

Remote workers' perceived health during the COVID-19 pandemic: an exploratory study of influencing factors in the IT and communications sector in Malta

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Abstract: The COVID-19 pandemic resulted in a sudden switch to remote working that many organisations and workers were unprepared for. The study investigates the perceived impact of remote working on workers' health and influencing factors. The topic has received limited attention within published studies. A cross-sectional online survey was distributed to IT and communication remote workers in Malta ($N=459$). Closed-ended questions were analysed quantitatively in order to identify perceived changes in health. Open-ended questions were analysed qualitatively to determine the perceived reasons for such changes. More workers reported that their health had deteriorated than improved during the first 12 months of the pandemic. Greater proportions of remote work were associated with improved levels of health. Several factors were perceived to have influenced levels of health, including: health behaviours, such as physical activity, nutrition, and sleep; the development of disease, particularly mental health issues; work related factors, such as social support, work demands, and the blurring of work-life boundaries; and personal factors, including family life and leisure. The study concludes that remote working can be beneficial for health when workers engage in the correct health-promoting behaviours and are provided with the necessary support, both during their working and private life.

Key words: COVID-19, Remote work, Telework, Work from home, Occupational health, Mental health

Introduction

The COVID-19 pandemic greatly impacted the world of work. One key strategy used to reduce virus transmission was the sudden uptake of remote working, also known as teleworking. Many organisations were unprepared for this change, whereas for many workers, the sudden switch was

their first experience of working from home. European Union (EU) statistics indicate that almost half of the workforce carried out work from home during the first year of the pandemic, despite most not having worked remotely prior to this period¹⁾. Research that studied the impact of remote working upon individuals predated the COVID-19 pandemic. This attributed several benefits to remote working, such as fostering work-life balance, improving work flexibility and autonomy, and reducing commuting time. It has also been associated with disadvantages including the blurring of boundaries between work and personal life,

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social isolation, and reduced work support^{2, 3}).

It is likely that such a seismic overnight shift in the nature of work would impact upon workers' health and wellbeing. Despite this, since the onset of the pandemic, few studies have focused on the health of remote workers. Fewer still have aimed to explore the factors that may have influenced remote workers' health. The topic has also not been investigated in Malta; the EU's smallest member state. Data from 2019 suggested that Malta had a greater potential for working remotely than the EU average. Despite this, the use of remote working in Malta was consistently lower than the EU average⁴. In view of the pandemic, remote working arrangements in Malta increased substantially during 2020 when compared to 2019, with growth greater in females than males⁵. In fact, EU statistics suggest that the growth in the uptake of remote working in Malta during 2020 was amongst the highest of any EU member state⁶.

The following study therefore aims to address this chasm in the scientific literature by exploring the health of remote workers in the IT and communications sector in Malta. The study has the following objectives: (I) To determine if perceived health levels changed in individuals working remotely during the COVID-19 pandemic when compared to the twelve months that preceded it; (II) To investigate if changes in perceived health levels are associated with the percentage of work conducted remotely; and (III) To explore remote workers' perceived reasons for changes in their health levels.

The health and wellbeing of remote workers

A review article of studies that investigated the impact of remote working on health prior to the pandemic concluded that mixed findings had been reported in this respect³. Whilst this article identified several health-related benefits associated with remote working³, the mental wellbeing of remote workers has often been described as being poorer than those who do not work remotely². A limited number of studies have investigated this topic during the COVID-19 pandemic⁷⁻⁹. Cross-sectional findings generally indicate that mental wellbeing appears to be poorer in those working from home than those who continued to attend their workplace. However, these findings do not appear to apply to those working from home on occasion⁷. Furthermore, the negative impact of remote working on mental health was not confirmed during a longitudinal analysis⁹.

Findings from prior to the pandemic associated remote working with the development of several physical and

mental health issues. These included the development of musculoskeletal disorders, feelings of loneliness and depression, whereas findings on the development of stress were mixed³. Studies conducted during the pandemic which focused exclusively on remote workers have reported mixed findings regarding the development of pain and musculoskeletal disorders¹⁰⁻¹², whereas the development of common mental health issues, such as negative emotions, anxiety and depression have been frequently reported^{10, 13, 14}. Here too, however, mixed findings exist, with one study reporting that remote workers felt less stressed compared to when they worked from their office¹².

Despite mixed findings, it appears likely that the sudden transition to remote working during the COVID-19 pandemic has had an overall negative impact upon such workers health (Hypothesis I). Furthermore, despite a lack of related studies, it appears more likely that workers who carried out a greater percentage of their work remotely will perceive that their health is poorer than those carrying out a smaller percentage of their work remotely (Hypothesis 2).

Factors influencing the health of remote workers

It could be argued that the mixed findings in respect to the impact of remote working on health-related issues are unsurprising. As was previously discussed, studies of the effect of remote working upon individuals have yielded contrasting views, with both benefits and disadvantages being associated with this method of working. In view of this, it may be beneficial to identify those factors believed to effect the health of remote workers positively, as well as those that may have a negative effect. Despite this, limited research on this topic has been undertaken since the beginning of the pandemic.

Amongst the factors that have been the focus of relevant research are those related to demographics. The presence of young children and isolation appear to be associated with poorer wellbeing and negative emotion^{9, 15}, negative emotions also appear more frequent in females than males^{13, 14}, however the impact of age and education are less clear in terms of wellbeing and the development of negative emotion^{9, 13, 16}.

