Remote Work and Well-being

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ABSTRACT

Remote work traditionally has allowed people flexibility in how they approach their work practices, and the benefits and challenges of remote work are well documented in the literature. However, with the recent rapid shift to working from home for a significant portion of the workforce, the traditional notions about remote work have been challenged. Remote work looks different when everyone is doing it. There are now entire families who coexist in the same household during working hours, and the need to balance between work and personal life is more pressing than ever before. In this research we study the impact of remote work on the well-being of people who have had to adapt their work lives to being at home. We focus on the cognitive aspect of getting work done, the challenges of negotiating boundaries and the impact on physical and mental well-being – all of which are important components of productivity and life satisfaction. Based on our findings from an external survey, we derive insights for how future workplaces that are looking to move to a hybrid model of remote work can adapt in the near future.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**; *Empirical studies in HCI*.

KEYWORDS

Work-life boundary, well-being, modern workplace, COVID19.

1 INTRODUCTION AND RELATED WORK

Remote work has traditionally afforded people flexibility in how they approach their work practices, and the benefits and challenges

of remote work are well documented in the literature [2, 3, 8]. Typically, remote work is available as an option to a subsection of the workforce whose job responsibilities may fall in the 'non-essential' category, often applicable for information workers (IW). However, with the mandate to work-from-home (WFH) during the current pandemic for a significant portion of the workforce, coupled with school closures and stay-at-home orders [6], remote work experiences could be expected to diverge from the traditional experiences, and the balance between work and personal life may have also shifted.

Remote work has been shown to lead to higher productivity [5, 18], with those who were less productive at home more likely to return to the office after the mandates are lifted [5]. The extent of remote work has also been associated with higher employee retention and greater commitment to the organization [12, 13]. Although remote work was originally promoted as a way to satisfy societal (e.g., environment) and individual needs (e.g., transportation, family, leisure) and to reduce work-family conflicts [27], recent changes of entire households being locked down at home suggest a fresh look at the benefits of remote work.

Remote work during the pandemic re-introduces some of the known WFH challenges from prior work. Although remote work allows flexible transitions back and forth between work and family roles, workers have had conflicting tensions between the flexibility in interweaving work and home roles and creating a structure to separate the two [9]. Non-work distractions increase when working from home, whereas work-related distractions decrease for many, and distractions from caregiving, for example, tend to fall harder on women than men [32]. Following prior work [14], looking at how workers have been able to focus on their work during the pandemic is an important and timely area of research.

While people try to balance work and personal life, there is evidence that self-reported productivity and satisfaction vary by individual differences such as experience, job responsibilities, personality and family situation. Prior research found that factors like personality [28] and gender [2, 16] play a role in remote work outcomes. Previous work also suggests that work that is easily codified is more amenable to remote work [4, 33], but that creative work [10], new work streams [11, 29], and tasks that require extensive collaboration will suffer when done remotely [10, 33]. Therefore, accounting for individual differences is key in characterizing the impact of remote work during the pandemic.

Remote work has been known to impact workers' well-being through their perceived inability to switch off [8] and work longer hours [26] . In fact, remote workers may be inclined to work more hours to signal "work devotion" in lieu of being able to do so through consistent physical presence at the office [13]. In addition, remote workers feel socially isolated from their colleagues [25] with face-to-face interaction in the office being most important for maintaining workplace friendships [31]. More generally, evidence suggests that long-term, ubiquitous, remote work negatively affects relationships among coworkers [2]. During the pandemic, mandated social distancing measures are likely to impact those living alone or those who normally thrive with social interactions, resulting in loneliness.Although mandated WFH may create other quality-of-life benefits such as less time spent on commuting and more time spent with family, lack of social interactions with coworkers and working longer hours could impact workers' overall physical and mental well-being and raise concerns about long-run burnout.

Prior research has alluded to one specific challenge of remote work, which is blurring the work-life boundary during remote work [2]. However, due to the elimination of physical boundaries separating the office and home, the current pandemic situation eliminates the temporal boundary afforded by a commute as well as causing the accrual of additional care-giving duties due to school closures or lack of access to external caregivers or care services. These new challenges introduced by the mandated WFH measures have not been studied before. Therefore, targeted research on the impact of such measures on remote work and well-being is critical in informing policy makers and organizational leaders in supporting workers now and in helping them prepare not only plan for the potential next pandemic-like disruption, but also inform development of new hybrid workplace and workforce experiences.

