

5-5-2021

The Effects of At-Home Remote Work Environments on Human Cognitive Performance and Work Task Performance Based on Current Societal Conditions

Angela Arias
arias6@my.erau.edu

Follow this and additional works at: <https://commons.erau.edu/edt>



Part of the [Cognitive Psychology Commons](#), [Human Factors Psychology Commons](#), [Industrial and Organizational Psychology Commons](#), [Systems Engineering Commons](#), and the [Training and Development Commons](#)

Scholarly Commons Citation

Arias, Angela, "The Effects of At-Home Remote Work Environments on Human Cognitive Performance and Work Task Performance Based on Current Societal Conditions" (2021). *PhD Dissertations and Master's Theses*. 598.

<https://commons.erau.edu/edt/598>

This Thesis - Open Access is brought to you for free and open access by Scholarly Commons. It has been accepted for inclusion in PhD Dissertations and Master's Theses by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu.

**The Effects of At-Home Remote Work Environments on Human Cognitive Performance
and Work Task Performance Based on Current Societal Conditions**

by

Angela Marie Arias

B.A., Psychology, California State University Northridge, 2018

A Graduate Thesis Submitted to the College of Aeronautics,
Department of Graduate Studies, in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Human Factors

Embry-Riddle Aeronautical University

Worldwide Campus

May 2021

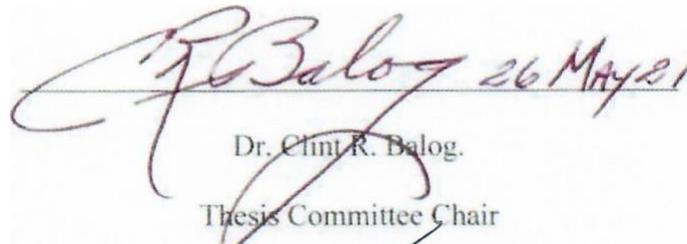
The Effects of At-Home Remote Work Environments on Human Cognitive Performance and
Work Task Performance Based on Current Societal Conditions

by

Angela Marie Arias

This Graduate Thesis was prepared under the direction of the candidate's Thesis Committee
Chair, Dr. Clint R. Balog, and Graduate Thesis Committee Member Dr. Dennis A. Vincenzi,
Worldwide Campus, and has been approved. It was submitted to the Department
of Graduate Studies in partial fulfillment of the requirements for the degree of
Master of Science in Human Factors

Graduate Thesis:



Dr. Clint R. Balog.
Thesis Committee Chair



Dr. Dennis A. Vincenzi.

Thesis Committee Member

26 May 21

Date

“Everything is energy and that’s all there is to it. Match the frequency to the reality you want,
and you cannot help but to get that reality, it can be no other way.” – Albert Einstein

Dedications

To Glen Alfter. I wish you were here today to share this experience with us. I truly appreciate all of your love and support while you were here, and for treating me like

I was a granddaughter of your own. Love you.

To Jerry Lawrence. Jerry, I did it! Although you would say, “see, and you were worried for nothing!” Thank you for helping me realize the tenacity in me, your brutal honesty, and your spirited Marine jokes. Wish you were here. Love you.

Acknowledgements

To my father, Angel A. Arias, and grandmother, Bette Alfter, I cannot express how beyond grateful I am for your love, sacrifice, prayers, and overall support throughout these years.

Thank you for your continuous belief in me and encouragement to pursue my greatest endeavors.

To my fiancée, John H. Franco II, I truly appreciate your support, encouragement, and for being by my side. Your love and everything that you have endured with me do not go unnoticed.

To Robert Jones, I am the utmost humbled and grateful for your mentorship, love, and guidance since the very beginning.

To my advisors, Dr. Clint R. Balog and Dr. Dennis A. Vincenzi, I am immensely grateful for your superior guidance and patience throughout this thesis journey.

Thank you for challenging me, yet allowing me to use my creativity in approaching my research. You both have truly made this a positive learning experience for me. I hope years from now, I am on the other side.

Abstract

Home-based remote work systems present a unique set of cognitive performance and work task performance challenges to employees without remote work experience. The COVID-19 pandemic forced companies into transforming their work system structures, and their employee roles, without the preparation or education of the dynamics that surround home-based remote work systems. This thesis benefits the Human Factors community by investigating the effects of at-home remote-based work environments on cognitive performance, and work task performance, of employees who currently work remotely from home. A multimethod approach was employed to carry out this research. A survey was administered to home-based remote employees, with varying levels of remote work experience, to investigate the cognitive and work task performance issues as they relate to the at-home remote work environment. While this study did not yield statistically significant results, it did identify key themes and distinctions between experienced remote workers and inexperienced remote workers as they relate to cognitive and work task performance. Furthermore, it did identify an interrelationship between cognitive performance and work task performance. Findings in this study can serve as a baseline of understanding for employers, and researchers, interested in developing effective, contemporary, home-based remote-work systems, policies, and procedures that are congruent with current societal conditions.

Keywords: human factors, remote work, remote employee, telework, work systems, cognitive performance, work performance, covid-19, pandemic

Table of Contents

	Page
Graduate Thesis Cover Sheet	1
Dedications	4
Acknowledgements	5
Abstract	6
Table of Contents	7
Chapter I Introduction	9
Significance of the Study	9
Statement of the Problem	10
Purpose Statement	11
Research Question and Hypothesis	12
Delimitations	13
Limitations and Assumptions	14
List of Acronyms	14
Chapter II Review of the Relevant Literature	16
Background	16
Remote Work Benefits	17
Identified Remote Work Issues	19
Boundaries in the Home-work Domain	20
Cognition in the Workplace	22
Summary	23
Chapter III Methodology	25

Research Approach	25
Design and procedures	26
Apparatus and materials	28
Sample	29
Sources of the Data	30
Validity	30
Treatment of the Data	31
Chapter IV Results and Discussion of Results	33
Results	33
Quantitative Analysis	34
Qualitative Analysis	44
Discussion of Results	58
Chapter V Conclusions and Recommendations	65
Conclusion	65
Recommendations	67
References	68
Appendices	73
Appendix A.....	73
Appendix B.....	75
Appendix C.....	77
Appendix D.....	79

Chapter I

Introduction

Significance of the Study

Societal changes that occurred as a result of the COVID-19 pandemic changed the way in which we function as a whole. Particularly, this change drastically impacted the function and structure of work systems in countless organizations across the nation. Due to the abrupt changes those work systems have encountered, and the prevalence of remote work implementation efforts, home-based remote work systems are challenged. Remote work was widely unpracticed in several companies. The majority of organizations were unprepared and undereducated of the dynamics that surround home-based remote work systems as they relate to human cognition and work performance, an area in which this thesis addressed.

The findings of this study benefit the human factors discipline and community by providing relevant and current data that generates deeper insight into the relationship between at-home remote workers and their work environments through the investigation of cognitive factors and performance issues that may surface as a result of this interaction. This data benefits the Human Factors and Ergonomics (HF/E) community by its contribution to the exploration of an emerging domain within HF/E research. Results from this study also provides guidance to future researchers, practitioners, Human Resources, and other organizations in understanding issues surrounding the interaction between humans and their work environment.

Incorporating remote-based options to organizational structures potentially creates industry-changing dynamics for companies worldwide. Given the widespread uncertainty of how to establish a successful remote work system, largely with companies that were not intended for remote work, businesses that are considering an organizational transition to include home-based

remote work options may also profit from this research. The findings from this study can also assist businesses in the preparation for such a transition by highlighting some of the known issues with remote-based work, and the identification of any unknown issues associated with this type of work system, overall, helping businesses to avoid the risks involved with at-home remote work systems. Additionally, this research can benefit businesses seeking to implement training protocols for at-home-remote-based work. The goal of this research was to discover any cognitive factors and performance issues that surround a home-based remote work environment. In addition, this research aimed to set the foundation of new, relevant knowledge, providing its contributions to the ongoing body of research surrounding cognition and human performance.

Statement of the Problem

The problem that was examined in this research study is that at-home remote-based work environments present a unique set of challenges that have the potential to negatively impact cognitive performance and work task performance. Due to the COVID-19 pandemic, employees worldwide were forced into making abrupt changes to their work structure and systems by shifting their daily work processes from a traditional, non-remote, work setting to working remotely from home (Sytych & Greer, 2020). Majority of workers were unprepared, most without the proper resources or designated office space, and were forced to adapt by using kitchen tables as work desks and living room spaces as office space (Toniolo-Barrios & Pitt, 2020). Additionally, several workers attempted this transition while managing a family. Nearly a year later, society has yet to resume back to a level of “normalcy,” which has created a new set of challenges for at-home workers that differ from those experienced in a traditional work environment.

An at-home work environment is dynamic in nature and many events that take place are often unpredicted. Because of this, it may precipitate undesirable cognitive demands and performance issues, such as concentration and interference from home environmental factors (Grant et al., 2013). One of the more prevalent home-environmental challenges that workers have faced is the balance between childcare while working. Parents are susceptible to interruptions from their child/children that are distracting from their work (Toniolo-Barrios & Pitt, 2020). Doorbell rings, pets, and other family/home obligations are other common distractions that are experienced (Toniolo-Barrios & Pitt, 2020). Factors in the home environment can also create technological challenges, preventing the worker from being able to perform their duties efficiently or in a timely manner. A lack of boundaries between work and home-related tasks is another problem that many individuals face (American Psychiatric Association, n.d.). Oftentimes, workers will postpone their work until later, or may lack the discipline to complete their work on time. In sum, these known factors have the potential to negatively affect workers' performance and cognitive ability while working at home, and in some cases, causing physiological effects.

Purpose Statement

The purpose of this study was to investigate the effects of at-home remote-based work environments on cognitive performance and work task performance of employees who currently work remotely from home. This study aimed to develop a descriptive understanding of the factors that lie within the complex system of home-based remote-work environments and the role they play in individual cognitive performance during remote work tasks, as well as the impact such factors have on how the individual performs their daily work tasks. As a result of fulfilling this purpose, this study furthers the area of research surrounding remote-based work systems by

developing a baseline of understanding in the specific domain of home-based remote work systems, and also providing a basis for employers and researchers for developing effective, contemporary, home-based remote-work systems, policies, and procedures that are congruent with current societal conditions.

In addition to individuals who have already begun the work-from-home transition, a range of companies have expressed their intent to transition many traditional non-remote roles into permanent remote-based roles (Sytych & Greer, 2020). As this emerging work culture/system becomes more prevalent, it has the potential to shift the way employees interact with their work environment on a larger scale, which is why it is imperative that research is conducted on cognitive factors and performance issues that are uniquely derived from at-home remote-work environments.

Research Questions and Hypotheses

The following research questions and hypotheses were tested in this study. To perform this analysis, a mixed methodology was employed which consisted of both qualitative and quantitative data collection and analysis. A mixed-methodology provides a more comprehensive approach to addressing the cognitive and performance issues that result from working in an at-home work environment. Two data collection instruments were employed. First, quantitative data was collected with a Likert rating scale that was constructed to address cognitive performance and work task performance factors surrounding the at-home work environment. Second, qualitative data was collected with an open-ended survey to discover new ideas, as well as connections between the primary variables and the environment.

