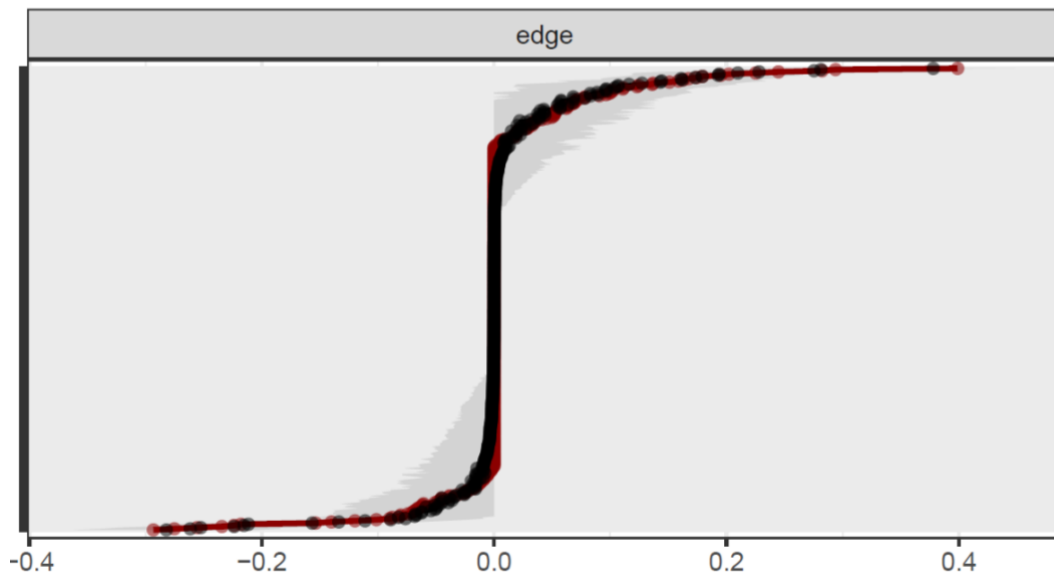
Standardised Z-scores for node centrality indices – Strength, Closeness, Betweenness, & Expected Influence.



8.6.4 Supplementary figure 2 (SF2)

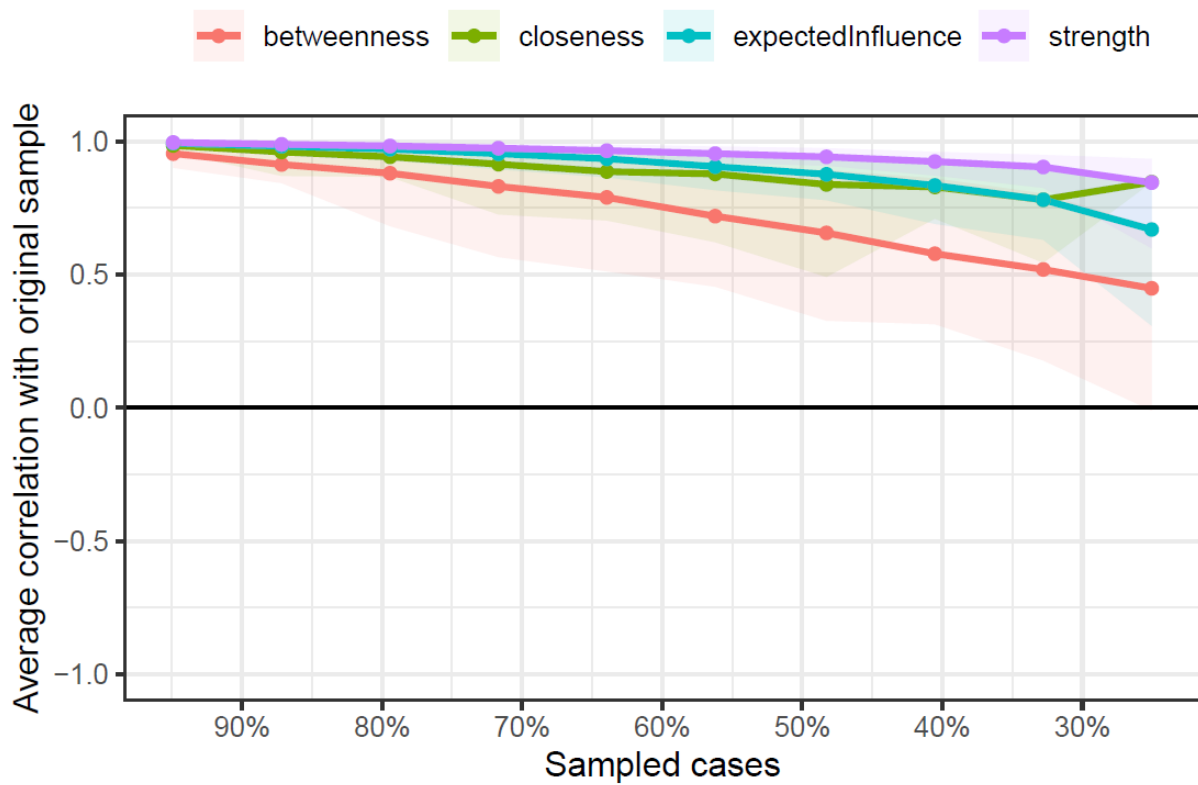
Bootstrapped (2000) edge weight accuracy.