A few studies have presented findings related to work-related factors. Poorer wellbeing has been associated with greater work demands and greater levels of distress in remote workers¹⁶. In fact, remote working has been linked to greater workloads and technostress, which refers to the stress users experience with aspects of ICT such as

multitasking and technical issues¹⁷). Divergent findings have been reported in terms of remote working and work-family conflict, with some workers viewing the integration between the two positively, whereas others have reported struggling to juggle work and family life when working from home¹⁷⁻¹⁹). Other challenges associated with working remotely include poor communication, procrastination and loneliness¹⁹).

The move to remote working may also have influenced health behaviours, which in turn may have impacted workers' health. Physical activity levels are believed to have dropped during the pandemic¹³), however it has also been reported that those who worked remotely prior to the pandemic were more likely to exhibit sedentary behaviour during non-working hours, and to report greater decline in physical functioning and stress than those who converted to remote working during COVID-19¹⁰). Remote working has also resulted in negative changes to nutrition, sleep and emotion. These latter changes were associated with increased levels of work-life integration and reduced levels of co-worker support²⁰).

Beyond these limited findings, it is also possible that other relevant factors remain unidentified. The majority of the presented studies made use of quantitative research methods and it is possible that exploratory studies that make use of qualitative research methods may uncover other relevant factors, or aid to explain findings that are often contrasting. Whilst some studies have analysed health, others have focused on wellbeing, or specific health issues, making it harder to draw conclusions²¹). Furthermore, few studies have aimed to identify factors believed to be associated with improvements in health whilst remote working, instead focusing on those deleterious for health. Despite this, it is clear that several factors influenced remote workers' health levels during the COVID-19 pandemic. Isolation, dealing with children, the female sex, excessive work demands, reduced levels of exercise, poor nutrition and poor sleep behaviours are likely to be associated with poorer health levels, whereas social support, being male, manageable workloads, improved exercise, better nutrition and good sleeping habits are likely to be linked with improved levels of health (Hypothesis 3).

To summarise, therefore, the study has the following hypotheses:

H1: Remote workers will perceive that their health has regressed during the first year of the pandemic when compared to the previous year;

H2: Workers who carry out a greater proportion of their work remotely will score more poorly in health-related

variables than those who carry out a smaller proportion of their work remotely;

H3: Several factors will be linked to a deterioration in remote workers' health, including isolation, living with children, the female sex, excessive work demands, reduced levels of exercise, poor nutrition and poor sleeping behaviours. The alternative of each factor will be linked to improved levels of health.

Subjects and Methods

The study analyses data obtained from a cross-sectional online survey distributed to the workers of organisations within the IT (including online gaming) and communications sector in Malta between July and August 2021. Organisations operating within this sector were identified by means of a business directory and were sent a letter of invitation: 29 such organisations were identified, of which 15 agreed to participate in the study. Of the organisations that participated, 14 were from the private sector, whilst one organisation was a public sector entity. All participating organisations provided workers with the possibility of working remotely during the first 12 months of the pandemic. A letter of invitation was distributed electronically by consenting organisations to their employees with information about the purpose of the study and encouraged those who had engaged in remote working during the first 12 months of the pandemic to participate. Individuals who consented to participate were re-directed to an anonymous online questionnaire. The study received ethical clearance from the Faculty Research Ethics Board at the Faculty of Economics, Management and Accounts at the University of Malta (Approval number: 9359).

Measures

In view of the study's exploratory nature, the distributed questionnaire included both closed and open ended questions²²). A 12 month recall period was used throughout the survey. This recall period was used for several reasons. Firstly, as the study dealt with health, a recall period which limited the effect of seasonal health changes was desirable. Secondly, COVID-19 cases, related public health measures and support measures in Malta also varied throughout the first year of the pandemic²³). Thus it was hoped that a longer recall period would be impacted less by such fluctuations than a short recall period that coincided with the introduction of certain support measures or COVID-19 case numbers. Finally, whilst some sectors only made use of remote working towards the beginning of the pandemic

and again when COVID-19 case numbers were particularly high, previous findings indicated that organisations in the studied sector made use of remote working throughout the first year of the pandemic²⁴). The tool, which was tested amongst a small group of IT workers prior to distribution ($n=5$), contained the following measures:

Proportion of remote working: A single-item question²⁵ asked participants to estimate their average use of remote working during the first 12 months of the COVID-19 pandemic on a 5-point scale ranging from no remote working (0%) till all of the work was done by remote working (100%).

Change in remote working: A single-item question investigated if participants' use of remote working had changed during the first 12 months of the pandemic compared with the 12 months prior to this. Responses were given on a 3-point scale which included, reduced use of remote working, same use, and increased use of remote working during the first 12 months of the pandemic.

Overall health: A single item from the Short Form-36²⁶ was used: 'In general I would say my health is'. Responses were given on a five-point scale which ranged from poor to excellent.

Change in overall health: a single item question asked participants if their overall physical and mental health had changed during the first 12 months of the pandemic when compared to the 12 months that preceded it. Response options included that health had regressed, remained the same or improved.

Reasons for change in overall health: by means of an open-ended question, participants who reported that their health had either improved or regressed during the first 12 months of the pandemic were asked to provide reasons for this change.

Demographics: data were collected on gender (male, female, other); age, and role (administrative, technical, support and sales, professional, management, other).

Analysis

A total of 469 replies were received, which represents just under 5% of the individuals working within the information and communication sector in Malta²⁷). In terms of exclusion criteria, cases that either included a large amount of missing data or indicated that they did not engage in any remote working during the first 12 months of the pandemic were omitted. Apart from a single case that was excluded for a large amount of missing data, this was not an issue with the current data set; the percentage of missing data did not exceed 2% for any of the measured variables.