Research Questions:

1. Is there a significant difference in cognitive performance of experienced at-home remote workers versus workers with less experience?
2. Is there a significant difference in the work task performance of experienced at-home remote workers versus workers with less experience?
3. What factors impact cognitive performance in at-home remote workers?
4. What factors optimize cognitive performance in at-home remote workers?
5. What factors impact work task performance in at-home remote workers?
6. What factors optimize work task performance in at-home remote workers?

Hypotheses:

1. There will be a difference in cognitive performance in at-home remote workers.
2. There will be a difference in work task performance in at-home workers.
3. There will be a significant difference in cognitive performance between experienced at-home remote workers who work at least 50% of their work time remotely, and at-home remote workers who work less than 50% of their work time remotely.
4. There will be a significant difference in work task performance between experienced at-home remote workers who work at least 50% of their work time remotely, and at-home remote workers who work less than 50% of their work time remotely.

Delimitations

This study was limited to the targeted demographics who were adults of at least 18 years of age, who had at least one year of experience working in a traditional, non-remote work environment at any point in time prior to working remotely from home. This was to ensure that participants had sufficient working experience and could provide relevant responses. Participants

must have been currently employed and worked at least 75% of their job time remotely from home. The location of this study took place online and was administered through the Microsoft Office Forms platform. The duration of this study took place for four weeks. Lastly, compensation was not provided to participants.

Limitations and Assumptions

Limitations

Limitations of this study included potential biases in participant responses that may have been influenced by personal preference for working from home, which had the potential to skew the results. Due to the time constraint for completing this Master's Thesis, 18 weeks, the window for recruitment, data collection, and analysis was significantly shortened. The sample collected was based on the number of respondents to the recruiting outreach. Therefore, it posed a limitation for the statistical analysis significance. Time was another factor that limited the depth of the qualitative analysis portion of this study. Due to the limited time for data analysis and the sheer volume of responses, only the most apparent themes were extracted from participant responses for the qualitative analysis portion.

Assumptions

Participants in this study were assumed to be representative of remote workers from home. To ensure this was accurate, screening questions were asked to each participant in order to verify their work status. Data from participants who answered these questions incorrectly were not able to participate.

List of Acronyms

Human Factors and Ergonomics (HF/E)

At-home remote workers (AHRW)

Traditional work setting (TWS)

Analysis of Variance (ANOVA)

Cognitive performance (CP)

Work task performance (WTP)

Chapter II

Review of the Relevant Literature

Background

Although currently trending, the origins of remote-based work concepts have in fact evolved since the 1970s. Niles (1975) was one of the first scholars to introduce the term "Telecommuting," which is used to describe "individuals working from home using technology to communicate back to their workplace" (as cited in Charalampous et al., 2019, p. 52). Since then, the telecommuting framework has expanded to include several other terminologies and associated meanings. This includes terms such as telework, remote work, distributed work, virtual work, flexible work, flexplace, and distance work (Allen et al., 2015) among others. This poses a challenge when reviewing the literature on remote-based work because oftentimes scholars will associate different meanings to the remote term. One possible explanation for this may be due to the operationalization differences of the term itself which is largely based on job-specific factors, such as the extent to which the remote work is being conducted, the location that the work is taking place, and how often remote work is being performed (Allen et al., 2015). For instance, the remote term may be defined by if the individual is working from home, a remote office, hotel, or another location, as well as how many days out of the week they work remotely, or the percentage of their job responsibilities that are dedicated to remote work. In such cases, one of several terminologies may be used (Society for Human Resource Management, n.d.). This review refers back to the telework framework to operationalize the remote term that was employed for this study. Throughout this review, various telework terms are used interchangeably to address individuals that work remotely from their home-space, unless specified otherwise.

Resulting from the exponential growth of technological developments during the 1970s and 1980s, companies quickly began noticing many of the advantages that telecommuting offered in the workplace (Crosbie & Moore, 2004), mainly in helping to solve various types of workplace issues (Allen et al., 2015). Correspondingly, remote work options are more affordable for employers and can enhance recruitment efforts (Society for Human Resource Management, n.d.). Conversely, research has shown several benefits and drawbacks to remote-based work with regard to the employee. Earlier literature regarding telework often highlights the positive aspects of remote work, which is shown to benefit the organization, yet lacks sufficient data regarding the impact remote work had on the individual, specifically issues pertaining to cognition (Charalampous et al., 2019) and work task performance. In addition, the vast majority of literature focuses on the interaction between the worker and a traditional work setting (usually in offices), of both positive and negative effects. The succeeding sections address commonly discussed themes found in the literature revolving around a traditional work setting, remote work, and its impact on the individual.

Remote Work Benefits

To establish the context of remote work for which this current study is geared, it is first important to discuss the remote work contexts that have been previously studied. Individuals who work from home may do so for various reasons. For example, it is common for entrepreneurs to work from multiple remote locations, including the home. Other reasons pertain to employees who have roles that require remote work as a condition of their job function. Additionally, the remote work option can be offered to employees as a “flextime” option, whereas the employee has the ability to work from home on select days of preference.

Employees who take advantage of the flextime option typically opt to work from home as a personal preference in order to take advantage of the benefits that remote work offers.

The most common benefits associated with remote working offer an enhanced work-life balance (Grant et al., 2013; Crosbie & Moore, 2004; Weldon, 2019; Society for Human Resource Management, n.d.), lower stress, and greater well-being (Grant et al., 2013). One feature of an enhanced work-life balance that many workers tend to favor are the reduced travel demands (Hartig et al., 2007), as for, driving obligations to the office are no longer a part of the daily routine of an at-home remote-worker. Some employees also take a preference over remote work due to the autonomy aspects with regard to their time, also referred to as “time-autonomy” (Kattenbach et al., 2010). In other words, certain types of remote workers enjoy the benefit of having greater control of their time.

Another proposed characteristic of improved work-life balance applies to employees with live-in children. Parents that are able to attend to child-caring responsibilities, are able to spend more time with family and are able to attend to other non-work tasks (Tietze & Nadin, 2011; Hartig et al., 2007) such as domestic-related tasks (Crosbie & Moore, 2004). For example, non-work tasks that were reported in one interview study revolved around having greater flexibility of their time for cleaning, washing, gardening, and other activities such as shopping and managing household finances (Crosbie & Moore, 2004). On the contrary, some workers, mainly those with children, reported just the opposite, in that despite having more flexibility of their time while working from home, disturbances from their children impeded their work (Crosbie & Moore, 2004). Thus, the individual experience of an at-home remote-worker varies.

Identified Remote Work Issues

In contrast to these views regarding an enhanced work-life balance and benefits that remote work can offer, many scholars have addressed the pitfalls that have been observed in previous research that concerns remote-based work. While some employees experience greater benefits from remote work, others perceive it to be more challenging. Some workers have endured greater levels of stress due to issues that were unique to working from home. For example, increased stress was shown to be caused by technical issues (Staples, 2001). The degree of technical support is sometimes limited for remote work settings compared to technical support that is readily available in a traditional office setting, causing frustration in remote workers and may interfere with individual job tasks.

Another threat to the well-being and work-life balance in remote workers is the propensity for employees to work in excess and into non-working times (or hours outside of their normal work schedule) (Weldon, 2019; Crosbie & Moore, 2004). Results from a study conducted by Grant et al. (2013) revealed that remote workers were more susceptible to overworking which eventually resulted in feelings of burnout. However, in contrast to those findings, some workers reported experiencing lower levels of stress while working from home (Grant et al., 2013) and slightly higher work-life balance (Weldon, 2019).

It is not a foreign thought for workers to experience burnout from their jobs. In fact, burnout is a common experience that people encounter in traditional, non-remote work settings. Common causes are due to exhaustion, work pressure, and autonomy (Demerouti et al., 2010). The question becomes, however, what factors in the at-home remote environment lead to burnout, and who is at risk of it? Yet, the answers to such questions are not easily identified. Some scholars believe that individual differences (Charalampous et al., 2019; Clark et al., 2012),

demands, and construction of the work system (Kattenbach et al., 2010) play a role in how workers perceive their remote work experience. For example, personality type and characteristics have been linked to the desire and success of remote work (Charalampous et al., 2019; Clark et al., 2012; Kniffin et al., 2021). Such workers, for instance, those with extraversion and agreeableness characteristics, tend to consider remote work less challenging and experience healthier balance and coping abilities, whereas individuals with greater characteristics of neuroticism and those with less emotional stability, may, in contrast, experience increased difficulty coping with remote work (Clark et al., 2012). Although personality type and individual characteristics do play a role in how remote work is experienced, “one size does not fit all” (Charalampous et al., 2019), meaning, individual differences are not as clear-cut and are not the sole predictor of remote work experiences. On the other hand, work-home boundaries play a contributing role in how remote work is experienced.

Boundaries in the Home-work Domain

With regard to remote-work systems in the home space, the boundary between the work domain and home domain is compromised and often removed (Allen et al., 2015; Crosbie & Moore, 2004; Grant et al., 2013; Golden, 2012). However, the literature surrounding work-home boundaries appears to conflict with other opposing views. Although remote-based work does allow greater flexibility of time, remote-based work is not always the most optimal option for some workers. For example, individuals with less remote work experience may encounter more difficulties than non-remote workers. Workers with less remote experience may encounter difficulty establishing and maintaining home and work boundaries. For example, employees who possess remote-based roles tend to be skilled with greater self-management abilities and can therefore manage to work from home with minimal interference from the home environment

(Wang et al., 2021). In addition, employees with remote-based roles tend to be more prepared and have designated workspaces, as well as perceive this feature to be a necessity (Crosbie & Moore, 2004). Experienced remote workers also tend to have higher levels of self-efficacy (Staples et al., 1998), which supports Crosbie and Moore's (2004) observations, to which experienced workers had stronger regard for motivating themselves to manage their workload while simultaneously disregarding the boundary between home and work more effectively. Essentially, being unbothered by it, suggesting that experienced remote workers have better coping abilities in a home-based remote-work environment than less experienced remote workers. However, remote workers, in general, have shown to experience issues maintaining time boundaries, as previously mentioned whereas employees displayed "overworking" behaviors, in other words, working past their scheduled or allotted time for work (Weldon, 2019; Crosbie & Moore, 2004; Grant et al., (2013).

Additionally, remote-based work tends to be more complicated for individuals with children due to interference such as interruptions and distractions (Crosbie & Moore, 2004), creating conflict in the work-family domain (Golden, 2012). Tietze and Nadin (2011) suggest this is due to the psychological contract between members in the household. In other words, the existing expectations are based on the type of relationship that is established between individuals. For example, children may have certain expectations that their parents should attend to them while in their presence. However, the psychological contract established is then violated when the parent continues to work, thus creating a work-family/work-home conflict. Therefore, it is in the best interest of less experienced remote workers to establish clear boundaries between parties (Allen et al., 2015). Moreover, there tends to be less conflict with experienced remote workers (Allen et al., 2015).