● Bootstrap mean ● Sample



8.6.5 Supplementary figure 3 (SF3)

Bootstrapped (2000) centrality stability: Strength, closeness, betweenness, expected

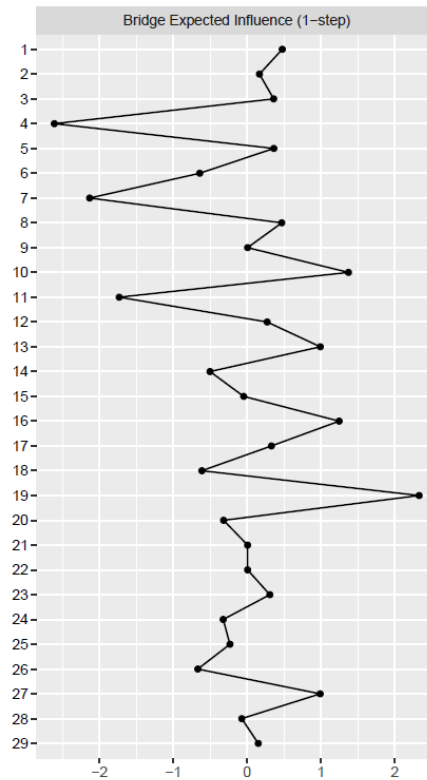


influence.

Note. Maximum drop proportions to retain correlation of 0.7 in at least 95% of the samples:
Betweenness: 0.216, Closeness: 0.128, Expected Influence: 0.595, Strength: 0.672.