Nine cases that reported not having engaged in any remote working during the first 12 months of the pandemic were however omitted. The dataset was also analysed for strings of responses²⁸), however no such issues were identified, possibly due to the varying scales used and mix between open and closed-ended questions. Subsequently, 459 cases were analysed.

In the case of quantitative variables, descriptive statistics were generated by means of SPSS version 27. For the purpose of analysis, dichotomous variables were created for gender and role, whilst the proportion of remote working was recoded into three categories: no more than half of one's work was carried out remotely ($\leq 50\%$), the majority of work was carried out remotely ($>50\%$), and all work was carried out remotely (100%). In view of the ordinal nature of the variables; levels of health and change in health, differences between these and the other measured variables were investigated by means of the Mann-Whitney test when these were dichotomous (gender and role) and the Kruskal-Wallis test when these were ordinal (proportion of remote working, change in remote working, age)²⁹). Significant Kruskal-Wallis tests were then further investigated by running Mann-Whitney tests for each possible pair of mean ranks in order to identify significant pairs. When using the Mann-Whitney test in this manner, a Bonferroni correction was used to reduce the chance of Type I errors²⁹). Missing data were tackled by means of pairwise deletion.

Open ended data were collected from participants who stated that their levels of overall health had changed during the first 12 months of the pandemic. Figure 1 presents a flowchart of responses to the initial quantitative question which investigated if levels of health were perceived to have changed and the subsequent open-ended question that collected data on participants' perceived reasons for any such change. Qualitative data were analysed by means of thematic analysis, with themes and sub-themes being identified as per Braun and Clarke's³⁰) framework. The stage on data transcription was omitted due to the digital nature of the data. Data analysis was carried out by the author who familiarised themselves with the received data, selected the initial codes, and then organised these into themes and subthemes. Once these had been reviewed, themes were defined and a report was prepared. In order to establish the validity and credibility of the findings, these were presented to academic colleagues for their feedback. Furthermore, the findings were sent through to the contact individuals at the various studied organisations (generally the HR manager) for their feedback.

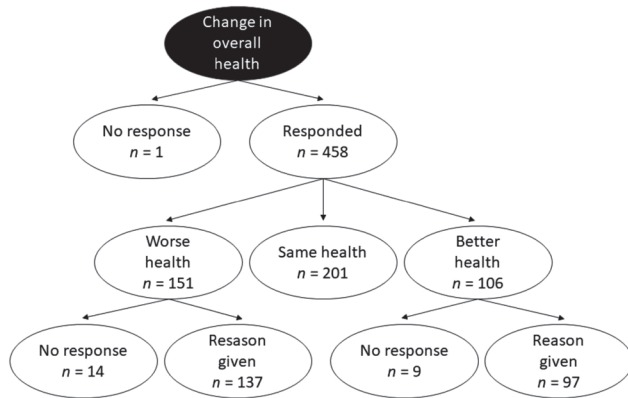


Fig. 1. Flowchart of participant responses to change in overall health and subsequent open-ended question on reasons for this change.

Results

Descriptive statistics (Table 1) revealed that the majority of participants were male (54.5%) and aged between 26 and 35 (42.9%). In terms of their role, most participants either held a technical (29.2%) or a managerial (24.6%) role. Many participants (46.4%) reported carrying out all of their work remotely, with a further 32% carrying out most of their work remotely. Furthermore, the vast majority (81.7%) reported remote working more during the first 12 months of the pandemic than the 12 months that preceded it. In terms of health, most participants reported good (38.6%) or very good (30.1%) health, with more participants reporting that their health had regressed (32.9%) during the first 12 months of the pandemic than had improved (23.1%).

Significant differences were not identified between the participant's characteristics and their levels of overall health or change in overall health. Kruskal–Wallis non-parametric tests however revealed that a weak but significant difference existed between the proportion of remote working conducted and respondents' perceived change in overall health (Table 2). This significant difference was further investigated by means of conducting Mann–Whitney tests in order to identify statistically significant pairs. As three comparisons were conducted, a Bonferroni correction was applied, with a p -value of less than 0.017 considered statistically significant for these tests. The analysis indicated that those who reported carrying out no more than half of their work by means of remote working also reported poorer change in overall health scores than those who carried out all their work by means of remote working (Table 3).

Table 1. Descriptive statistics of the measured variables

Variable	n (%)
Gender	
Male	250 (54.5)
Female	204 (44.4)
Other	1 (0.2)
Age (yr)	
25 or younger	51 (11.1)
26–35	197 (42.9)
36–45	136 (29.6)
46–55	54 (11.8)
55 or older	20 (4.4)
Role	
Managerial	113 (24.6)
Professional	78 (17.0)
Technical	134 (29.2)
Administration	68 (14.8)
Support & sales	59 (12.9)
Proportion of remote work	
All	213 (46.4)
Most (> half)	147 (32.0)
About half	38 (8.3)
Some (< half)	61 (13.3)
Change in remote working	
More remote working	375 (81.7)
Same remote working	45 (9.8)
Less remote working	35 (7.6)
Health	
Excellent	69 (15.0)
Very good	138 (30.1)
Good	177 (38.6)
Fair	65 (14.2)
Poor	10 (2.2)
Change in health	
Improved	106 (23.1)
Same	201 (43.8)
Worse	151 (32.9)

Qualitative analysis indicated that the factors believed to have influenced remote workers' health levels could be divided into five themes. These included: the general determinants of health; the development of diseases, disorders and feelings; work-related determinants of health; pandemic specific factors; and personal factors. The frequency of the different themes are reported in Table 4 and are described in the following sections.