Boundaries also become blurred when the demands of the work task interfere with the home-life balance. Although it is impossible to completely eliminate boundaries surrounding the home environment (Crosbie & Moore, 2004), unexpected outcomes can occur as a result of the way one copes with work demands. For example, the home is viewed as a place of restoration where one can go after work and relax. However, restoration effects of the home become compromised in remote work settings (Hartig et al., 2007). Consequently, the effects of compromised restoration negatively affect workers' energy, making it difficult to keep up with job demands (Hartig et al., 2007). Demerouti et al. (2015) suggest that the connection between the need for recovery (from work), and the interference from home factors are self-regulating cognitive processes, such as concentration. In contrast, some remote workers have been shown to experience less stress, enhanced well-being, and increased productivity (Grant et al., 2013). In any case, adequate recovery from the stresses of home-work interaction is imperative to well-being (Sanz-Vedrgel et al., 2011), whereas stressors can negatively impact cognitive performance (Hsu et al., 2019; Demerouti et al., 2007).

Cognition in the Workplace

According to Charalampous et al. (2019), less is known about the cognitive factors that surround remote work environments. Previous literature has addressed cognitive issues and cognitive capacity involved in keeping up with the work demands in traditional, non-remote work settings, such as offices. For example, what research does know is that attention processing and allocation of cognitive resources for difficult tasks have been shown to impact problem-solving and work task performance in non-remote work settings (Meijman & Mulder, 1998 as cited in Demerouti et al., 2007; Kalakoski et al., 2020). Cognitive load theory asserts that there is a capacity for information processing in working memory (Johg, 2010). Thus, greater cognitive

demands in work tasks can increase cognitive loads (Kalakoski et al., 2020). Régis et al. (2014) contend that optimal information processing requires the ability to focus on a single task uninterrupted from environmental stimuli. Therefore, the idea is to be able to focus on one task at a time.

As previously mentioned, there are a number of issues that revolve around remote-work environments, specifically in the home domain. Boundaries between the work and home appear to be an issue that negatively impacts home-life balance, stress level, and the workers' ability to manage one's own workload, among others mentioned. Additionally, the issues of distractions and interruptions in the home-work environment were also addressed. Based on these known facts about the issues that surround the remote work environment and known cognitive issues that surround non-remote work settings, it can be postulated that similar cognitive issues emanate from home-based remote work environments. Allen et al. (2021) report an increase in remote workers' desire for greater segmentation between work and home since the recent COVID-19 pandemic. This leads to further theory that at-home remote-work environments may in fact negatively influence cognitive performance and work task performance in some home-based remote workers. Therefore, the problem and questions become, when interference occurs in the home environment, how does this affect cognitive performance in home-based remote workers, especially considering that there are some degrees of time flexibility while working from home? Additionally, how do these factors impact work task performance in home-based remote workers?

Summary

The current literature provides valuable insights into the benefits and challenges surrounding remote-work, such as boundary issues and the work-life balance factors. However,

there remains a lack of empirical literature on cognitive issues and task performance issues surrounding the remote-work environment. Hyman et al. (2002) pose that future research should address issues pertaining to remote work that highlight aspects other than the benefits to be gained (as cited in Crosbie & Moore, 2004). In addition, Wang et al. (2021) suggest further research that highlights the experiences of workers at home compared to their experiences in their traditional non-remote work settings. Due to the fact that the pandemic has abruptly forced several workers into remote working roles, this challenges the applicability of previous research regarding remote work systems (Wang et al., 2021).

This current study aimed to contribute to the current body of knowledge by filling in some of the gaps concerning this new and evolving remote work system, to include the context of involuntary remote workers, as well as any other additional demands and boundaries, and uncover the unknowns. As previously discussed, Allen et al. (2015) pointed out the significance of operationalizing the context of remote work. Therefore, remote work for this study encompasses remote work performed exclusively in the home. Ultimately, the hopes of this research were to provide insights into cognitive issues and work task performance issues surrounding the at-home remote-based work system in order to help aid future developments of at-home remote work systems, and the optimization of human performance.

Chapter III

Methodology

Research Approach

The research approach employed for this study was a mixed-methods embedded design approach which included data collection and analysis of qualitative and quantitative data simultaneously. This method was selected to better test the research hypothesis and understand the data. Survey research was the method used to collect both qualitative and quantitative data which was executed by administering a survey that consisted of a combination of question types. This study was designed to evaluate human factors issues, therefore, survey research was an optimal strategy for exploring and describing human behavior (Ponto, 2015). The quantitative data collection portion was captured by using a survey with numerically rated questions (Ponto, 2015) to perform statistical analysis and draw inferences based on the analysis results.

The qualitative data analysis portion of this design was based on the procedures used for a collective case study, with some modifications. A collective case study data analysis is a qualitative research strategy that allows the researcher to gain a greater first-hand understanding of the participants' lived experiences by their responses expressed to open-ended questions (Balog, n.d.). This method treats each participant as its own case study by collecting in-depth, explicit data, generally in an interview style, then identifies and categorizes the core issues found in each participants' response to each question. This is followed by a within-case analysis which compares the emerging themes identified in participant responses to establish connections among them (Balog, n.d.). A true collective case study methodology requires full immersion of the data to identify all possible themes, which is timely and can be an overwhelming process (Baxter & Jack, 2008), which this study did not afford. Therefore, an abridged version of a collective case

study analysis was leveraged by identifying the most easily identifiable themes within the responses. Thus, the number of categories for the data is less substantial than a purely collective case study.

Design and Procedures

Design

This study included three participant groups: 1) individuals who primarily work remotely, 2) individuals who work remotely as needed, 3) individuals who were not hired to work remotely. Participants in the *primarily remote* group were hired for and currently work in a position that requires remote work as a condition of their essential job functions for at least 50% of the time prior to the COVID-19 pandemic. Workers in the *non-remote* group were hired for and currently work in a position that did not require remote work as a condition of their essential job functions prior to the COVID-19 pandemic (less than 25% of their work time). Workers in the *as-needed remote* group were hired for and work in a position that required remote working as a condition of their essential job functions on an as-needed basis prior to the COVID-19 pandemic (25%-50% of their work time).

Independent and Dependent Variables

The dependent variables used in this research study are cognitive performance and work task performance. *Cognitive performance* was measured as cognitive load, cognitive strain, focus, stress, burnout, motivation, memory/forgetfulness, and fatigue. *Work task performance* was measured as task errors, work-prioritization, work contribution, time management, productivity, and autonomy. The independent variable for this analysis is home-based remote work. *Environmental factors* for this study were measured as their own independent variable and measured as technological issues, disruption and interruptions.

Procedure

Prior to recruiting participants and conducting this research, approval from the Institutional Review Board (IRB) was obtained. It should be noted that this research adhered to the basic ethical principles of the Belmont Report by ensuring Respect for Persons, Beneficence, and Justice. Respect for persons was fulfilled by providing the participant with sufficient information about the study and what was required of them if they chose to participate. Candidates were not coerced into participating and were given the option to do so of their own free will, as autonomous agents. To satisfy the principle of Beneficence, participants were treated in an ethical manner and did not undergo any harm by participating in this study. I, the researcher, took all necessary precautions to minimize any possible harm to the participant by keeping information confidential and providing the participant with the option to discontinue their participation at any time, without negative consequence. To satisfy the Justice principle, all participants were treated equally, and each shared the same benefits and risks without any exclusions based on their demographic information. The following sections further demonstrate the remainder of this study's procedure in compliance with IRB guidelines.

Participants were recruited through direct requests and online platforms such as LinkedIn, Facebook, and word of mouth. A statement was generated explaining the general purpose of the study and requesting participation (see Appendix A). Candidates were informed that the objective of the research was to gather information about their experiences with at-home remote-based work systems. To avoid biases in responses, participants were not informed of the specific focus of the study or its variables. The statement provided also included eligibility requirements for participation, along with an attached link to the survey via an online post. In addition to the online post, I, the researcher, made contact with candidates individually through an online direct

message, phone, and/or email, to solicit their participation along with a link to the survey for candidates to follow at their own discretion and autonomy. I also asked participants to share the survey link with anyone who might be interested in participating. However, the candidates were under no obligation to share and were informed of such.

An online survey was administered via Microsoft Office Forms platform. When the participant followed the link, a written briefing was provided that restated the objective of the study and eligibility requirements for participation. Informed consent was also provided in writing to inform candidates that their participation was voluntary, and of their right to withdraw participation at any point without negative consequences (see Appendix B). Candidates were provided with the option to either agree or deny the consent. If a candidate denied consent, they were not able to participate, and no data was collected. If the candidate agreed to the consent, three screening questions were asked to verify their eligibility for participation. If a candidate did not meet eligibility requirements, a generated response appeared informing the candidate of their ineligibility, and they were not able to participate. If the candidate met eligibility requirements, a demographics survey was administered (see Appendix C). At the completion of the demographics survey, the participant was prompted to begin.

Apparatus and Materials

To facilitate this study, a self-administered online survey was issued through the Microsoft Office Forms platform (see Appendix D). Participants had access to the survey from their computers and/or mobile devices. Sections of the survey consisted of questions inspired by the NASA-TLX to assess workload, while other questions were a combination of open-ended questions, and rating questions. A demographics survey was included to collect age, gender, work profession category, years of work experience, and level of remote work experience. To

conduct the statistical analysis, StatCrunch online statistical software was used. Data was exported from Microsoft Forms to Excel. Statistical data was imported to StatCrunch to perform the quantitative analysis. To conduct the qualitative analysis, data was exported from Microsoft Forms to Excel. Responses to open-ended questions were evaluated in Excel and coded by me, the researcher.

Sample

This study used a non-probability sampling method. The sampling methods used were a combination of quota sampling, self-selection sampling, and snowball sampling. *Quota sampling* was used to ensure the strata being studied was proportional and as representative as possible to the different groups within the population of at-home remote workers. *Self-selection sampling* was used by posting the survey online and ensured the respondents were individuals that wished to participate on their own free will. *Snowball sampling* was used to help reach the targeted number of participants for each group in the case that there was a lack of respondents to the online survey post. Although some individuals were solicited for their participation, individuals that did participate accepted and did so on a volunteer basis only and were informed that they were under no obligation to continue their participation at any point. Provided that participants met the eligibility criteria, each individual had an equal chance of participating.

The targeted population were full-time workers who were at least 18 years of age, worked in a traditional work setting for at least one year, at any point in time, prior to the COVID-19 pandemic, and currently work at least 75% of their work time remotely from home. The targeted sample size were 30 individuals to represent the population of at-home remote workers.

Data collected from this sample was used to draw conclusions about the at-home remote worker groups which included, individuals who were hired to work primarily remotely (50% or

more remote), individuals who work remotely as needed (25%-50% remote), and individuals who were not hired to work remotely (less than 25% remote). Although generalizations cannot be made to the population of at-home remote workers as a whole, the data collected from this sample provide human factors professionals and researchers, human resources, and other industry professionals with relevant data about individuals who meet a similar criterion of the groups studied.

Sources of the Data

Primary data refers to original data that is obtained by the researcher who is conducting a study to understand and/or solve a research problem (Wagh, n.d.). For this mixed research study, primary data was collected firsthand by me, the researcher, by using a self-administered online survey consisting of a combination of open-ended questions and a Likert rating scale.