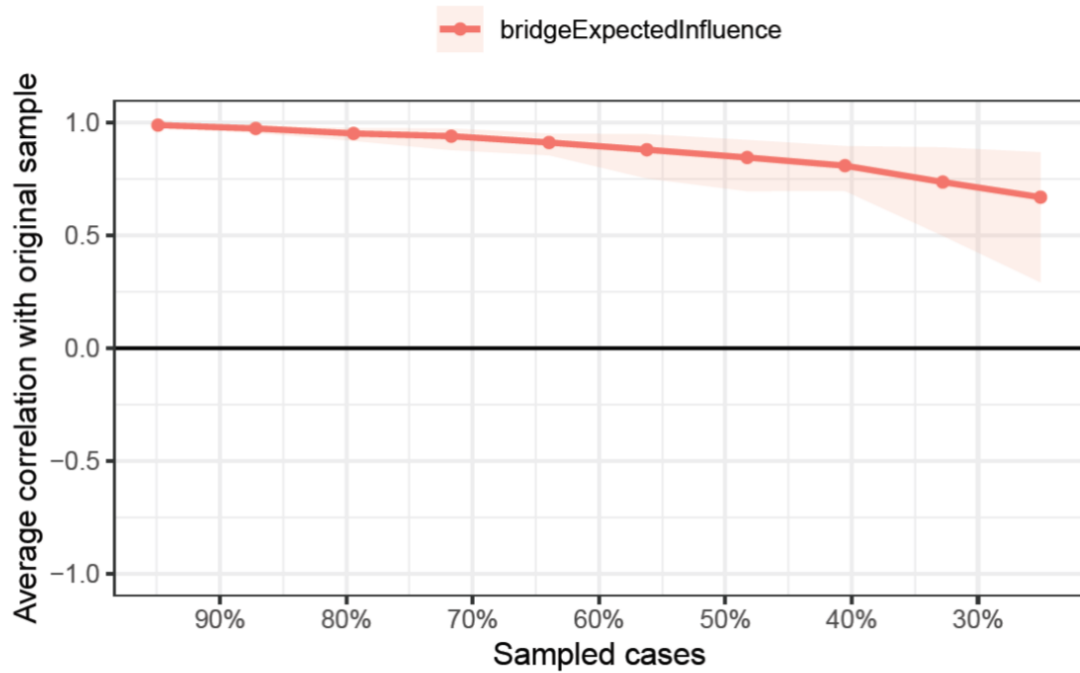
8.6.6 Supplementary figure 4 (SF4)

Standardised Z-scores for Bridge node centrality: Bridge expected influence [1-step].



8.6.7 Supplementary figure 5 (SF5)

Bootstrapped (2000) bridge node centrality stability: Bridge expected influence [1-step].



Note. Maximum drop proportions to retain correlation of 0.7 in at least 95% of the samples: Bridge expected influence [1-step]: 0.517

8.6.8 Supplementary Methods

8.6.8.1 Network accuracy and centrality stability.

The accuracy of the estimated network and the stability of centrality indices were assessed through non-parametric bootstrapping methods via the boonet package (Epskamp et al., 2018b). Estimated network accuracy was determined by calculating edge-weights in 2000 randomly allocated bootstrapped samples. Centrality stability was indicated via the case-drop bootstrap (2000), which estimated the maximum number of participants that could be dropped whilst retaining a correlation of ≥ 0.70 between the original sample and iteratively smaller subsets of the sample (ranging between 90% - 30% of the sample, reduced by 10% iterations). CS coefficients (Correlational Stability) were calculated for each of the centrality indices to quantify the proportion of data that could be dropped to retain with 95% certainty a correlation of at least 0.7 with the original centrality value. CS coefficients indicate stability when above 0.5 (Epskamp et al., 2018a).

8.6.8.2 Analyses.

8.6.8.2.1 Centrality indices selection.

Node characteristics can be examined via centrality indices, each aiming to assist in the exploration and discovery of influential nodes in the estimated network. Indices available to examine were node *strength*, *closeness*, *betweenness* (Hevey, 2018), and *expected influence* (Robinaugh et al., 2016). Due to the absolute value calculation, *strength* is limited to only accurately informing the centrality of positively associated edges. *Expected influence* addresses the *strength* indices limitation and informs us of the importance of when nodes both activate and deactivate one another. Our estimated network contains nodes where code reversal would be inappropriate, therefore the interpretation of *expected influence* was chosen over *strength* (Robinaugh et al., 2016). Nodes furthest away from the value of zero indicate a high expected influence, with the direction of association denoted by whether the expected influence is positive or negative. The remaining centrality indices (*betweenness* & *closeness*) were not included in the analyses due to demonstrated instability indicated by correlational Stability coefficients below 0.5 (see SF3).

8.6.8.3 Supplementary Results.

8.6.8.3.1 Network accuracy and centrality stability.

Calculated bootstrap confidence intervals for the relationships observed in the network network were small to moderate in width, indicating a good level of network accuracy (see SF2). Of the observed centrality indices (see SF3), only expected influence (CS [cor = 0.7] \approx 0.67) demonstrated stability, whereas betweenness (CS [cor = 0.7] \approx 0.28), and closeness (CS [cor = 0.7] \approx 0.36) demonstrated instability with CS coefficients below 0.5 and were therefore treated with caution and excluded from the main interpretation (Epskamp & Fried, 2018; Hevey, 2018). CS coefficients were calculated to assess the stability of the considered centrality indices produced for the bridge analyses. Bridge expected influence (CS [cor = 0.7] \approx 0.52) displayed acceptable stability, supporting its use as informative centrality indices.