It is our goal in this submission to characterize the effects of WFH during the pandemic with an eye toward future designs of productivity tools and policies that might help offset some of the negative consequences, while hopefully amplifying the positive outcomes. The specific research questions that we are interested in include: 1) How is one's ability to get work done being impacted during the work-from-home mandate? 2) How is one's well-being affected as a result of the work-from-home mandate? and 3) How are people managing boundaries between work and personal responsibilities during work hours? We now turn to our study of balancing work and well-being while remotely working from home.

2 METHOD

Our goal is to understand the effects of remote work and mandated work-from-home measures and the associations between remote work contexts (e.g., number of children, work setting), job demands (e.g., hours of remote meetings), and physical and mental well-being (e.g., exercise, exhaustion, ability to focus). We conducted a survey to collect objective measures of remote work contexts as well as subjective ratings of remote work and its impact.

2.1 Survey Design

Our survey questions included basic demographic information (e.g., age, gender, education, job role), household information (e.g., number of children, number of remote workers), economic impact (e.g., changes to employment), work setting at home (e.g., satisfaction, configuration), technology use (e.g., number of remote meetings), well-being behaviors (e.g., exercise, healthy eating), and open-ended questions about modifications to and sharing of work setting as well as challenges of remote work and its impact on well-being. We also included previously validated scales such as Work-Life Indicators [20], Big 5 Personality Inventory [7], Maslach Burnout Inventory [24], Job Content Questionnaire [19], Cognitive Absorption Scale [1], Social Connectedness Scale [22], and the UCLA Loneliness Scale (short form) [17, 30]. We strictly followed the question-response language and the order of questions from the original scales with a few exceptions to accommodate the currently mandated work-from-home measures and to apply the scales to our study contexts. From the Work-Life Indicators, we removed questions 6 ("I regularly bring work home."), 8 ("I work during my vacations."), and 10 ("I usually bring work materials with me when I attend personal or family activities.") because our participants were mandated to work and remain at home. All questions from the Cognitive Absorption Scale were rephrased to refer to "work" instead of "the Web" (e.g., "Time flies when I am using the Web" is rephrased to "Time flies when I am working.").

2.2 Participants

Survey participants were recruited by posting a link to the survey on popular social media platforms (e.g., Facebook, Twitter, LinkedIn) on a large technology company's accounts. The survey was advertised and primarily open for two weeks from the last week of April, 2020 and was restricted to U.S. residents. We received a total of 224 responses with 127 complete responses and 97 partial responses.

Of the 187 participants that reported age, 29.4% were 36-45 years old, 25.1% were 26-35 years old, 22.5% were 46-55 years old, and 13.4% were 18-25 years old. Forty-two percent of our participants reported as being male, 40.6% as being female, 0.5% as being non-binary, and 17% did not report their gender. Participant roles included Engineer/Technologist (33.7%), Researcher (19.0%), Academia/Education (13.2%), Manager (8.4%), and Marketing/Public Relations (6.3%). Fifty-five percent of our participants reported pursuing or having a post-college degree, and 43.9% reported pursuing or having a college degree. Thirty-eight percent of our participants reported annual household income between $100,000 and $200,000, and 36.8% reported having over $200,000 as their annual household income. Only 14 participants reported that they had reduced work hours, and four reported job loss.

2.3 Analysis

All survey questions were optional, and included a "prefer not to answer option" to respect our participants' privacy and choice. The skipped questions were excluded from our analysis. For validated scales that included multiple questions and depended on complete responses to arrive at the measure, only participants who completed all questions for each scale were used in our analysis. For the Social Connectedness and Loneliness scales, we averaged the response values if the participant responded to at least 7 out of 8 questions. A handful of our participants responded with ranges of time (e.g.,

30-60 minutes, 4-5 hours) instead of a precise time values, and we manually re-coded these responses to be the midpoint of the time ranges. For our qualitative analysis, we coded the open-ended responses to derive themes that led to insights around the factors that we were interested in.