Validity

Often times in quantitative research, the data alone can illustrate the “bigger picture” of the current issue through graphs and scores yet lacks explanation behind the data, whereas qualitative methods alone can provide information such as the subjective truth yet fail to provide the “bigger picture” (Krawczyk et al., 2019). Whatever research strategy is chosen must be able to adequately support the validity of the findings and support any inferences derived from the results. For this study, a mixed-methods approach was selected because the combination of both quantitative and qualitative data provided a holistic perspective of results. This combination allowed for a more confident interpretation of the results and allowed me to identify any potential reliability and validity issues early on (Krawczyk et al., 2019).

The qualitative method portion of this analysis supported this research by providing a deeper insight into the cognitive and performance factors that surround an at-home working

environment. It achieved this by allowing me to identify any common themes within the participants' responses. It also helped me discover new phenomena that may inspire future research of relating issues. The quantitative portion of this analysis allowed me to test the known variables and provide a statistical explanation of identified phenomena. The structure of a quantitative research approach makes it possible to collect a larger sample of the target population(s), providing greater statistical power. Combined, these approaches helped me to establish triangulation of the data by supporting the hypothesis and proving the ability to compare data from both qualitative and quantitative sources to identify common themes.

Treatment of the Data

Qualitative data collected in this study was gathered from participant responses to open-ended survey questions. Data was transferred to an Excel spreadsheet where it was analyzed through the process of *categorical aggregation*, where I searched for a collection of themes that were relevant to the research questions (Capella University, n.d.). The categorical aggregation process employed concepts adopted from the *Inductive Thematic Analysis* method, whereas the data was analyzed and interpreted without any preselected theoretical categories (Capella University, n.d.), yet developed categories based on my analysis and interpretation of the data provided. Thus, allowing the data to lead the direction of the categories.

I began by conducting an individual *within-case analysis*, where data from each participant was treated as an individual case. Each case (participant) was examined using a variation of the *thematic analysis* method to identify emerging themes that relate to the research questions. After reading the response, I highlight any phrases, sentences, and paragraphs that were significant (Capella University, n.d.). Next, data that was selected was reviewed once again to determine if it relates to the research question. I then created *in vivo codes* using the

participants' own words for the selected data and developed categories. After categories were developed, they were analyzed once more to identify any themes, followed by a written description of each theme that included verbatim passages and direct quotations from the participant (Capella University, n.d.). This process was repeated for each participant until the individual within-case analyses were completed. Following the individual within-case analyses, a cross-case analysis was conducted that included a thematic analysis across all cases (Capella University, n.d.) which identified patterns and themes that were revealed in individual cases. This included my assertions and interpretations of the meanings within the themes (Capella University, n.d.).

Quantitative data was analyzed by using a combination of statistical tests to test the hypothesis for statistical significance. First, a test for means was conducted for both dependent variables to include each of the 18 measures for cognitive performance and work task performance. These initial analyses provided a statistical perspective of the total sample population of at-home remote workers as a whole. Next, 18 separate ANOVAs were conducted to determine the individual differences between the three sample groups: 1) individuals who were hired to work primarily remotely, 2) individuals who were hired to work remotely as needed, and 3) individuals who were not hired to work remotely, which according to Norman (2010), is a supported method for this type of data. Lastly, data derived from the qualitative analyses were compared to the statistical findings to explain any observed phenomena.

Chapter IV

Results and Discussion of Results

The purpose of this thesis was to investigate the effects of at-home remote-based work environments on cognitive performance and work task performance of employees who currently work remotely from home as a result of the COVID-19 pandemic. The previous chapter (Methods) outlined the mixed-methods approach that was employed for this research. This chapter describes the qualitative and quantitative results that were derived from the posed research questions and hypotheses discussed in Chapter 1 (Introduction). This chapter will first discuss the quantitative analyses in order of how the hypotheses were presented in Chapter 1 and organized according to the corresponding measures for cognitive performance and work task performance. Qualitative analyses will follow.

The Analysis of Variance (ANOVA) was the statistical test used for these analyses. There were 18 separate ANOVAs conducted in order to determine if there was a statistical difference between the means in the primarily remote group (50% or more), as needed remote group (25%-50%), and non-remote group (less than 25%). The ANOVAs were carried out using StatCrunch online statistical software. The total number of respondents to the survey was 73. There were four respondents who did not meet the criteria for this study, thus no data was collected. Of the remaining 69 respondents, data did not record for three participants, bringing the total number of participants to 66 for statistical analysis ($n=66$). With regard to the qualitative analysis, 65 participants responded to the open-ended survey questions.

A total of eight qualitative open-ended questions were asked to generate key insights into the lived experiences of at-home remote workers. As mentioned, there were a total of 65 participants who responded to the open-ended questions. The qualitative analysis addressed the research

questions mentioned in Chapter 1 (Introduction). This section is organized by construct, cognitive performance, and work task performance. Each construct addressed the corresponding research questions as they pertain to the sample population of at-home remote workers (AHRW), followed by the remaining research questions that specifically address the comparisons between each of the three groups.

Quantitative Analysis

There were a total of 18 quantitative questions administered to which participants rated each question on a 6-point Likert scale. The Likert scale ranked as follows: 1 = Strongly Agree, 2 = Agree, 3 = Somewhat Agree, 4 = Somewhat Disagree, 5 = Disagree, 6 = Strongly Disagree. Groups included primarily remote (N=27), not hired for remote role (N=31), and hired for remote work as-needed (N=8).

Hypothesis 1 and 3 Corresponding Results

Research question 1 (Is there a significant difference in cognitive performance of experienced at-home remote workers versus workers with less experience?) is the guiding research question for hypothesis 1 and hypothesis 3. Hypothesis 1 proposed that there was a difference in cognitive performance in at-home remote workers. Hypothesis 3 proposed that there was a significant difference in cognitive performance between experienced at-home remote workers who worked at least 50% of their work time remotely prior to COVID-19, and at-home remote workers who worked less than 50% of their work time remotely prior to COVID-19. As detailed in Chapter 3 (Methods), cognitive performance was measured as focus, motivation, burnout, fatigue, memory/forgetfulness, cognitive load, cognitive strain, and stress. To test these hypotheses, 18 separate AVOVAs were conducted for each measure in order to determine statistical differences between each group.

Focus (question a). Focus question 1a addressed whether focusing on work tasks was more challenging since working from home. The means for each group were calculated; not hired for remote role ($M = 3.23$), primarily remote group ($M = 3.93$), and hired for remote work as needed ($M = 4.0$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 1.5, p = 0.23$. There were no statistical differences identified between the three groups (see Table 1 for means and standard deviations).

Focus (question b). Focus question 1b addressed whether their minds wandered more at home. The means for each group were calculated; not hired for remote role ($M = 3.32$), primarily remote group ($M = 3.81$), and hired for remote work as needed ($M = 3.88$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.80, p = 0.45$. There were no statistical differences identified between the three groups (see Table 1 for means and standard deviations).

Motivation. Motivation was addressed by asking participants if they were more excited to begin their work-week since working from home. The means for each group were calculated; not hired for remote role ($M = 2.52$), primarily remote group ($M = 2.96$), and hired for remote work as needed ($M = 3.00$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.86, p = 0.43$. There were no statistical differences identified between the three groups (see Table 1 for means and standard deviations).

Burnout. Burnout was addressed by asking if participants felt more overwhelmed at the end of the work-week since working from home. The means for each group were calculated; not

hired for remote role ($M = 3.97$), primarily remote group ($M = 4.37$), and hired for remote work as needed ($M = 3.88$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.55, p = 0.58$. There were no statistical differences identified between the three groups (see Table 1 for means and standard deviations).

Fatigue. Fatigue was addressed by asking if working from home was more mentally draining. The means for each group were calculated; not hired for remote role ($M = 3.45$), primarily remote group ($M = 4.04$), and hired for remote work as needed ($M = 3.50$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 1.0, p = 0.37$. There were no statistical differences identified between the three groups (see Table 1 for means and standard deviations).

Memory/Forgetfulness. Memory/forgetfulness was addressed by asking if forgetting tasks occurred more while working at home. The means for each group were calculated; not hired for remote role ($M = 4.10$), primarily remote group ($M = 4.04$), and hired for remote work as needed ($M = 4.75$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 1.29, p = 0.28$. There were no statistical differences identified between the three groups (see Table 1 for means and standard deviations).

Cognitive Load. Cognitive load addressed whether the current workload was more overwhelming since working from home. The means for each group were calculated; not hired for remote role ($M = 3.68$), primarily remote group ($M = 4.37$), and hired for remote work as needed ($M = 4.13$). A one-way ANOVA was performed to determine the variance between the

mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 1.35, p = 0.26$. There were no statistical differences identified between the three groups (see Table 1 for means and standard deviations).

Cognitive Strain. Cognitive strain was addressed by asking if work demands were greater since working from home. The means for each group were calculated; not hired for remote role ($M = 3.55$), primarily remote group ($M = 3.81$), and hired for remote work as needed ($M = 4.25$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.61, p = 0.55$. There were no statistical differences identified between the three groups (see Table 1 for means and standard deviations).

Stress. Stressed was addressed by asking if stress was experienced more since working from home. The means for each group were calculated; not hired for remote role ($M = 4.03$), primarily remote group ($M = 4.37$), and hired for remote work as needed ($M = 4.13$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.34, p = 0.71$. There were no statistical differences identified between the three groups (see Table 1 for means and standard deviations).

Table 1

Summary of Means and Standard Deviations for Cognitive Performance Variables by Group

Group	Measure	<i>M</i>	<i>SD</i>
Not hired for remote role (Less than 25% remote)	Focus a	3.23	1.78
	Focus b	3.32	1.77

Summary of Means and Standard Deviations for Cognitive Performance Variables by Group

Group	Measure	<i>M</i>	<i>SD</i>
	Motivation	2.52	1.48
	Burnout	3.97	1.89
	Fatigue	3.45	1.59
	Memory/Forgetfulness	4.10	1.64
	Cognitive Load	3.68	1.74
	Cognitive Strain	3.55	1.59
	Stress	4.03	1.72
Hired for primarily remote role (50% or more remote)	Focus a	3.93	1.66
	Focus b	3.81	1.55
	Motivation	2.96	1.34
	Burnout	4.37	1.28
	Fatigue	4.04	1.60
	Memory/Forgetfulness	4.67	1.36
	Cognitive Load	4.37	1.47
	Cognitive Strain	3.81	1.75
	Stress	4.37	1.21
Hired for remote role as needed (25% - 50% remote)	Focus a	4.00	1.20
	Focus b	3.88	1.13
	Motivation	3.00	1.31
	Burnout	3.88	1.55
	Fatigue	3.50	1.86
	Memory/Forgetfulness	4.75	1.28
	Cognitive Load	4.13	1.55
	Cognitive Strain	4.25	1.58
	Stress	4.13	1.99

Note. *M* = Mean. *SD* = Standard Deviation. *M* are based on respondent ratings (1 = Strongly Agree, 2 = Agree, 3 = Somewhat Agree, 4 = Somewhat Disagree, 5 = Disagree, 6 = Strongly Disagree).