8.6.8.3.2 Variable selection for shortest path analyses.

Based on the initial expected influence centrality values (see SF1), the top indicator variables of wellbeing and health were selected to investigate the shortest pathways to homeworking experiences. From the indicators of wellbeing, general wellbeing (V16, EI = -1.43) and burnout (V14, EI = 1.24) were selected. Among the health-related indicators, work-time physical activity (V23, EI: 1.19), vigorous exercise (V20, EI: 0.98), break taking (V25, EI: -0.88), sleep trouble (V19, EI: 0.83), and moderate exercise (V21, EI: 0.79) demonstrated the highest expected influence values. However, due to similar shortest pathways observed from variables 23, 20, and 21 to 25, only variables 23 (work-time physical activity), and 19 (sleep trouble) were chosen for focussed interpretation.

8.6.9 Supplementary method references

Epskamp, S., Borsboom, D., & Fried, E. I. (2018a). Estimating psychological networks and their accuracy: A tutorial paper. *Behavior Research Methods*, 50(1). <https://doi.org/10.3758/s13428-017-0862-1>

Epskamp, S., Borsboom, D., & Fried, E. I. (2018b). Package “bootnet.” *Behavior Research Methods*, 50(1).

Epskamp, S., & Fried, E. I. (2018). A tutorial on regularized partial correlation networks. *Psychological Methods*, 23(4). <https://doi.org/10.1037/met0000167>

Hevey, D. (2018). Network analysis: A brief overview and tutorial. *Health Psychology and Behavioral Medicine*, 6(1). <https://doi.org/10.1080/21642850.2018.1521283>

Robinaugh, D. J., Millner, A. J., & McNally, R. J. (2016). Identifying highly influential nodes in the complicated grief network. *Journal of Abnormal Psychology*, 125(6). <https://doi.org/10.1037/abn0000181>

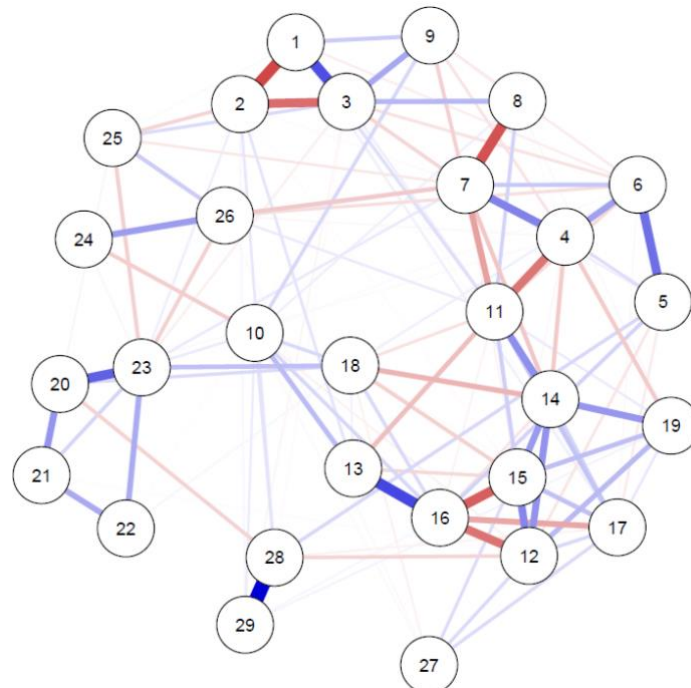
8.6.10 Hyperparameter iterations

Estimated networks iteratively varied by hyperparameter (0.0, 0.5, 0.1, 0.15, 0.2, 0.25, 0.3, 0.35, 0.4, 0.45, 0.5)