In our analysis, we examined four dependent variables: *Focused Immersion, Loneliness, Emotional Exhaustion*, and *Boundary Control. Focused Immersion* is a subscale of the Cognitive Absorption scale [1] and is a measure of the degree to which one is totally engaged in their work. *Loneliness* is a measure from the UCLA Loneliness Scale [30] and measures the extent to which an individual experiences loneliness. *Emotional Exhaustion* is a subscale of the Maslach Burnout Inventory [24] and measures the extent to which one feels emotionally drained from one's work. *Boundary Control* is a subscale of the Work-Life Indicator scale [20] and measures the degree to which an individual feels they can control their work and personal life boundaries.

Our independent variables included the following: *Job Demands, Control, Work Identification, Extraversion, Neuroticism, Hours on Devices, Hours in Remove Meetings, Children under 18*, and *Satisfaction with Work Setting. Job demands* is a subscale from the Job Content Questionnaire, measuring the degree of job demands [19]. *Control* is a subscale from the Cognitive Absorption scale [1] and is a measure of how much control one feels they have in their work. *Work Identification* is a subscale from the Work-Life Indicator scale [20] and measures the extent to which people identify with, and are devoted to their work roles. *Extroversion* and *Neuroticism* are measures from the Big 5 Personality Inventory [7] and known to impact focus and stress [23]. *Hours on Devices* and *Hours in Remote Meetings* are self-assessed average daily measures. *Children under 18* is based on self reports as caregiving responsibilities are expected to impact work-from-home experiences. *Satisfactions with Work Setting* was measured using a 5-point Likert scale. We also included two demographic variables, *Gender* and *Income*, which served as controls.

Our quantitative analysis used linear regression. Multicollinearity in all four models was checked, and the variance inflation factor (VIF) indicated that multicollinearity was not a problem.

3 RESULTS

We set out to understand three aspects of working from home during the pandemic: 1) how people's work was being affected, measured through *Focused Immersion* and *Physical Work Setting* 2) how people's well-being was impacted, measured through *Loneliness, Emotional Exhaustion, Stress and Anxiety*, and *Exercise and Healthy Eating*, and 3) how people were managing the boundaries between work and life, measured through *Interleaving* and *Boundary Control*. We report our results using both quantitative and qualitative analysis.

Tables 1-4 show the results from the quantitative analysis for the four dependent variables we examined. In all the tables, Est refers to the unstandardized beta coefficient and std. Beta refers to the standardized beta coefficient.

Table 1: Variables predicting Focused Immersion.

Predictors	Est	std. Beta
(Intercept)	1.778	
Gender	-0.162	-0.074
Income	-0.002	-0.002
Job Demands	0.009	0.045
Control	0.202*	0.204
Children under 18	-0.085	-0.066
Satisfaction with Work Setting	0.211*	0.22
Work Identification	0.565***	0.388

$^*p < 0.05, ^{**}p < 0.01, ^{***}p < 0.001$, adj. $R^2 = 0.26$

3.1 Effects on Work

3.1.1 Focused Immersion. For *Focused Immersion*, we hypothesized that higher *Focused Immersion* would be associated with higher *Job Demands*, higher *Control*, fewer *Children under 18*, a greater *Satisfaction with Work Setting*, and greater *Work Identification*. The regression model of *Focused Immersion* (Table 1) was significant: $F(7, 101) = 6.34, p < .0001$. *Gender* and *Income* had no effect. Greater focus in work was associated with higher *Control* in work, a greater *Satisfaction in Work Setting*, and a stronger *Work Identification*. *Job Demands* and *Children under 18* showed no effect. This model explained 26% of the variance.