Hypothesis 2 and 4 Corresponding Results

Research question 2 (Is there a significant difference in the work task performance of experienced at-home remote workers versus workers with less experience?) is the guiding research question for hypothesis 2 and hypothesis 4. Hypothesis 2 proposed that there was a difference in work task performance in at-home remote workers. Hypothesis 4 proposed that there was a significant difference in work task performance between experienced at-home remote workers who worked at least 50% of their work time remotely prior to COVID-19, and at-home remote workers who worked less than 50% of their work time remotely prior to COVID-19. As detailed in Chapter 3 (Methods), work task performance was measured as task errors, productivity, autonomy, work-prioritization, time management, and work contribution. To test these hypotheses, several AVOVAs were conducted for each measure of work task performance in order to determine statistical differences between each group.

Task Errors. Task errors were addressed by asking if making mistakes on work tasks occurred more since working from home. The means for each group were calculated; not hired for remote role ($M = 4.81$), primarily remote group ($M = 4.82$), and hired for remote work as needed ($M = 5.00$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.09$, $p = 0.91$. There were no statistical differences identified between the three groups (see Table 2 for means and standard deviations).

Productivity. Participants were asked if they accomplished more tasks working from home than in their traditional work setting. The means for each group were calculated; not hired for remote role ($M = 3.03$), primarily remote group ($M = 2.63$), and hired for remote work as needed ($M = 2.25$). A one-way ANOVA was performed to determine the variance between the

mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 1.24, p = 0.30$. There were no statistical differences identified between the three groups (see Table 2 for means and standard deviations).

Autonomy. Participants were asked if they worked with the same amount of supervision now that they work from home. The means for each group were calculated; not hired for remote role ($M = 2.84$), primarily remote group ($M = 2.52$), and hired for remote work as needed ($M = 2.88$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.42, p = 0.66$. There were no statistical differences identified between the three groups (see Table 2 for means and standard deviations).

Work Prioritization. Participants were asked if it takes more effort to prioritize work tasks since working from home. The means for each group were calculated; not hired for remote role ($M = 3.61$), primarily remote group ($M = 3.93$), and hired for remote work as needed ($M = 4.13$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.46, p = 0.63$. There were no statistical differences identified between the three groups (see Table 2 for means and standard deviations).

Time Management (question a). Participants were asked if they had enough time within the day to handle unexpected events. The means for each group were calculated; not hired for remote role ($M = 2.77$), primarily remote group ($M = 2.33$), and hired for remote work as needed ($M = 2.25$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA

indicated $F(2, 63) = 1.52, p = 0.23$. There were no statistical differences identified between the three groups (see Table 2 for means and standard deviations).

Time Management (question b). Participants were asked if they worked past their shift/on weekends to meet deadlines. The means for each group were calculated; not hired for remote role ($M = 2.87$), primarily remote group ($M = 2.33$), and hired for remote work as needed ($M = 3.34$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 1.99, p = 0.15$. There were no statistical differences identified between the three groups (see Table 2 for means and standard deviations).

Work Contribution. Participants were asked if they were more involved with their work since working from home (e.g., meetings, individual projects, group projects, speaking at meetings, etc.). The means for each group were calculated; not hired for remote role ($M = 3.06$), primarily remote group ($M = 2.89$), and hired for remote work as needed ($M = 3.00$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.10, p = 0.90$. There were no statistical differences identified between the three groups (see Table 2 for means and standard deviations).

Table 2

Summary of Means and Standard Deviations for Work Task Performance Variables by Group

Group	Variable	<i>M</i>	<i>SD</i>
Not hired for remote role (Less than 25% remote)	Task Errors	4.81	1.33
	Productivity	3.03	1.45

Summary of Means and Standard Deviations for Work Task Performance Variables by Group

Group	Variable	<i>M</i>	<i>SD</i>
	Autonomy	2.84	1.51
	Work-prioritization	3.61	1.63
	Time Management a	2.77	1.26
	Time Management b	2.87	1.67
	Work Contribution	3.06	1.61
Hired for primarily remote role (50% or more remote)	Task Errors	4.82	1.11
	Productivity	2.63	1.42
	Autonomy	2.52	1.22
	Work-prioritization	3.93	1.57
	Time Management a	2.33	0.83
	Time Management b	2.33	1.14
	Work Contribution	2.89	1.42
Hired for remote role as needed (25% - 50% remote)	Task Errors	5.00	0.76
	Productivity	2.25	1.04
	Autonomy	2.88	1.81
	Work-prioritization	4.13	1.55
	Time Management a	2.25	1.04
	Time Management b	3.34	1.30
	Work Contribution	3.00	1.20

Note. *M* = Mean. *SD* = Standard Deviation. *M* are based on respondent ratings (1 = Strongly Agree, 2 = Agree, 3 = Somewhat Agree, 4 = Somewhat Disagree, 5 = Disagree, 6 = Strongly Disagree).

Environmental Factors on Cognitive Performance and Work Task Performance

Chapter 3 (Methods) proposed a separate analysis for environmental factors which was treated as its own independent variable. Environmental factors were measured as technological issues, and disruptions/interruptions. Participants were asked two qualitative questions to which

they rated each question on a 6-point Likert scale. As a reminder, the Likert scale ranked as follows: 1 = Strongly Agree, 2 = Agree, 3 = Somewhat Agree, 4 = Somewhat Disagree, 5 = Disagree, 6 = Strongly Disagree. Participants were asked to rate the following two questions:

Question 1. Question 1 stated: Technological issues interfere with my work performance more at home than in my normal work setting? The means for each group were calculated; not hired for remote role ($M = 3.65$), primarily remote group ($M = 3.67$), and hired for remote work as needed ($M = 4.50$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.93, p = 0.40$. There were no statistical differences identified between the three groups (see Table 3 for means and standard deviations).

Question 2. Question 2 stated: Disruptions and interruptions occur more frequently at home than in my normal work setting? The means for each group were calculated; not hired for remote role ($M = 3.81$), primarily remote group ($M = 3.44$), and hired for remote work as needed ($M = 3.25$). A one-way ANOVA was performed to determine the variance between the mean of each group. The alpha level for the ANOVA was set to $p < .05$. Results from the ANOVA indicated $F(2, 63) = 0.54, p = 0.59$. There were no statistical differences identified between the three groups (see Table 3 for means and standard deviations).

Table 3*Summary of Means and Standard Deviations for Environmental Factors by Group*

Group	Measure	<i>M</i>	<i>SD</i>
Not hired for remote role (Less than 25% remote)	Technological Issues	3.65	1.72
	Disruptions and Interruptions	3.81	1.70
Hired for primarily remote role (50% or more remote)	Technological Issues	3.67	1.69
	Disruptions and Interruptions	3.44	1.65
Hired for remote role as needed (25% - 50% remote)	Technological Issues	4.50	1.07
	Disruptions and Interruptions	3.25	1.49

Note. *M* = Mean. *SD* = Standard Deviation. *M* are based on respondent ratings (1 = Strongly Agree, 2 = Agree, 3 = Somewhat Agree, 4 = Somewhat Disagree, 5 = Disagree, 6 = Strongly Disagree).

Qualitative Analysis

As previously mentioned in Chapter 3 (Methods), the data gathered was first analyzed by using the individual within-case analysis approach. Each participant's response was reviewed individually multiple times. This was followed by additional reviews and coding to develop categories that corresponded to the research questions. The data was reviewed again to focalize the most prevalent themes that emerged. This was followed by a cross-case analysis approach whereas that data was compared across groups to identify obvious patterns and themes that correlated to the conceptual framework of this research study. Throughout the duration of the analyses, it became apparent that many of the responses to like-questions that addressed the same

factor were in fact answered similarly within each participant, with some variations, to which they corresponded with other research questions. This shifted the approach to accommodate responses to like-questions and combined those responses to develop relevant categories. For example, some responses to like-questions stated “same,” or the response was duplicated from a previously asked like-question.

Additionally, many of the responses to questions that addressed cognitive performance and work tasks performance did overlap. Therefore, some of the themes identified are addressed for more than one research question for both cognitive performance and work task performance. Also, take note that any participant responses that were either not applicable were eliminated from the analyses and reported results in this thesis. Presentation of the results follows in the subsequent sections. Table 4 shows a summary of themes identified during the qualitative analysis that helps to support the proposed research questions.

Table 4

Summary of constructs and identified themes.

Construct	Research Question	Theme
Cognitive Task Performance	RQ #3: What factors impact cognitive performance in at-home remote workers?	<ul style="list-style-type: none"> • Family • Time boundaries* • Domestic responsibilities* • Mental well-being/physical well-being • Workspace/workspace environment*

	RQ #4: What factors optimize cognitive performance in at-home remote workers?	<ul style="list-style-type: none"> • Frequent breaks/physical outdoor activity • Music • Structure • Routine • Isolated work environment
Work Task Performance	RQ #5: What factors impact work task performance in at-home remote workers?	<ul style="list-style-type: none"> • Lack of resources • Lack of workspace/workstation* • Communication dynamics • Time management/time boundaries*
	RQ #6: What factors optimize work task performance in at-home remote workers?	<ul style="list-style-type: none"> • Controlled work environment • Organizational system

Note. * Indicates theme identified for more than one research question.

Cognitive Performance and Corresponding Research Questions

Research Question 3 and Findings. Research question 3 concerned identifying factors in the at-home remote work environment that impacted cognitive performance in at-home remote workers. This current study found that workers across all three groups reported many of the same environmental factors associated with cognitive performance. The subsequent sections address the identified themes.

Family. Family was found to be the most prominent factor. The family factor was found to be problematic due to a number of reasons including balancing caretaking obligations for another family member during work hours, interruptions from children that hindered focus, increased pressure to attend to children while performing work tasks, the added task of preparing lunches, assisting with schoolwork, distractions from significant others (usually distracted in

passing). Several participants stated that their families tend to disregard the fact that they were working simply because of their presence in the home.

Comments included: “Everyone thinks you can drop your work and help with home tasks” (Participant 43, not hired for remote role). “My kids needing me, wanting to talk to me and just overall needing attention because they know I am home” (Participant 41, not hired for remote role). “Kids under 18 need/expect attention when working at home” (Participant 8, not hired for remote role). “...It’s really hard to train them [family] not to interrupt my work time. It almost seems like they understand me working at home is a part-time job and not so much a full-time job” (Participant 40, hired for remote role).

Time Boundaries. The second most common factor identified as impacting cognitive performance while working at home was time boundaries. *Time Boundaries* can be referred to as the established time limit that one sets for a particular task or set of tasks without exceeding the respective time limit intended. Many participants expressed a considerable amount of frustration throughout their responses and exhibited a perceived inability to adhere to work time boundaries for reasons mentioned such as lack of motivation, stress, and distractions from family. A number of participants reported violations of time boundaries by starting work earlier than their scheduled shift, working later past their scheduled shift (planned time for the day and contracted hours) including working late nights, and working weekends. Time boundary violations appeared to enhance perceived stress and affect work/life balance. Moreover, time boundary violations increased due to a greater number of distractions throughout the day in the home environment, which further induced procrastinating behaviors. This cycle was apparent in multiple participant responses.