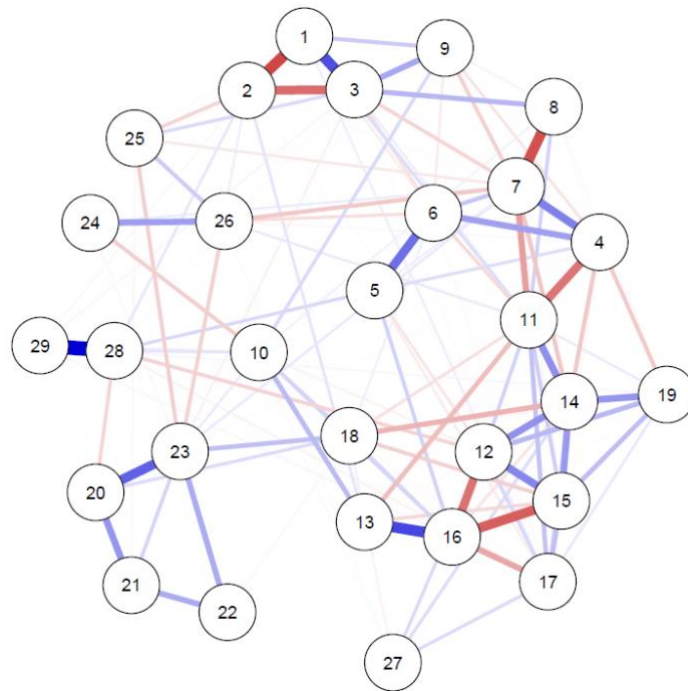
A – Network node key

Cluster 1 - Homeworking mastery	Wellbeing
1. Pressure to work at same time as colleagues	11. Work life conflict
2. Homeworking autonomy	12. Cognitive stress
3. Pressure to attend meetings	13. Job satisfaction
	14. Burnout
	15. Stress
	16. General wellbeing
	17. Isolation
Cluster 2 - Home-work transition	Health
4. Ability to switch off from work	18. Self-rated health
5. Freedom to transition between home and working environments	19. Sleep trouble
6. Ability to transform workspaces	20. Vigorous exercise
	21. Moderate exercise
	22. Walking
	23. Work-time Physical activity
	24. Over all Sedentary behaviour
	25. Break taking
	26. Work-time sedentary behaviour
	27. Snacking
Cluster 3 - Daily work pressure	Demographics
7. Daily workload manageability	28. Age
8. Perceived excess of daily meetings	29. Job tenure
Cluster 4 - Work-day forecast	
9. Video on / off pressure	
10. Work-day planning & organisation	

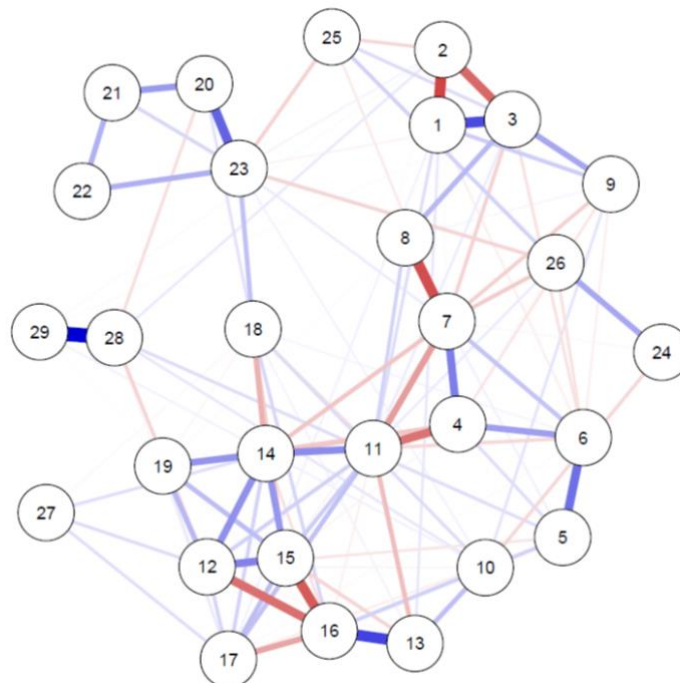
B – Hyperparameter = 0.0, 0.5, 0.1 (no change)