For respondents with care-giving responsibilities, 84.8% of the females and 69.2% of the males reported that care-giving responsibilities made it somewhat to much more difficult to work. Responses to open ended questions suggested that the difficulties accrued from balancing homeschooling and household chores. One male respondent stated: *"...Adding a new job home schooling a 7yo and 6yo to my already intense work life"*, while a female respondent highlighted the intensity of additional challenges: *'It's really shown how much I'm responsible for as part of the household. No one else is just as busy as they were before the shut down. No one else is busier, except for parents, and specifically, the parent that takes care of the chores (cooking, cleaning, shopping, teaching)".*

3.1.2 Physical Work Setting. 45.51% of the respondents (48.75% of the females and 40% of the males) reported having to work in shared spaces or not having dedicated space for work. However, only 21% of the respondents reported that they were dissatisfied with their current work setting at home, and 62.5% were satisfied with their setting. People reported adapting and adjusting to the needs of the other people in the house, in order to ensure that they were able to carry out their work responsibilities. For example, one respondent stated that they must *"... coordinate who gets the shared office for a phone call. Paying attention to video calls to avoid being in the background"*. Another respondent highlighted the need to share devices: *"We only have one desk set up with multiple monitors, so we switch off throughout the day depending on who's work requires more screen real estate at any given moment"*. Even for people used to working from home, the new reality of having other people in their space results in space challenges, as exemplified in this quote: *"My space, which has been my space for years off the kitchen, is now encroached on by the other adults working in my home. Others get*

Table 2: Variables predicting Loneliness.

Predictors	Est	std. Beta
(Intercept)	-1.000	
Gender	-0.048	-0.037
Income	-0.046	-0.088
Job Demands	.024*	0.203
Control	0.013	0.023
Children under 18	-0.018	-0.025
Extraversion	0.072*	0.256
Neuroticism	0.105***	0.378
Hours on Device	0.045*	0.194

$^*p < 0.05, ^{**}p < 0.01, ^{***}p < 0.001$, adj. $R^2 = 0.26$

frustrated with their closed-off spaces because of darkness/coldness (in the basement) or smallness (bedroom)".

3.2 Effects on Well-being

3.2.1 Loneliness. For *Loneliness*, we hypothesized that higher *Loneliness* would be associated with higher *Job Demands*, lower *Control*, having fewer *Children under 18* in the house, spending more *Hours on Devices*, and personality measures of higher *Extroversion* and higher *Neuroticism*. The regression model for *Loneliness* (Table 2) was significant: $F(8, 82) = 4.85, p < .0001$. *Gender* and *Income* had no effect. The higher the *Job Demands*, the higher one scored in *Extroversion* and *Neuroticism*, and the more *Hours on Devices*, the more *Loneliness* respondents reported. *Control* in work and *Children Under 18* had no effect. This model explained 26% of the variance.

Even though the models did not find the number of children under 18 to not have an effect on loneliness, our qualitative analysis brings out some of the isolation concerns for people who do not live with young children. We found that respondents without childcare responsibilities, both on the younger end of the spectrum and older adults, were mostly impacted by loneliness. One male respondent reported: *"Living alone and already not having many friends or family close to me the restrictions to stay inside all day for an overall long duration while orders are in place has made it even more sad and rough that there aren't even little interactions by getting to go somewhere"*. A female respondent in the 18-25 age category with no children stated: *"Even though my social life was probably not incredibly exciting to most people before this, I saw my co-worker friends every day. I miss spontaneous conversations, especially since I think it's good socially and for my research. I get anxious more easily as well"*. These are a couple of examples of the invisible struggles that some people reported to face while working from home, implicitly impacting their mental well-being.

3.2.2 Emotional Exhaustion. For *Emotional Exhaustion*, we hypothesized that higher *Emotional Exhaustion* would be correlated with higher *Job Demands*, lower *Control*, having more *Children under 18* in the house, and longer *Hours in Remote Meetings*. The overall model (Table 3) was significant: $F(6, 106) = 14.41, p < .0001$. Females were more likely to experience *Emotional Exhaustion*, and the lower the *Income*, the greater the *Emotional Exhaustion*. The higher the *Job Demands* and the less sense of *Control* in work, the greater the *Emotional Exhaustion*. Further, the more *Hours in*

Table 3: Variables predicting Emotional Exhaustion.

Predictors	Est	std. Beta
(Intercept)	3.461***	
Gender	0.390*	0.186
Income	-0.220**	-0.264
Job Demands	0.049**	0.262
Control	-0.452***	-0.47
Children under 18	0.116	0.094
Hours in Remote Mtgs	0.098*	0.176

$^*p < 0.05, ^{**}p < 0.01, ^{***}p < 0.001$, adj. $R^2 = 0.42$

Remote Meetings, the greater the *Emotional Exhaustion*. This model explained 41% of the variance.