Comments include: “Working from home has made me procrastinate more. I feel I have more time to complete them, so I tend to push the task later on into the day. But then I get more tasks throughout the day, and it piles up. I then scramble the last half of the day to get work tasks done” (Participant 28, not hired for remote role). “I have spread my work time through [the] entire day and into [the] evening to get stuff done without distractions. Hard to adhere to boundaries” (Participant 16, not hired for remote role). “I work more, there is no 8-hour day, Email, and computer on 7/24 and I respond to tasks at all hours” (Participant 43, hired for remote role). “Work gets done but I do procrastinate due to feeling overwhelmed with having to do my work...” (Participant 41, not hired for remote role). “I realized that if I wasn't intentional about putting away the computer, I kept doing emails all night long” (Participant 34, not hired for remote role). “Sometimes I feel I have no limit to how many hours I work per day. Some days I start at 8 am and I can work till 9 pm” (Participant 43, hired for remote work as-needed). “Waking up early or staying up later than what most families consider sleep time” (Participant 40, hired for remote role).

Domestic Responsibilities. Domestic responsibilities were another theme identified that impacted cognitive performance during work. This factor was commonly expressed as a distractor when trying to maintain focus during work time. Note that domestic responsibility was a theme also identified in work task performance, which is discussed further in the discussion of results section. Domestic responsibilities in this regard include tasks such as cleaning the home, kitchen/dishes, washing laundry, running errands, and other home-related tasks.

Comments include: “It's easy to want to ‘clean the kitchen, or prep dinner, or run to the store’ when I'm ‘at home’” (Participant 24, non-remote). “More time spent cooking (even during the day at lunchtime)” (Participant 2, hired for remote role). “The fact I try to fit everyday chores

in during work hours” (Participant 16, not hired for remote role). “I sometimes have to deal with laundry, cooking, and dishes during the work-day” (Participant 25, hired for remote role as needed). “Food, lunch time has become a cooking event... I used to go on lunch at my leisure in the office, but now I have to be more conscious of the time” (Participant 1, not hired for remote role). “I would say home obligations. For example, home chores. I get distracted on what I need to do and feel that I can take some time away from work to complete chores” (Participant 28, not hired for remote role).

Mental Well-Being and Physical Well-Being. Mental and physical well-being were two homogeneous themes identified as factors that influenced the level of focus in at-home remote workers. These factors were expressed as having low motivation, feelings of being overwhelmed from engaging in new work processes, while simultaneously balancing home/family life. Isolation, lack of decompression time, perceived anxiety about zoom meeting participation and being more verbally involved, inability to “shut work off,” frustration due to technological issues, and general difficulty coping due to distractions were additional themes identified. Non-preferred isolation was also reported.

Comments include: “My mental health, if I am not mentally healthy, I feel tired and unmotivated and it makes me want to work from bed which is not as productive and it doesn't help my mental health improve” (Participant 24, not hired for remote role). “Decompressing from the day. Having the short five- or ten-minute drive from work to home, I was able to disconnect from the day and live at home... the stress builds” (Participant 17, not hired for remote role). Work is always ‘on’ it seems. I wake up many nights thinking about work” (Participant 10, hired for remote role). “There is definitely anxiety related to having to constantly turn on the video for calls, speak in meetings, etc.” (Participant 52, hired for remote role). “If I'm

feeling unmotivated it is more challenging to get motivated at home than in a non-remote work environment” (Participant 51, hired for remote role). “Disconnecting from work when outside of work hours” (Participant 14, not hired for remote role). “...Being away from others and not being able to see my family, my mental health has increased in dysfunctional thinking” (Participant 38, not hired for remote role). “The isolation of being at home without human connection regularly is exhausting. While my family is home, it's not the same as the comradery of the office environment” (Participant 12, not hired for remote role).

Workspace/Workspace Environment. Workspace was frequently mentioned throughout the responses to multiple questions. Many workers attributed their workspace/workspace environment to their perceived ability to focus due to the distractions around them. Some distracting factors mentioned were distractions associated with sharing a workspace, and a lack of workspace that is solely dedicated to working only. It was also reported that the home environment in general, was the challenge because there is no mental transition period between home and work, such as the period when driving to work and back home. Participants described this gap as a “preparation period” used to prepare, plan, and “mentally shift” before starting the workday.

Comments included: “Not having a workspace free from distractions, my bed being in the same room as my workspace. Sharing my workspace with my 7-year-old while he’s in zoom classes” (Participant 41, not hired for remote role). “Even when I'm off work, I'm still sitting at my work desk, so it feels like I never leave work” (Participant 23, not hired for remote role). “I actually take longer to do everything across the board. I am more lackadaisical in my tasks and don't really have as much motivation to complete something right away” (Participant 17, not

hired for remote role). “Loss of mental shift between work and home ‘modes’ that is provided externally by commuting” (Participant 10, hired for remote role).

“My home itself is the difficulty. I have trained myself to associate driving to work as a preparation of sorts to get work done. Now I just wake up and do whatever ‘work’ I can when I can, however, I can get it done” (Participant 38, not hired for remote role).

Research Question 4. Research question 4 concerned identifying factors in the at-home remote work environment that contributed towards the optimization of cognitive performance in at-home remote workers. This question aimed to uncover the strategies that at-home remote workers developed in order to cope with any cognitive performance-related issues that may have manifested as a result of working remotely from home. These strategies included activities such as physical outdoor activity, playing music, establishing a routine/developing a set structure

Frequent Breaks/Physical Outdoor Activity. Participants in each group responded with frequent breaks throughout the day, physical activity (exercise or walks), as well as being outdoors as a factor to help optimize cognitive performance. Factors were expressed as aiding in creativity, eliminating distractions, and maintaining focus.

Comments included: “Ability to go into the garden, go for a walk...allows for time to contemplate, be creative and still collaborate with fellow workers” (Participant 13, not hired for remote role). “I take frequent breaks to stretch and walk around” (Participant 25, not hired for remote role).

Music. Music was also reported as another factor that aided in the optimization of cognitive performance. Background music and noise-canceling headphones were reported as tools that aided in focus while performing work tasks, as they eliminated environmental

distractions. Common environmental distractions reported were general outside noises, neighbors, loud pets, and family.

Comments included: “I play music while working to help focus” (Participant 25, not hired for remote role). “I often have the radio on at low volume to provide background noise” (Participant 48, hired for remote role).

Structure/Routine. Participants reported that having a routine, establishing variations of structure to their workday aided in their ability to focus. Participants also reported that they incorporated schedule management aids such as calendars, times, schedule management software to help focus and prevent distractions.

Comments included: “Having set start/end times prevents me from overworking myself and has helped in delaying the burnout feeling that comes every few months” (Participant 1, not hired for remote role). “Keeping a calendar, timer on my phone, and constant reminders on my computer have definitely helped me keep on track” (Participant 40, hired for remote role). “I just concentrate on what I am doing. I have delegated some tasks to specific times of day, so I am able to focus on the tasks I am doing without worrying about other stuff” (Participant 53, hired for remote role).

Isolated Work Environment. Participants reported that being isolated aided in their perceived ability to focus while working remotely from home. Participants stated that isolation helped them to maintain focus, eliminate distractions, and eliminate noise.

Comments included:

“Being alone in a closed-off room allows me to concentrate and think” (Participant 23, not hired for remote role). “...Quiet, better focus at home” (Participant 13, not hired for remote role).

Work Task Performance and Corresponding Research Questions

Research Question 5. Research question 5 concerned identifying factors in the at-home remote work environment that impacted work task performance in workers.

Lack of Resources. Many workers reported that a lack of appropriate work resources impeded their ability to perform work tasks. Some of the reported resources included office supplies, office equipment/tools such as printers, scanners, and fax machines. Other resources mentioned included files and necessary work documents that were not electronically filed. To cope with these limitations, participants reported that they placed orders to work staff to attain some materials, but that it required a waiting period which further interfered with their reported performance.

Comments included: “Lack of access to materials and records” (Participant 25, not hired for remote role). “There are certain tasks that I cannot do from home and must go to my regular office to complete, simply because the equipment needed is not easy to bring home” (Participant 20, not hired for remote role). “Proper office resources, lack of space for an office/equipment/storage” (Participant 73, hired for remote role).

Lack of Workspace/Work Structure. The lack of work structure and lack of workspace was highly reported as interfering with overall task performance while working from home. Several of the participants who expressed these factors reported that they take more time now to complete work tasks since working remotely. Participants also expressed that they tend to procrastinate more since working from home because they can work on tasks whenever they wanted due to the fact that they were at home.

Comments included: “Without the familiar structure of a non-remote work setting, many aspects in my life have become lax and lose the level of care that I used to allot when working

non-remote” (Participant 21, not hire for remote role). “[Not] having an actual workspace was my biggest challenge” (Participant 22, not hired for remote role). “I actually take longer to do everything across the board. I am more lackadaisical in my tasks and don't really have as much motivation to complete something right away” (Participant 17, not hired for remote role). “The home space office set up is very uncomfortable and inefficient for my job engagements” (Participant 40, hired for remote role). “Now that my office is in my room, I feel like I am always at work...” (Participant 17, not hired for remote role). “It has made me feel less concerned and connected about my work tasks” (Participant 38, not hired for remote role).

Communication Dynamics. Participant responses expressed a variety of communication-related factors that altered their work task performance. Communication factors that were reported entailed an increase in the number of held meetings (zoom meetings and calls) throughout the day. Participants reported that communication dynamics have become an additional task because it required an added effort to coordinate around other co-workers’ schedule. The increased frequency of meetings was reported and taking time away from their planned tasks. Another reported challenge was due to the time delays incurred with the coordinating aspect of communication. Additionally, the lack of direct (face-to-face) was expressed as less efficient than in-person communication (whereas a co-worker might stop by for a quick question or to briefly discuss a matter). Furthermore, the increased frequency of emails and instant messages were reported as a major communication factor that interrupted planned work tasks.

Comments included: “Higher volume of meetings and phone calls compared to on-site work” (Participant 14, not hired for remote role). “Not being able to have direct employee communication” (Participant 7, not hired for remote role). “More time spent working with team

leads and management to provide status updates and prioritize tasks” (Participant 14, not hired for remote role). “Zoom meetings with less focus on work-related tasks” (Participant 21, not hired for remote role).

“Virtual communication feels a little more formal than in-person communication; more meetings are scheduled rather than spur of the moment and getting everyone together for a set time often proves difficult and delays more collaborative tasks. Communication also often feels less clear than it otherwise would be” (Participant 1, not hired for remote role).

Time Management/Time Boundaries. Participant responses expressed a combination of time management and time boundaries-related factors that were shown to work task performance in at-home remote workers on various levels. Participants reported their incorporation of time management strategies since working remotely from home as well as improved time management strategies. Participants also reported having greater flexibility of time since working from home. However, despite having more flexibility of time, participants also reported having exceeded typical working hours and extending work time beyond the traditional 8 hours a day and even into the weekends. Participants also reported crossing such time boundaries in order to meet deadlines.