C – Hyperparameter = 0.15, 0.2, 0.25 (no change)



D – Hyperparameter = 0.3, 0.35, 0.4, 0.45, 0.5 (no change)



8.7 Appendix G: Study 4 –Intervention content breakdown: description and component behaviour change techniques (BCTs)

Intervention content and structure summary split into four columns: Section head; Informational content/behaviour change recommendation; health behaviour/wellbeing domain targeted; Intended BCTs.

<p>Section heading (pages covered)</p>	<p>Informational content / behaviour change recommendations * (PO - pop out information type)</p>	<p>Specific health behaviour / wellbeing domains targeted</p>	<p>Intended behaviour change techniques</p>
<p><i>‘Getting in the zone’ (i.e., managing workspace) (3 - 5)</i></p>	<ul style="list-style-type: none"> - Creating a workspace - highlighting the benefits of having dedicated space in the home for work-related tasks (Ahrentzen, 1990). - Identifying your workspace - Acknowledging the optional preference of having a single dedicated workspace or using multiple areas of the home for particular tasks + Highlighting the need to build a mental association with spaces for productive work (Study 1, Chapter 2) <ul style="list-style-type: none"> ○ Finding what works for you (PO - behavioural tips) <ul style="list-style-type: none"> ▪ Create a work only space 	<p>Work life balance Sleep Posture / DSE</p>	<p>Information about social and environmental consequences; Instruction on how to perform behaviour</p>

	<ul style="list-style-type: none">• E.g. “- <i>“Try to avoid settings that you associate with leisure activities. Working in bed, for example, can interfere with the lifelong associations you have between the bed and relaxing or sleeping.”</i>▪ Keep away from distraction<ul style="list-style-type: none">• E.g. <i>“Choose a space where you are unlikely to be distracted – for example, by family or housemates, or by non-work tasks.”</i>▪ Clear the clutter<ul style="list-style-type: none">• E.g. <i>“If your workspace is in an area you use for non-work tasks – for example, the kitchen table - move all work materials out of sight at the end of your workday.”</i>▪ Make personal space		
--	--	--	--

	<ul style="list-style-type: none"> • E.g. <i>“create your own personal space and shut out the outside world by, for example, plugging in headphones and listening to music.”</i> ▪ Good posture <ul style="list-style-type: none"> • E.g. <i>“Adjust your seat: you should be able to use the keyboard with wrists and forearms straight and level with the floor” (**the cited link here has not been removed from the NHS website**)</i> 		
<p><i>‘Striking a balance’</i> <i>(i.e., managing work-life balance)</i> <i>(6 – 10)</i></p>	<p>- Separating work from leisure – Illustrating the previous benefits of the commute in mentally shifting individuals between work and home as well as promoting physical activity, therefore highlighting the need to alternate ways of shifting between work and leisure time (Jachimowicz et al., 2020).</p> <ul style="list-style-type: none"> ○ Mental transition (PO – Quotation – Study 1, Chapter 2) 	<p>Work life balance</p> <p>Physical activity</p> <p>Sedentary behaviour</p> <p>Water consumption</p> <p>Job-satisfaction</p> <p>Stress</p>	<p>Information</p> <p>about emotional consequences;</p> <p>information</p> <p>about health consequences</p>

	<ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ E.g. <i>“I go for an evening walk – it feels quite good to close your laptop, and kind of ‘leave the office.’”</i> ○ Do something to mark the start and end of your Workday (PO – <i>Behavioural tip – Study 1, Chapter 2</i>) <ul style="list-style-type: none"> ▪ E.g. <i>Many people find going out for exercise – such as a short walk, run, or cycle – helps to ready them for work.</i> - Structuring your day – Acknowledging working schedules and encouraging ways to segment the working day that promotes physical activity, hydration and reduces sedentary behaviours (Dewitt et al., 2019). <ul style="list-style-type: none"> ○ Tips for planning your day - (PO – <i>Behavioural tips – Study 1, Chapter 2</i>) <ul style="list-style-type: none"> ▪ Add it to the calendar 	Sleep	
--	---	-------	--