General determinants of health

In terms of the general determinants of health, three key

Table 2. Associations between the studied variables and level of health and change in health

Variable	Level of overall health				Change in overall health			
	<i>n</i>	<i>r</i>	<i>H</i>	<i>p</i>	<i>n</i>	<i>r</i>	<i>H</i>	<i>p</i>
Gender	455	-0.06		0.22	454	-0.03		0.54
Role								
Managerial	452	-0.06		0.20	451	0.00		0.99
Professional	452	-0.03		0.57	451	0.00		0.93
Technical	452	-0.03		0.53	451	-0.02		0.73
Administration	452	-0.09		0.06	451	-0.02		0.71
Support & sales	452	-0.03		0.53	451	0.00		0.97
Age	458		4.07	0.40	457		4.01	0.41
Proportion of remote work	459		2.73	0.26	458		8.31	0.02*
Change in remote work	455		0.10	0.95	454		3.94	0.014

n: number; *r*: effect size; *H*: Kruskal–Wallis H; *p*: significance; **p*<0.05.

Table 3. Associations between proportion of remote work and change in overall health

Compared pairs: Proportion of remote work	Mean Ranks	<i>n</i>	<i>U</i>	<i>p</i>	<i>r</i>
No more than half of work conducted remotely (≤50%)	118.31	245	6,763.00	0.31	-0.06
Majority of work conducted remotely (>50%)	126.99				
No more than half of work conducted remotely (≤50%)	136.74	311	8,587.50	0.006*	-0.16
All work by remote working (100%)	164.99				
Majority of work conducted remotely (>50%)	168.97	359	13,960.00	0.07	-0.09
All work by remote working (100%)	187.65				

n: number; *U*: Mann–Whitney U; *p*: significance; *r*: effect size; **p*<0.017.

Table 4. Change in perceived level of health-frequency of themes

Theme	Worse overall health ¹ (%)	Better overall health ² (%)
Determinants of health		
Physical activity	39 (28.5)	34 (35.1)
Nutrition and habits	12 (8.8)	16 (16.5)
Sleep	3 (2.2)	11 (11.3)
Development of diseases, disorders and feelings		
Development of negative feelings and common mental health disorders	111 (81.0)	32 (33.0)
Development of physical diseases, disorders and gaining weight	20 (14.6)	4 (4.1)
Work-related determinants of health		
Reduced social contact	42 (30.7)	16 (16.5)
Commuting	–	44 (45.4)
Work demands	22 (16.1)	9 (9.3)
Flexibility and work life balance	–	24 (24.7)
Avoid communicable diseases	–	15 (15.5)
Physical work environment	7 (5.1)	6 (6.2)
Reduced boarder between work and home	10 (7.3)	–
Pandemic specific factors		
COVID-19 restrictions and reduced levels of freedom	19 (13.9)	–
Inability to travel abroad	7 (5.1)	–
Dealing with COVID-19	3 (2.2)	–
Personal factors		
Children and other household members	20 (14.6)	17 (17.5)
Dedicating more time for self	–	21 (21.7)
Concerns about employment	4 (2.9)	–

¹137 replies received; ²297 replies received.

subthemes were identified. These included; physical activity, nutrition and, sleep. Physical activity was highlighted by a large number of participants, with several identifying it as a reason for their deteriorating health. Causes included increased sedentary behaviour within the home, having previously been more active within the workplace, whereas others noted that they previously walked during their commute.

The increased remote working resulted in more time on computer screens instead of in face-to-face meetings, which resulted in less movement.

Others described how they could no longer play their favourite sport or access a gym due to COVID-19-related restrictions. It was also argued that exercise at home could not replace this loss:

Football was stopped and gyms were closed. You can train all you want at home but you will never get to the level as when the training is organised.

However, other participants carried out more physical activity during the first year of the pandemic, which benefitted their health. Some participants used the time previously spent on commuting to work to exercise instead, others stated that remote working allowed them to fit workouts in between work tasks or during breaks, others felt more energetic once working from home or had greater access to the outdoors (including the sea), which facilitated physical activity.

The fact that I could use the time in the morning that I used to waste in traffic and to find parking, and instead put it to good use to fit in extra workouts made me stronger and healthier.

Some even credited the closure of contact sports and gyms as improving their health further:

I found an alternate way of working out from home which kept me more consistent and stronger (physically and mentally) than at the gym.

A second sub-theme that impacted workers' health was nutrition and habits. This also had mixed findings with some participants highlighting how their nutrition regressed during the pandemic. Workers highlighted how they ended up "eating junk food non-stop", using terms such as comfort food, as well as how they, "Binged, irregular eating". In other cases, the increased consumption of alcohol, coffee and smoking were highlighted. Others credited the first year of the pandemic as having benefitted their eating habits. Reasons included having more time and flexibility to cook due to remote working, eating fresh food as they were at home, as well as eating better because of lower stress levels. Some also consumed less alcohol or

smoked less as they were no longer around colleagues or able to socialise.

... you can eat nice homemade and healthy food that you may be a bit lazy to take with you when at the office.

A few individuals linked poorer levels of health to issues related to sleep. In such cases, worries about the pandemic and an inability to mentally switch off from work led to sleeping difficulties. More individuals, however, associated this period with improved levels of sleep. Primarily, participants substituted time previously spent commuting to work and getting ready for work with additional sleep. Others viewed their commute as a stressor and slept better having rid themselves of it.