3.2.3 Stress and Anxiety. For self-reported stress and anxiety, 48.6% of respondents reported that they felt stressed or anxious about half the time or more and 42.0% reported sometimes. Females reported stress and anxiety significantly more frequently than males $(t(133) = -3.9, p < 0.001)$.

3.2.4 Exercise and Healthy Eating. We hypothesized that people with children at home would participate in less exercise and less healthy eating behaviors. 54% of the respondents reported that they were exercising less now compared to before the WFH measures were put in place, while 29.0% reported they were exercising more. While 50% of the females with children reported that they were exercising *much* less, t-tests did not find a significant difference between people with or without children under 18. 45% of the respondents reported that they were eating more healthy now compared to before the WFH measures while 28.4% reported they were eating less healthy compared to before. We saw that people with children under 18 were eating significantly less healthy than those without $(t(143) = 3.97, p < 0.001)$.

3.3 Work-life Boundaries

3.3.1 Interleaving. Our survey results showed that most people strongly agreed that they were interleaving their work and personal life: 36% females with childcare responsibilities, in particular, strongly agreed that they were doing personal work during work time. Most people (70.35%) also somewhat to strongly agreed that they engaged in work tasks during personal time. However, in the open-ended responses, we saw a dichotomy across care-giving responsibilities. Those who do not have care-giving responsibilities can plan for interleaving (e.g., doing laundry or cooking) whereas for those with care-giving responsibilities, the interleaving happens due to factors beyond their control, hence they have difficulty in resuming their interrupted activities.

3.3.2 Boundary Control. For *Boundary Control*, we hypothesized that higher *Boundary Control* would be correlated with lower *Job Demands*, higher *Control*, fewer *Children under 18* and less *Hours in Remote Meetings*. The regression model (Table 4) was significant: $F(6, 106) = 5.73, p < .0001$. The controls of *Gender* and *Income* were not significant. The perceived sense of control for managing the boundary between work and family life was associated with lower *Job Demands*, a greater sense of *Control* in work, and fewer

Table 4: Variables predicting Boundary Control.

Predictors	Est	std. Beta
(Intercept)	3.981	
Gender	-0.28	-0.116
Income	0.138	0.144
Job Demands	-.059**	-0.272
Control	.293**	0.264
Children under 18	-.289*	-0.203
Hours in Remote Mtgs	0.044	0.069

$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, adj. $R^2 = 0.20$

Children under 18 in the household. *Hours in Remote Meetings* had no effect. This model explained 20% of the variance.

In summary, we found that having less control over work, sharing work spaces or devices at home, unsatisfactory work settings, or care-giving responsibilities impacted our respondents' work and the ability to focus. In terms of well-being, personality traits, such as extroversion or neuroticism, spending more time on devices, or not having care-giving responsibilities led to loneliness. In addition, having less control of one's work with longer hours in remote meetings led to higher emotional exhaustion. Stress, exercise, and healthy eating were negatively impacted by remote work as well. Although most reported being able to interleave work and life, the sense of control for managing work-life boundary depended on job demands, control over work, and care-giving responsibilities.

4 DISCUSSION

Our research explored how work is being impacted as people work from home during the pandemic, its potential impact on well-being, and how people are managing the boundaries between work and personal life. We found that people are having difficulties in focusing on work - those with lower control in work, lower satisfaction in the work setting and less work identification suffer from being unable to focus in their work. Anecdotally, those with childcare responsibilities found it more difficult to focus, compared to those who didn't have childcare responsibilities. We also learned that, although less than half the people had to work in shared spaces, only 21% reported to be dissatisfied in their work setups. The difficulties in focusing, therefore, mostly emerged from the challenge of managing responsibilities beyond work. Although our research did not measure productivity explicitly, prior research has shown that the ability to focus on work positively impacts productivity [15]. Therefore, organizations and communities that enforce remote work policies should also consider providing adequate work support for those with less control over work or work settings at home in order to improve their workers' focus and productivity. These could be more flexible work practices including different work hours, reducing requirements on online meeting participation and more holistic ways of measuring productivity and performance. Such policies should not only benefit those who have specific challenges, but the workforce in general.