Comments included: “Time management! I start working earlier, I have shorter lunch breaks than usual, and I finish work later than usual. It became ‘normal’ to do 10 hours / day” (Participant 2, hired for remote work as needed). “The flexibility of working from home has given me time to complete my tasks any time of the day, night or weekends if needed to meet deadlines” (Participant 3, not hired for remote role). “It has helped in some ways because my

team has had to develop more internal project management strategies” (Participant 52, hired for remote role).

Research Question 6. Research question 6 concerned identifying factors in the at-home remote work environment that contributed towards the optimization of work task performance in workers. The focal point of this question aimed to identify the coping strategies of at-home remote workers that may generate insights into the differences, if any, between workers hired for remote roles and workers not hired for remote roles.

Controlled Work Environment. One of the most common themes identified that contributed to the optimization of work task performance was the benefit of having a controlled work environment. Several participants reported that having a controlled work environment that best suited their preferences aided them overall. Contributing factors included the “comfort” of having your own space, designated office/workspace, ability to shut the door at their leisure, control over home temperature setting, the flexibility of working from another room or outdoors, fewer distractions (from co-workers), and the ability to isolate oneself from others without distractions (that would otherwise be experienced due to co-workers stopping by their workspaces/offices). Participants also reported that adding office furniture/office equipment enhanced their workspaces and feelings of productivity.

Comments included: “I don't actually have to do anything. The convenience and comfort of working from home, as well as fewer distractions than in an office environment, makes my work more effective” (Participant 51, hired for remote role). “Create an office environment that is conducive to work...” (Participant 14, not hired for remote role). “Once you have a dedicated workspace, things are not much different for me working from home or the office” (Participant 46, hired for remote work as needed). “Working from home allows me to be more relaxed. I like

being here with my dogs in my chair in my home. I am more efficient than ever before” (Participant 29, not hired for remote role). “I feel calmer in situations. Able to get tasks completed with no interruptions at work” (Participant 18, not hired for remote role). “I work better when I’m alone and don’t get interrupted by people stopping by to chat” (Participant 20, not hired for remote role).

Organizational Systems. An emerging theme that was identified throughout the responses was the implementation of organizational systems that aided in overall work task efficiency. Responses revealed a number of organizational techniques that participants employed to help with a variety of factors such as time management, task management, and productivity. Reported techniques include being mindful of the day and tasks at hand, scheduling, time blocking, the utilization of organizational software, and Gantt charts.

Comments included: “It [working remotely from home] has made me even more organized. I have started making a task little of things I want to accomplish daily” (Participant 22, not hired for remote role). “I have to be more structured, create tasks lists and stay on top of my email” (Participant 24, not hired for remote role). “... It has required me to structure my work time much more than I would have in the office. I have to make distinct time designations for certain work tasks, so that others do not overshadow them” (Participant 31, not hired for remote role). “I have to keep many sticky notes with reminders of tasks. I have to be purposeful on when I sit down to do extra tasks) (Participant 32, not hired for remote role). “I am learning to prioritize my tasks more efficiently. I am learning how to I work more on a timely schedule. And I am also managing my tasks any more disciplinary action” (Participant 40, hired for remote role).

“I have had to be more intentional about setting a work schedule (start time and end time) as well as organize my tasks a little bit more deliberately--e.g., checking email first thing in the morning but then not looking at it until afternoon” (Participant 48, hired for remote role).

Discussion of Results

Hypothesized Results

Hypothesis 1 and 3 proposed that a difference would be found in cognitive performance of at-home remote workers, particularly, with regard to workers who were hired for remote roles when compared to workers who were not hired for remote roles. Hypothesis 2 and 3 proposed that a difference would be found in work task performance in at-home remote workers, again, paying particular attention to the differences between workers who were hired for remote roles and workers who were not hired for remote roles. The assumption behind these hypotheses was based on the recent shifts in current work systems as a result of the COVID-19 pandemic. Workers were forced to make abrupt changes to their work practices and begin working remotely from home for the first time.

Research question 1 asked if there would be a significant difference in cognitive performance of at-home remote workers. Hypothesis 1 and 3 were developed to investigate these differences. Research question 2 asked if a difference would be found in work task performance of individuals who worked remotely from home. Hypothesis 2 and 4 were developed to investigate these differences. This research employed a mixed-methods approach in order to gain a deeper understanding of the lived experiences of remote workers and to strengthen the overall conclusions of this research. For this study, 18 separate ANOVAs were conducted to test the

differences between each group (those hired for remote roles, those not hired for remote roles, and those hired to work remote roles as needed).

As a result, the data indicated no statistically significant differences in cognitive performance or work task performance in at-home remote-based workers among groups. However, when the means for each group were compared against each other, participants in the not hired for remote role (less than 25% remote) group, did show a consistent difference in how they rated each question when compared to the hired for remote role (50% or more) group for the majority of the survey questions.

Limitations

As previously mentioned in Chapter 1, there existed three known limitations including, time constraints (which decreased the time frame for participant recruitment, data collection, and analysis), the potential for biased responses due to personal preference for working from home, and lastly time constraints that would limit the depth of qualitative analysis, extracting only the most apparent themes.

The results obtained from this study may be limited due to various reasons. The first limitation encountered was due to the sample size. It is possible that insignificant statistical results may be attributed to the small sample size, with a total of 66 samples. For example, group 3 (hired for remote role as needed) had incomplete data with only eight samples. A small sample size can yield an effect; however, it may be undetectable (Makin et al., 2019). A larger sample size can increase the power during statistical analysis (Leedy & Ormrod, 2016, p. 239).

With regard to the qualitative portion of this study, the primary limitation was the sheer volume of data collected. There was a total of 520 qualitative responses. This study employed an abbreviated version of the collective case study methodology. In a true collective case study, data

is reviewed until no further categories or themes can be identified (data saturation). However, provided the amount of time available for data analysis and the number of responses, this study does not guarantee complete data saturation. Despite this, the goal for conducting this study was achieved.

The structure of select qualitative questions may have limited the quality of participant responses. As previously mentioned in the qualitative analysis section in this chapter, some questions were perceived as similar or like-questions. This idea is deduced based on responses that stated, “same,” or “same answer as...,” and in one instance, a participant stated, “Too Many questions here that seem to ask same.” Each qualitative question was strategically constructed to elicit a response that would provide answers to the research questions, all while attempting to prevent social desirability in responses. To achieve this, each question addressed its own factor, however, this was not as apparent to some participants. Additionally, questions that addressed the cognitive performance factor and work task performance factor did have some overlap in the responses. Although the majority of participants provided unique responses to each question, overlap may have been prevented by rephrasing those questions. Furthermore, this study may have benefited from pilot testing survey questions, yet it was not a practical course of action due to the time constraint of 9 weeks to develop this thesis.

Qualitative and Quantitative Discussion

Using an example from Table 1 (means for cognitive performance), when participants were asked if focusing on work tasks is more challenging by working from home than their normal (non-remote) work setting, on a scale from 1 to 6 (with 1 meaning strongly agree, and 6 meaning strongly disagree), those in the not hired for a remote-role group agreed more with that statement than participants in the hired for remote-role group. The non-remote group scored a

mean of 3.23 (agreed more) and the remote group scored a mean of 3.93 (disagreed more). This pattern was consistent throughout the statistical analysis for cognitive performance. Overall, when at-home remote workers compared their experiences working from home as opposed to a traditional work setting, workers tend to disagree that work tasks are more challenging since working from home, disagree that their minds tend to wander more, agree that they are more excited to begin their work week, disagree that they are more overwhelmed at the end of the workweek, disagree that working from home is more mentally draining, disagree that they are more forgetful, disagree that their workload is more overwhelming, disagree that work demands are greater, and lastly, disagree they feel more stressed.

Overall, qualitative results indicated that family, time boundaries, domestic responsibilities, mental well-being and physical wellbeing, workspace, and workspace environment, frequent breaks and physical outdoor activity, music, structure and routine, and lastly, an isolated work environment were the most commonly reported factors to cognitive performance while working from home. When the data were compared across groups, family distractions were reported more in the inexperienced remote group. Although this finding does corroborate with previous research, some responses regarding family distractions may be exacerbated due to the changes in family dynamics as a result of the nationwide COVID-19 stay-at-home orders. To set the context, children who lived in the same household as their remote working parents were forced to attend school virtually, and most adults living in the same household began working remotely. This dynamic posed challenges in the household in situations where there was no dedicated workspace, when the workspace was shared, and because parents were forced to take on a teacher's role in order to help their children schoolwork during working hours.

Time boundary violations were reported in all groups. However, the inexperienced remote group tends to express these violations as more bothersome than experienced remote workers and are associated with higher perceived stress. In contrast, experienced remote workers appeared to embrace additional time spent on work tasks, as if they had already adapted to it. It is possible that this was due to their levels of self-efficacy. Staples et al., (1998) found that self-efficacy levels tend to be higher in experienced remote workers.

Interestingly, domestic responsibilities were found to be one of the top factors in the home environment that influenced cognitive performance and work task performance in the inexperienced remote group. Comparatively, there were very few mentions of domestic responsibility as a notable factor in the experienced remote group. The data revealed that inexperienced remote workers tend to perceive this factor as distracting and appeared to experience issues with resisting the urge to fulfill their home duties during their work shift. Crosbie and Moore (2004) found that remote workers with less experience tend to have difficulty establishing and maintaining work and home boundaries. Similarly, the data showed that mental well-being and physical well-being were more commonly reported in the inexperienced remote group than the experienced remote workgroup, which was an unexpected finding. Note, it should be reminded that these findings may be influenced by the change in family/household dynamics resulting from nationwide stay-at-home orders.

Workspace and workspace environment were factors identified in both cognitive performance and work task performance. Note, there appears to be an interrelation between work task performance and cognitive performance. Data revealed that workspace plays a crucial role in how the worker was able to focus and perform their tasks. It was apparent that workers preferred a dedicated space that was equipped with the same materials that would be found in

their respective traditional work settings. Workers in the inexperienced remote group had fewer workspace resources and setups than the experienced group, which was expected considering the lack of a transitional period from working in office settings or field, to completely remote, as well as the lack of preparedness on behalf of the employer. Workspace and workspace environments were found to be more optimal and conducive to healthy focus and work task performance in experienced remote workers. Generally, experienced remote workers had controlled workspaces/workspace environments which made them feel more comfortable and less bothered by external factors. Particularly, an isolated work environment that was separate from home distractors (TV, personal electronics, pets, noises, etc.) contributed to the optimization of cognitive and work task performance. Additional workspace environmental factors include breaks, physical activity, and music which were shown to impact cognition, yet cognition also played a role in work task performance such as, more or less focus, ability to avoid distractions, motivation, and stress. Moreover, experienced remote workers had better-established routines and work structure than non-experienced remote workers, which was identified as a key factor to work task performance in all groups. Experienced remote workers also tend to have more established organizational structures in place that also supported work performance.