Working remotely gives more resting time, as one can wake up for an early shift that starts at 7 am, just a half hour before, instead of having to wake up more than an hour before when traveling by bus to work.

Development of diseases, disorders and feelings

A second major theme was the development of diseases, disorders and feelings. Among the sub-themes, participants associated their drop in health with the development of physical diseases, disorders and gaining weight. In terms of disorders, these were mainly related to musculoskeletal pains due to poor working postures during remote working (discussed later). Other diseases as well as weight gain were linked to poorer nutrition and reduced physical activity.

I have gained a considerable amount of weight due to a lack of exercise and eating takeaway food.

Conversely, some individuals highlighted how the reduced stress they experienced during remote working aided them to control chronic physical diseases or to lose weight. Others became healthier via improvements in exercise and nutrition.

The most important thing is my stomach was finally calm, in the office I always had stomach problems.

A second important sub-theme was the development of negative feelings and common mental health disorders. A large number of individuals highlighted how mentally taxing the first year of the pandemic had been for them. Participants described feeling sad, depressed and lonely (the reasons for which are discussed below). Others, experienced feelings of anxiety, helplessness, uncertainty and fear of the unknown. Often, these feelings were linked with fears related to COVID-19, including worries about becoming infected with the virus or of a loved one catching it.

I felt alone, isolated, depressed, anxious. Overall I was

a mess.

I was afraid that I will catch the virus and pass it on to my relatives who are vulnerable.

Other terms frequently used included feeling mentally exhausted and lacking energy, boredom and lacking motivation. Organisational changes and changing methods of working, difficulties at home, loss of activities and hobbies and the general situation regarding the pandemic were given as reasons for this, and are elaborated upon elsewhere.

I would say mentally I get much more exhausted than before as the day to day cycle gets repetitive and makes one go a bit cocoo.

However, amongst those who felt that their health improved during the pandemic, a number of individuals highlighted how this period was deemed to be less stressful, less hectic and that they felt more energetic. This was linked to the loss of the daily commute, the perceived slower and more flexible pace of life, and due to feelings of being sheltered from COVID-19 transmission.

I was living a very hectic lifestyle before, the first 12 months was a good rest and break that was long needed.

Work-related determinants of health

The third theme revolved around work-related determinants of health. In terms of those who felt that their health had deteriorated, many participants highlighted how remote working resulted in reduced social contact. This was often linked to feelings of isolation and loneliness. Some participants who had company at home described how they still wanted to interact with people other than those they lived with. Some participants spoke more generically of missing social contact, friends and social occasions.

I am working 100% remote and not being around colleagues is affecting me negatively, I miss the human interaction a lot.

Furthermore, it was highlighted how the lack of social contact during a difficult period like the pandemic made the latter more difficult to cope with:

I have experienced more anxiety due to the uncertainty of the pandemic and also due to the fact that I could not socialise and talk with my friends which have always been my support network in stressful situations.

Amongst those who felt their health improved, however, some participants put this improvement down to the reduced social contact. Participants described how working remotely allowed them to avoid difficult co-workers and clients, whilst also working from a more quiet environment with fewer distractions.

I did not experience the mental exhaustion that normally comes when being part of an open office full of different characters with different habits and needs.

The inferior physical work environment at home was also given as a reason for poorer health by some participants. Participants primarily reported not having the correct ergonomic equipment or lacking air conditioning at home.

I do not have a proper chair. Never thought to get one since I thought and hoped that this situation is temporary.

However, amongst those who reported better health, some participants attributed this to the better work environment at home, with most highlighting that they had better air temperature and quality at home, having escaped the workplace air conditioner:

Room temperature and amount of fresh air is better as I can work with an open window and don't have to use AC all the time.

Amongst those who reported poorer health, one issue was the reduced border between work and home. Participants complained that work and life tasks as well as working and non-working time had merged, becoming indistinguishable – other workers contacted them after working hours, whereas they themselves found themselves checking emails after working hours. The lack of change of environment during and after work was also discussed negatively.

It is much more stressful working from home. People expect you to be available ALL the time and not just during office hours.

However, amongst those with better health, one of the reasons cited most frequently was the improved levels of flexibility and work-life balance. Participants highlighted how they could use their hours more flexibly to cope with other aspects of life. This generally went hand in hand with the time saved by no longer needing to have to commute. As discussed, participants could use the time saved and flexibility to exercise, eat and sleep better. Workers also saved time by not having to get ready for work and could also use the time saved to spend more time on chores, hobbies and their family. These are described in the final theme. The commute was also seen as a major source of stress for many. This was particularly meaningful for those living in Gozo (Malta's sister island) and stated that they previously had to commute to Malta daily for work.

Remote working enabled me to transition from work-time to personal-time much easier by avoiding commuting and the terrible Maltese roads traffic.

Another sub-theme that emerged were issues related to

work demands. Amongst those with poorer health, those with management tasks stated how they struggled to manage their teams remotely, adding that remote working during a pandemic presented new issues such as monitoring of staff's performance, issues of staff members unable to attend the workplace when needed (e.g., those caring for children), as well as struggling to keep up with changing COVID-19 restrictions and sourcing Personal Protective Equipment (PPE).

Workers also highlighted how their workload and working hours increased, tasks could become more difficult due to the lack of face-to-face discussions, that they struggled with changing work procedures and work tasks, and that added monitoring by controlling managers could be a source of stress and increased workload.

Too many changes taking place at once, too many new processes, too many long hours working till very late at night.