We also found significant impact on well-being as a result of working from home during the pandemic. These effects were manifest in measured loneliness, emotional exhaustion, and stress, as well as in changes in exercise and healthy eating behaviors. For example, those with higher job demands, those who were more extroverted and those who spent more hours on devices reported to suffer most from loneliness. In the open-ended responses, we found that adults without care-giving responsibilities had the most challenges with loneliness. This suggests that the loss of social interactions at work have a strong impact on loneliness when people are alone and working remotely. Although we found longer time on devices to be a significant factor impacting loneliness, this could be a result of people engaging with devices more to counter their need for companionship.

Our models showed people were affected differently in feeling emotional exhausted. Females were more likely to experience emotional exhaustion, as did those with lower income. Higher job demands and less sense of control of work, as well as more remote meetings, also impacted emotional exhaustion. Females reported having higher stress and anxiety compared to males. Those with children reported eating less healthy. Based on our understanding of the impact of remote work on physical and emotional well-being and the differences in its impact across various demographic subgroups, it is critical to provide flexible well-being support that caters to individual needs and circumstances when providing WFH guidance. Such support could include mental health resources to the most vulnerable workers, flexibility in working hours for those who have to balance multiple responsibilities, emphasis on the important of breaks and taking time off, normalizing integration of family needs during work time and so on.

Working from home while managing boundaries between work and personal life presents a significant challenge, especially when other family members are also at home. We found that people managed this by interleaving work and personal life - for most people, their personal responsibilities permeated their work hours, and they let work interrupt them during personal time. Although these patterns may not be entirely new, the mandate to stay home has likely blurred the boundaries further, and amplified how work and personal life have become more intertwined. Our models show that people with less control over their work, with children and lower job demands tend to have less control over their work-life boundaries. The difficulties of work-life balance are not new. However, because of the amplification effect during the pandemic, organizations and remote workers should pay extra attention to work-life balance and ways to support optimal well-being based on workers' preferences [21]. For example, workers themselves should make sure they allow time for mindfulness and reflection, feel comfortable to take breaks and attend to physical and mental well-being and set reasonable expectations for themselves.

Our survey respondents were mostly biased towards higher social-economic status (SES), yet we still see challenges for them in managing work and personal life. Although we did not have enough representation from those with lower SES, extrapolating from our results, we can hypothesize that their challenges would be even greater. Future work must study the unique difficulties of a lower SES population.

Our findings bring up important points to consider as we start to plan towards future workplaces where hybrid practices are expected to prevail for the near future. The current problems provide us a glimpse into part of the challenges future workplaces will have to address - how to make the experience better for those

who will continue to work from home? As schools plan moving towards hybrid learning, this will result in many parents having to work from home part or full time in order to continue to balance their work and personal life. How do people manage their *hybrid workpatterns* especially in coordination with their collaborators? On the other hand, people who return to work cannot expect to return to the pre-pandemic state. They will likely find a very different environment, physically, collaboratively, and even socially. How does organizations help people reformulate their work to adapt to these modified scenarios such as socially distanced co-located meetings or casual water cooler conversations while staying at a safe and healthy distance? Moreover, there will be the additional challenge of *hybrid workforces* where some people will work from home, while others will work in their offices. How can equitable experiences be created so that those working from home are not unfairly at a disadvantage and can collaborate seamlessly when facing disparate work situations? The ideation and design of the modern workplace and workforce of the future must consider these imminent challenges as it pertains to the near future.

5   CONCLUSION

This paper presented the results of a survey designed to understand the impact of remote work on the well-being of people whose jobs had to adapt to being at home during the pandemic. By analyzing the responses of almost 200 people, we found that many aspects of the current emergent remote work experience, such as shared work spaces and care-giving responsibilities, had a negative impact on the cognitive aspect of getting work done. Participants reported feeling loneliness and emotional exhaustion, and these findings were particularly associated with certain personality traits (e.g., extroversion and neuroticism were correlated with loneliness) and work contexts (e.g., more hours in meetings were correlated with exhaustion). Although most reported being able to interleave work and life, the sense of control for managing work-life boundary depended on job demands, control over work, and care-giving responsibilities. Our hope is that these findings can inform people's work practices in a way that preserves and improves their well-being as we increasingly move to a hybrid model of work.

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