	<ul style="list-style-type: none">• E.g. “- Use your online calendar to reserve chunks of time in your day to focus on specific tasks.”▪ Ignore distractions (Kushlev & Dunn, 2015)<ul style="list-style-type: none">• E.g. “Checking and replying to email only at certain times of the day can reduce stress.”▪ Reduce unproductive time<ul style="list-style-type: none">• E.g. “<i>When scheduling meetings, try not to allow too much time. Shorter meetings can be more efficient.</i>”▪ Take breaks<ul style="list-style-type: none">• E.g. “<i>Schedule regular breaks, either at regular time intervals (eg every hour)</i>”▪ Take a thinking break		
--	--	--	--

	<ul style="list-style-type: none"> • E.g. <i>“Taking a break and going for a walk, or even just moving around your home, can give you the thinking space you need to take stock, be creative, or solve difficult problems.”</i> - Switching off – Highlight the importance of setting rigid boundaries between work and leisure time through routined time keeping with start and stop times (Sonnentag, 2012). <ul style="list-style-type: none"> ○ Switching off (PO – Quotation – Study 1, Chapter 2) <ul style="list-style-type: none"> ▪ E.g. <i>“Alerts pop up all the time. So I just turn all of my notifications off.”</i> - Getting into sleep mode - Highlight how mobile phone and late night screen use can interfere with sleep (Quante et al., 2019) <ul style="list-style-type: none"> ○ Getting into sleep mode (PO – Research study) 		
--	---	--	--

	<ul style="list-style-type: none"> ▪ E.g. “Simply leaving their devices out of reach each night led them to have better sleep, more energy, and better mood (Mohideen et al., In Press)”. 		
<p><i>‘Looking after yourself’ (i.e., integrating health promotion into work practices)</i></p> <p>(11 – 14)</p>	<ul style="list-style-type: none"> - Staying healthy – Highlight health behaviour risks of a homeworking routine and that healthier behaviours can be integrated into the working day. - Break up your sitting – Highlighting the sedentary nature of homeworking (e.g. prolonged sitting & lack of commute) and signalling the need to offset this physical activity loss with at least 2 hours stood a day (Buckley et al., 2015) <ul style="list-style-type: none"> ○ Tips for breaking up your sitting (PO – Behavioural tips – Study 1, Chapter 2) <ul style="list-style-type: none"> ▪ Make a stand 	<p>Sedentary behaviour</p> <p>Physical activity</p> <p>Dietary consumption</p> <p>Diet - Snacking</p> <p>Water consumption</p>	<p>Information on health consequences</p>

	<ul style="list-style-type: none"> • E.g. <i>“If you can, find a working space in your home that allows you to work while standing”</i> ▪ Make a moving habit <ul style="list-style-type: none"> • E.g. <i>“Think about which of your work tasks you can do while standing, or moving around – for example, taking phone calls, or online meetings”</i> ▪ Walking meetings <ul style="list-style-type: none"> • E.g. <i>“Video call apps can usually be accessed via a phone, making it possible to attend online meetings while walking.”</i> <p>- Eating and drinking – Indicating the potential for home environments to alter daily eating behaviours, as well as encouraging ways to stay hydrated whilst promoting physical activity (e.g. <i>“Using a small bottle, and refilling it every time it is empty, will require you to walk to the kitchen”</i>)</p>		
--	---	--	--

	<ul style="list-style-type: none"> ○ Avoid unhealthy snacking (PO – Behavioural tip - Marteau et al., 2012) <ul style="list-style-type: none"> ▪ Hard to resist <ul style="list-style-type: none"> • E.g. <i>“If you find it hard to resist snacking, try keeping unhealthy snacks in a locked cupboard, or taping the cupboard shut.”</i> 		
--	--	--	--

Note. PO = Pop out

* Tip descriptions are not comprehensive. Only text explicitly describing a behaviour change recommendation is included in this table; justifications or explanation of tips are not provided.