My direct line manager became even more controlling than before. This led to a big brother style situation where every move had to be monitored, there was a complete lack of trust, I ended up working more, and was always doubted.

Some of those who reported improved health, however, spoke positively of how they took on greater workloads or worked more efficiently in view of their reduced stress levels and quieter work environments they obtained through remote working:

I worked more, and in some instances I put in extra hours when necessary to meet deadlines, yet I felt less stressed.

Finally, participants with better health reported that reduced contact with other individuals at work aided them to avoid communicable diseases that they would otherwise usually suffer from.

Minimised contact with other persons and staying at home meant that I was not exposed to any microbes or bacteria from other persons. As a result, I wasn't sick at all, not even the common cold.

Pandemic specific factors

As already discussed, several individuals who reported poorer health described feelings of anxiety and fear in relation to COVID-19. Apart from this, a few other COVID-19 specific sub-themes emerged in relation to deteriorating health. Participants described frustration with COVID-19 restrictions, being stuck indoors and reduced levels of freedom. Primarily, participants highlighted their frustration at being stuck indoors and restrictions on

sports, which limited physical activity and socialisation, as well as their enjoyment of the outdoors which impinged on family life. Furthermore, the closure of establishments, measures to reduce transmission (such as the wearing of masks) and perceptions of reduced freedom were also highlighted as negatively impacting on health by some, including the "*constant media coverage of the pandemic*".

I can't stand staying locked at home 24/7.

Another related sub-theme was the inability to travel abroad. This was highlighted as having a negative effect for two reasons: participants who felt a need to travel for leisure but could not due to restrictions; as well as workers whose family lived abroad and thus were isolated from them, and unable to provide needed support:

Being away from my family and their health complications made it difficult to not be present for them.

A final sub-theme was dealing with COVID-19. A few participants highlighted how they had to deal with either being diagnosed with COVID-19, having a household member diagnosed with it, or having to quarantine due to it.

Mentally it was worse due to reasons related to my wife's covid diagnosis.

Personal factors

Amongst those with worse health, several participants highlighted the difficulty of working and living whilst around children and other household members. Primarily, participants emphasised the difficulty of working whilst trying to care for children, describing this as very stressful and extending working hours. Difficulties of trying to simultaneously cope with children's schoolwork as well as worries about children's future were also highlighted. Participants who lived with their parents also described how their privacy was eroded, whereas others described how their relationships regressed during the pandemic.

My mental health definitely suffered because I found it very stressful to work at home whilst taking care and abiding to my kids' needs and education at the same time.

Despite this, a reason given for better levels of health by others was the greater amount of time participants were able to spend with their partners, children and pets during the studied period. This was secondary to working from home, flexibility, and less time being lost commuting.

I got to dedicate more time to me and my family, for example sitting to have breakfast and lunch with them was something I was not able to experience before.

Remote Working was an ultimate blessing because having 3 little children flexibility is key and working remotely

provided me exactly with what I needed to be able to wrap my work around my family.

A second related sub-theme relevant to those who reported better health was dedicating more time for self. Apart from the aforementioned increase in physical activity, sleep and nutrition, participants also described enjoying their home, spending more time outdoors, and carrying out hobbies. These were facilitated by the time saved by avoiding the commute and being flexible.

Becoming less social was not the worst thing because I managed to rekindle my love for reading and writing

I had more free time after my work and could do the things I love

In terms of those who reported worse health, concerns about employment also played a role in a small group of individuals. A few participants highlighted how they or members of their household lost their job or were concerned about it. As explained below, the loss of a job carried additional stresses for non-EU workers:

When the pandemic hit, the mental health took a major hit as I was unsure how I will be able to stay in Malta on a work permit if I were to lose my job.

Discussion

In terms of the study's objectives, more than half of the studied IT and communication workers perceived that their overall health levels had changed during the first year of the pandemic, with more workers reporting that their health had regressed than improved. Limited evidence was obtained regarding associations between levels of remote working and levels of health, however a significant difference was identified between the proportion of remote working and reported change in overall health levels (Table 2); in particular, the group of individuals that reported carrying out the smallest proportion of their work tasks via remote working also reported a more negative change in their health during the studied period than the group that reported carrying out all of their work remotely (Table 3). Qualitative analysis revealed several factors believed to have influenced changes in overall health during this period. These included factors related to health behaviours, the development of emotions, disorders and diseases, work-related factors, and personal factors.

In line with Maltese⁵⁾ and EU statistics⁶⁾, remote working increased dramatically during the first year of the pandemic. Almost 80% of the sample carried out all or most of their work remotely, which appears substantially higher than a reported EU average of 14.2 h during June and July

2020³¹⁾. The difference is likely due to the survey having been conducted within the IT and communications sector, a sector which prior to the pandemic was most likely to have remote working arrangements in place³²⁾. The study also targeted companies that offered workers the possibility to remote work.

Overall health levels were generally reported to be high, with very few participants rating their health as fair or poor. Despite this, and in line with the study's first hypothesis, more remote workers perceived that their overall health had deteriorated than had improved during the first 12 months of the pandemic. Mixed findings on the impact of remote working on health have been reported prior to the pandemic³⁾ and in the current study positive impacts of remote working were also reported by participants.

It was hypothesised (Hypothesis 2) that those who carried out a greater proportion of their work tasks remotely would also experience poorer levels of health. The findings did not support this hypothesis, with limited associations being identified between the proportion of work conducted remotely and variables related to perceptions of overall health. Contrary to the hypothesis, a statistical difference was identified when the group undertaking the least amount of remote work (no more than half of their work was conducted remotely) and the group undertaking the greatest level of remote work (working entirely online) were compared, with the former reporting poorer scores in the variable 'change in overall health' than those who undertook all their work remotely. The finding is interesting as studies often suggest that prolonged remote working may be negative for workers' health and wellbeing⁹⁾. In view of the current study's cross-sectional design, however, it is unclear if health levels were affected by the proportion of remote working conducted, or if levels of health influenced individuals' remote working choices.

The current study also hypothesised that several other factors would be linked to improvements and deteriorations in health (Hypothesis 3). Qualitative findings supported a multi-factorial approach, with several potentially relevant factors emerging. The most frequent perceived reason for a deterioration in health was the development of negative emotions and mental health issues. The potential negative impact of remote working on mental health is well documented^{7, 8)}, with participants attributing this to issues such as social isolation and COVID-19-related worries. Studies have described how loneliness is a major challenge for those working from home¹⁹⁾, whereas worries regarding the danger of COVID-19 have previously been described in other contexts³³⁾. In fact, the

current study revealed that for some participants, reduced social support made it more difficult to deal with COVID-19-related fears. Feelings of boredom, demotivation and sadness were also linked to COVID-19 restrictions. Whilst Malta did not limit individuals' movements, gatherings were restricted and establishments were closed, limiting participants' options regarding where they could exercise and socialise. This might suggest that remote working during the first year of the pandemic had the potential to be more hazardous to health than remote working prior to this period, when workers were able to seek support and change environments more freely and were not yet burdened with worries related to the pandemic.

A smaller group of participants, however, attributed mental benefits to working remotely and to the first year of the pandemic. Such participants reported that their lives had become less hectic, that remote working sheltered them from COVID-19-related worries, and that working from home allowed them to avoid noisy work environments and difficult co-workers. Workers are concerned about COVID-19 to different degrees³³⁾ and thus those who have a proclivity to worry may have benefited more from remote working than those who do not. Furthermore, working with difficult people is one of the most frequently reported psychosocial risk factors present within European workplaces³⁴⁾, and thus remote working may have reduced workers' exposure to such a stressor. Participants' relationships with co-workers may therefore have had an impact on how the relative isolation associated with remote working was perceived.

Physical decline such as weight gain and the development of physical disorders were also discussed by participants. In line with previous findings^{10, 12)}, the development of musculoskeletal disorders were frequently mentioned. Such negative health changes were often linked to reduced levels of physical activity, malnutrition and a lack of correct ergonomic equipment once working from home. A small number of participants also had to cope with the direct or indirect effects of COVID-19. Despite this, for others, the period working from home was described as one where their health behaviours improved. In fact, changes in such health behaviours were reported more frequently by those whose health had improved. Reduced time spent commuting and increased work flexibility was described by participants as having allowed them to sleep more and better, find more time for physical activity and prepare better meals. In line with the scope of sheltering at home, participants also reported experiencing less communicable diseases whilst remote working. The mixed

findings obtained are reflected in the scientific literature. Studies have highlighted that sleep duration increased during the pandemic³⁵⁾, although sleep quality appears to have decreased^{10, 35)}. Remote working has also been linked to prolonged sitting³²⁾ and whilst it has been described that physical activity decreased during the pandemic, overall many continued exercising to the recommended amount¹³⁾. Mixed results have also been reported in terms of nutrition and habits during the pandemic, however trends are often negative^{36, 37)}, including in remote workers²⁰⁾. It is notable, however, that remote working provides workers with the potential to use time otherwise lost on commuting and to apply flexible work schedules to improve their health behaviours.

Whereas those who reported worse health described how they found it hard to disconnect from their work and to differentiate between working hours and free time, others spoke positively about how remote working boosted their work-life balance. Difficulty to disconnect was described as both imposed by the workplace, for example by ongoing work communication after hours, as well as self-imposed, where workers themselves found it harder to stop work or continued to check work communications during non-working hours. More participants, however, spoke positively of the time they saved by remote working and the flexibility that it provided, which benefitted their personal life. Such contrasts have previously been described¹⁸⁾ and remote workers have been shown to work longer hours and to worry more about their work after hours than non-remote workers³²⁾. The current study indicates how these factors could impact health and indicates that whilst remote working may aid in facilitating work-life balance there is also a real risk for many that work erodes negatively into their non-working hours.

Increased work demands were associated with poorer levels of health. The link between excessive work demands and the development of common mental health disorders has long been established within the scientific literature³⁸⁾. The loss of support described by remote workers is also a risk factor for such disorders³⁸⁾, whilst also exacerbating the negative impact of work demands upon workers³⁹⁾. Psychosocial risk factors have also been shown to impact upon physical health levels⁴⁰⁾. The study highlighted that managers' role became more demanding due to the difficulty of monitoring remote workers, as well as due to duties and process changes introduced due to COVID-19. Similarly, workers also felt that demands had increased, citing longer working hours, communication issues, changing tasks and monitoring procedures. Remote

working has previously been associated with greater work demands¹⁷⁾, whereas the difficulty in monitoring remote workers has also been highlighted by managers⁴¹⁾. Whilst the current study highlights how these factors were believed to have influenced remote workers' health in a negative manner, a smaller number of workers noted that working from home allowed them to cope with their demands more easily and associated this with better health levels. It is worth noting that such workers highlighted that remote working allowed them to take on greater workloads as they reported finding it easier to work from home. Whilst such workers found this less stressful, it is also possible that if this continued for a prolonged period, such added workloads may have a negative impact upon remote workers, without this necessarily being recognised.