Intended behaviour change techniques – Drawn from the BCT Taxonomy v1 (Michie et al., 2013).

8.8 Appendix H: Study 4- Intervention Screen shot examples

Screen shots of intervention document, demonstrating formatting and pop out functionality.

8.8.1.1 Intervention format example – Page 8 – ‘Structuring your day’

Striking a balance



Structuring your day

Planning your workday can help productivity, and so prevent work spilling into your leisure time.

Many office-based jobs involve:


- **reactive** work tasks, such as replying to email
- **proactive** tasks, such as making progress on long-term projects
- **interactions** with colleagues, such as phone calls or meetings

Thinking ahead about what tasks you have to do, and setting aside clear chunks of your day to do them, can keep you focused.

Segmenting your day like this can also help you to find opportune moments for taking breaks. For example, many people start the day by clearing their inbox of recent email, before moving on to more proactive tasks. The boundary between finishing off email and starting other tasks is a perfect time to take a break, stretch your legs, and fetch a drink of water⁶.

Top Tips
Planning your day

6. Dewitt et al. (2019) BMC Public Health, 19, 819.



8.8.1.2 Page 8 example – Top tips pop out

Tips for planning your day

- 1. Add it to the calendar**

Use your online calendar to reserve chunks of time in your day to focus on specific tasks.
- 2. Ignore distractions**

Switching your phone and email off during periods of focused work can minimise distractions. Checking and replying to email only at certain times of the day can reduce stress⁷.



7. Kushlev & Dunn. (2015) Computers in Human Behavior, 43, 220-8.

8.8.1.3 Page 8 example – Quotation pop out

Segment your day

“
If I’m a bit stuck on something,
I can just walk away and get a
glass of water and come back.
It’s like giving your brain a little
bit of a break.”

Sean, office manager



X

8.9 Appendix I - Study 4- Think aloud instructions

'Think aloud' instruction document given to participants before 'think aloud' interview.



Now we'd like you to read through our information about working from home. As you read each sentence, we would like you to "think aloud". In other words, we want you to **speak every and any thought that comes to mind as you read through the information, from the beginning to the end of this e-module.** *Don't plan out what you are saying, or explain what you mean. Instead, just freely voice your thoughts as they come to you.*

Throughout the e-module, you will have the opportunity to click on pop up sections, **so please make sure to click on these so you are able to view all the information included** – The icons for these pop ups will look like the ones below:



Please try to **speak as frequently** and **clearly as possible**. Bear in mind that we need to transcribe this recording and we won't know which part you are commenting on. *So please read the part you are referring to out loud first and then say what you think about it after.*

Try and be as descriptive as possible as this will allow us to have a better understanding of what you are thinking as you read the sentence. There are no right or wrong answers to this – we are only interested in what you think with regards to the information you'll be reading.

Next, I am going to turn my camera and my microphone off and will let you talk aloud as you read the information. Please also share your screen so that I can follow which part of the information you are reading. If you stop talking, I will unmute myself just to remind you to carry on talking.

Do you have any questions before we begin?

8.10 Appendix J – Study 4- Follow-up interview schedule

Interview schedule utilised during the 1 week follow up one on one semi structured interviews.

2nd interview (one week later)

Over the past week, how did you get on with the advice that was provided?

PROMPTS:

- Did you make any changes to how you worked?
 - If so, how did you get on with those changes?
 - Do you think the changes that you've made will stick, or might you revert back to what you were doing before?
 - IF NO - why do you think you'll revert back?
 - IF NO - what stood in the way of you making changes?
- Did you experience any difficulties in following the advice? If so, what?
- Was there anything we could have done to make it easier for you to follow the advice?

Was there any particular advice that you found particularly useful over this past week?

Did you refer back to the information at any time during the past week?

PROMPTS:

- What information did you refer back to?
- Was it easy or difficult to find?

Knowing what you know now, what advice would you give to someone working from home and would you recommend this module to them? Why/why not?

Are there any additional comments you would like to give us?