Personal factors were also perceived to have influenced health levels. Most discussed were the impact of children, and to a lesser degree, other household members. A number of participants described the difficulty of coping with children and their schooling whilst trying to work. However, a similar number of individuals noted how remote working afforded them more time with the families, boosting their health. This conflict has previously been reported in the literature¹⁸⁾, and may have to do with other factors such as the age of children in question and support from other family members. Furthermore, schools across Malta were closed down during parts of the first 12 months of the pandemic, however different schools offered differing levels of online support during this period. Schools also reopened at different times and to different degrees, and thus may have influenced such perceptions. The current study therefore illustrates how this issue may have impacted upon remote workers' health. Women often face being burdened with greater family-related responsibilities, however the current study did not identify any statistical differences between the health of the genders. For several participants, the first year of the pandemic also afforded them more time for themselves, allowing them to engage in hobbies and other leisure activities. In line with the current study's findings, leisure activities have previously been linked to better levels of health⁴²⁾. A small number of participants, however, faced job uncertainty, a known stressor⁴³⁾. Unemployment levels were very low in Malta throughout the first year of the pandemic, possibly explaining why this sub-theme did not feature more often.

The current study therefore highlights how the experience of remote working can vary between individuals. In so doing, the study contributes by providing reasons as to why mixed findings have been reported in regards to

the impact of remote working upon health. To some, and in line with the study's third hypothesis, remote working can be described as a period of poorer health characterised by reduced exercise, poor nutrition and reduced sleep, with organisational factors such as excessive workloads and reduced social support believed to have contributed negatively. To others, remote working can provide an opportunity to live a healthier life and cope with workloads. In contrast with the third hypothesis, being male was not associated with better levels of health, whereas in terms of support, those reporting better health suggested that a lack of social contact had aided, rather than the availability of social support. The impact of children also appears to vary. Furthermore, factors not often associated with the health of remote workers were described, these included the avoidance of communicable disease, time saved from commuting, the benefits of flexibility and the subsequent increased time available for leisure activities. Conversely, others struggled to draw a border between work and non-working life, described that their isolation was exacerbated by COVID-19 and in some cases had to deal with this disease.

Limitations

The study focused on IT and telecommunication workers in Malta. Whilst this sector has a large percentage of foreign workers, the findings are not generalisable to other sectors, countries and cultures. Further studies that explore remote workers' health in other settings would therefore be of benefit.

Whilst the study was one of the first to explore remote workers' health during the COVID-19 pandemic, this was done by means of measuring workers' lay perceptions. Whilst many studies make use of such measures of health, future studies that make use of objective measures of health are required.

The cross-sectional and retrospective design of the study makes it impossible to determine the direction of the presented associations. Furthermore, the quantitative section of the study made use of several single-item measures which may have impacted upon validity. Whilst a few of these were sourced from other studies, future longitudinal studies are needed.

The study made use of a long recall period in order to reduce the impact of seasonal effects and the constant fluctuations in COVID-19 case numbers. It is however likely that the study's findings were influenced by recall bias, further highlighting the need for future studies that make use of different designs.

The study made use of an anonymous survey, whilst it is likely that this fostered participation, the design used did not allow for qualitative reasons to be probed.

Practical implications

The study highlights how the experience of remote working during the first 12 months of the pandemic varied between individuals. Remote working can be a positive experience which benefits health, but this appears to be dependent on workers using their additional time and flexibility to engage in positive health behaviours and other leisure activities. Furthermore, the home environment needs to foster healthy working and this depends on workers having access to the necessary support, realistic work demands and the required ergonomic equipment. Workers suffering from mental health issues may also benefit from the provision of support services.

In view of the findings, organisations should aim to educate their remote workers on topics such as physical activity, nutrition and sleep. Relevant activities, such as exercise classes, can also be carried out remotely. A policy on the right to disconnect may help workers to stop working during their non-working hours. Whilst this might not be possible in all situations, it may foster the setting of realistic targets, communication within the correct timeframes and ensure that non-working hours are used for activities unrelated to work. Managers struggling to monitor remote workers may also benefit from related training and support.

Work places should also aim to foster support and positive relationships between remote workers. One possible solution is by making use of a hybrid system where remote working is only used for part of the working week. The current study, however, indicated that those who carried out a greater percentage of their tasks by means of remote working also reported better levels of health; more research on this topic is therefore warranted.

Finally, those with children could find remote working particularly difficult. Further research regarding why some participants found this difficult and others did not is also warranted, however organisations could aid by providing employees with access to relevant childcare facilities.

Conclusion

The study revealed that whilst both positive and negative health changes were reported during the first 12 months of pandemic, more workers reported that their overall health had regressed. Workers who reported carrying out a lesser percentage of their work by means of

remote working were also more likely to perceive that their health had deteriorated. Several factors were identified that were believed to have influenced remote workers' health. These included: health behaviours, including physical activity, nutrition, and sleep; the development of disease, particularly mental health issues; work related factors, such as social support, work demands, flexibility and the blurring of boundaries between work and life; and personal factors, including family life and leisure.

It can be concluded that remote working can be a healthy way of working, but organisations should aim to foster health promoting behaviours in their employees, provide them with a realistic amount of work, foster organisational support, develop and enforce comprehensive policies that allow workers to disconnect from their work during non-working hours, and facilitate a healthy remote working space which may include measures to support those with young children, when needed.

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Conflicts of Interest

The author reports no conflicts of interest.

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