Lastly, the communication dynamics did show to impact work performance, mainly in the inexperienced remote group. This may also be explained due to the lack of a transitional period from the traditional work setting to a remote work setting. Most companies and employers did not have an established remote work system as a part of their business structure. Organizations with business models that interact with clients in persons, such as legal, mental/social/behavioral, health and medical, and education, tend to experience the most

challenges adapting to remote work systems, not only due to their lack of experience with remote work but a lack of well-established, efficient remote work system structure, and guidelines. This also includes the lack of necessary resources and workspace materials required for each respective job role. The findings from this analysis are very logical due to the fact that these occupations were not initially designed to function on a remote-based platform.

Chapter V

Conclusions and Recommendations

Conclusion

The concept and application of remote-based work have become ubiquitous across organizations nationwide. Technological advances over the past few decades have proven the potential and applicability of remote-based work, and several companies have realized the organizational and financial benefits that remote work options provide. Prior to the pandemic, many organizations have considered adding remote-based options to their current work structure in the future, however, the pandemic expedited these changes, and have forced companies to adopt, and makeshift, remote work systems without any preparation or knowledge of human factors concerning the individual worker and the at-home remote environment. Until now, previous research has primarily focused on remote working from the perspective of individuals who are assigned to remote-based positions, and not those who were assigned to the role involuntarily. Moreover, previous research has not yet investigated the home environment on cognitive performance and work task performance, especially considering remote workers who lack the experience, or whose job roles were simply not designed for remote work. These factors combined were the inspiration for deciding to conduct this research.

This study achieved its research objective of developing a baseline of understanding of the factors and challenges that affect cognitive performance and work task performance in individuals who work remotely from home, which is a valuable, and very relevant contribution to the current body of knowledge within the Human Factors community. To unveil these factors, a mixed-methods research approach was employed to identify such factors and the impact they have on individuals with remote-based work experience, and those who began remote-work

involuntarily due to the pandemic. Although statistical significance was not achieved, insightful patterns were identified, discussed, and data triangulation was met with the incorporation of qualitative analysis. Based on the results, there are sufficient grounds for belief that there exists an interrelationship between cognitive performance and work task performance, to which these variables are highly shaped by the individual's workspace and workspace environment.

Highlights were made to the themes that were discovered throughout the analysis, and some of the key distinctions between the experienced remote worker, and non-experienced remote worker. Overall, experienced remote workers tend to have established work systems and structures in place and tend to be less impacted by their environment. This was believed to be due to the adaptation period that most experienced remote workers would have undergone when first making the transition from a traditional work setting to a home-based remote work setting, prior to the pandemic, respectively.

Home-based remote work systems will inevitably continue to evolve. As they do, it serves in the best interest of Human Factors professionals, Human Resources, and employers to consider cognitive performance and the factors that intertwine with the worker's ability to perform their job tasks efficiently, safely, and adhere to good work practices for the optimal remote work experience, work environment, and work system set up. The focus of this thesis was to establish a descriptive understanding of those factors that can aid in future research and development of well-structured, home-based remote-work systems, policies, and procedures. Moving forward, as sociotechnical systems continue to advance, it is essential to ensure that the human component is kept in the forefront during future designing and decision making.

Recommendations

There are a number of avenues for future human factors research exploration in the area of at-home remote work systems. Two primary themes were identified in previous research that limit the generalizability of those findings towards remote-based work, due to contradictory findings. Those themes include remote work systems that almost always pay special interest to voluntary remote workers, and their particular areas of focus, which tend to have a much broader scope. Considering these factors and the projection of future remote-work developments, it may benefit future researchers to narrow the research scope in order to address variables that can be studied in-depth, and thoroughly, in a single study.

This current research identified the interconnectedness of cognitive performance and work task performance, meaning they work homogeneously. It is suggested to researchers and practitioners to take this relationship into consideration during the design of future remote-based work systems. Considering the rise in open positions for remote-based roles, it may help researchers and employers to create pilot studies for potential remote work system designs to gauge their effectiveness and impact on individual work task performance. While cognitive performance was shown to shape work task performance, particularly with involuntary remote workers (i.e., those without prior remote work experience), relationships between mental health/well-being, the degree of adaptability to the home-based remote work environment, and coping practices appeared to co-exist. Future work aimed at examining these relationships and their impact on work task performance could demonstrate to be beneficial, especially in developing new remote systems, and remote system protocols for first-time remote employees. Doing so may further benefit the creation of universal remote work systems designs or the creation of system design options suitable for multiple experience levels and working styles.

References

- 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) 40–68. <https://doi.org/10.1177/1529100615593273>
- Allen, T. D., Merlo, K., Lawrence, R. C., Slutsky, J., & Gray, C. E. (2021). Boundary management and Work-Nonwork balance while working from home. *Applied Psychology*, 70(1), 60-84. <https://doi.org/10.1111/apps.12300>
- American Psychiatric Association. (n.d.). *Working remotely during COVID-19: Your Mental health & well-being*. <http://workplacementalhealth.org/getmedia/fd8a9b98-b491-4666-8f27-2bf59b00e475/Working-Remotely-During-COVID-19-CWMH-Guide>
- Balog, D. (n.d). *Mixed methodology qualitative data analysis* [Manuscript in preparation]. Department of Graduate Studies, College of Aeronautics, Embry-Riddle Aeronautical University-Worldwide
- Baxter, P., & Jack, S. (2008) Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *The Qualitative Report*, 14(4), 544-559
- Capella University. (n.d.). Qualitative Data Analysis Methods. https://campustools.capella.edu/BBCourse_Production/PhD_Colloquia_C4C/Track_3/phase_t3_u06s6_qualanalysis.html#:~:text=Categorical%20Aggregation%3A%20This%20involves%20seeking,performed%2C%20looking%20for%20common%20themes
- 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>

- Clark, L. A., Karau, S. J., & Michalisin, M. D. (2012). Telecommuting Attitudes and the 'Big Five' Personality Dimensions. *Journal of Management Policy and Practice*, 13(3), 31-46. <http://ezproxy.libproxy.db.erau.edu/login?url=https://www-proquest-com.ezproxy.libproxy.db.erau.edu/scholarly-journals/telecommuting-attitudes-big-five-personality/docview/1021380207/se-2?accountid=27203>
- Crosbie, T., & Moore, J. (2004). Work-life balance and working from home. *Social Policy and Society*, 3(3), 223-233. doi:<http://dx.doi.org.ezproxy.libproxy.db.erau.edu/10.1017/S1474746404001733>
- Demerouti, E., Mostert, K., & Bakker, A. (2010). Burnout and Work Engagement: A Thorough Investigation of the Independency of Both Constructs. *Journal of Occupational Health Psychology*, 15(3), 209–222. <https://doi.org/10.1037/a0019408>
- 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), 255-269. 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), 527-546. <https://doi.org/10.1108/ER-08-2012-0059>
- Hartig, T., Kylin, C., & Johansson, G. (2007). The Telework Tradeoff: Stress Mitigation vs. Constrained Restoration. *Applied Psychology*, 56(2), 231–253. <https://doi.org/10.1111/j.1464-0597.2006.00252.x>
- Hsu, Y. S., Chen, Y. P., & Shaffer, M. A. (2019). Reducing Work and Home Cognitive Failures: the Roles of Workplace Flextime Use and Perceived Control.

- Journal of Business and Psychology*, 36. 155–172. <https://doi.org/10.1007/s10869-019-09673-4>
- Jong, T. d. (2010). Cognitive load theory, educational research, and instructional design: Some food for thought. *Instructional Science*, 38(2), 105-134. <https://doi.org/10.1007/s11251-009-9110-0>
- Kalakoski, V., Selinheimo, S., Valtonen, T., Turunen, J., Käpykangas, S., Ylisassi, H., Toivio, P., Järnefelt, H., Hannonen, H., & Paaajanen, T. (2020). Effects of a cognitive ergonomics workplace intervention (CogErg) on cognitive strain and well-being: A cluster-randomized controlled trial. A study protocol. *BMC Psychology*, 8(1), 1-1. <https://doi.org/10.1186/s40359-019-0349-1>
- Kattenbach, R., Demerouti, E., & Nachreiner, F. (2010). Flexible working times: Effects on employees' exhaustion, work-nonwork conflict and job performance. *Career Development International*, 15(3), 279-295. <https://doi.org/10.1108/13620431011053749>
- Kniffin, K.M., Narayanan, J., Anseel, F., Antonakis, J., Ashford, S.P., Bakker, A.B., Bamberger, P., Bapuji, H., Bhave, D.P., Choi, V.K., Creary, S.J., Demerouti, E., Flynn, F.J., Gelfand, M.J., Greer, L.L., Johns, G., 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), 63-77. <https://doi.org/10.1037/amp0000716>
- Krawczyk, P., Maslov, I., Topolewski, M., Pallot, M., Lehtosaari, H., & Huotari, J. (2019). Threats to reliability and validity of mixed methods research in user eXperience. Paper presented at the 1-7. <https://doi.org/10.1109/ICE.2019.8792676>
- Leedy, P. D., & Ormrod, J. E. (2016). *Practical Research: Planning and Design* (Twelfth Edition ed.). Pearson.

- Makin, T. R., & Orban de Xivry, J. J. (2019). Ten common statistical mistakes to watch out for when writing or reviewing a manuscript. *eLife*, 8, e48175.
<https://doi.org/10.7554/eLife.48175>
- Norman, Geoffrey. (2010). Likert scales, levels of measurement and the “laws” of statistics. *Advances in health sciences education: theory and practice*. 15. 625-32. 10.1007/s10459-010-9222-y
- Ponto J. (2015). Understanding and evaluating survey research. *Journal of the advanced practitioner in oncology*, 6(2), 168–171
- Régis, N., Dehais, F., Rachelson, E., Thooris, C., Pizziol, S., Causse, M., & Tessier, C. (2014). Formal detection of attentional tunneling in human operator-automation interactions. *IEEE Transactions on Human-Machine Systems*, 44(3), 326-336.
<https://doi.org/10.1109/THMS.2014.2307258>
- Sanz-Vergel, A. I., Demerouti, E., Mayo, M., & Moreno-Jiménez, B. (2011). Work-home interaction and psychological strain: The moderating role of sleep quality. *Applied Psychology*, 60(2), 210-230. <https://doi.org/10.1111/j.1464-0597.2010.00433.x>
- Society for Human Resource Management. (n.d.). *Manage flexible work arrangements*.
<https://www.shrm.org/resourcesandtools/tools-and-samples/toolkits/pages/managingflexibleworkarrangements.aspx>
- Staples, D. S. (2001). A study of remote workers and their differences from non-remote workers. *Journal of End User Computing*, 13(2), 3-14.
<http://dx.doi.org.ezproxy.libproxy.db.erau.edu/10.4018/joeuc.2001040101>

- Staples, D. S., Hulland, J. S, Higgins, C. A. (1998). A Self-Efficacy Theory Explanation for the Management of Remote Workers in Virtual Organizations, *Journal of Computer-Mediated Communication*, (3)4. <https://doi.org/10.1111/j.1083-6101.1998.tb00085.x>
- Sytch, M., & Greer, L. L. (2020, August 18). Is Your Organization Ready for Permanent WFH?. *Harvard Business Review*. <https://hbr.org/2020/08/is-your-organization-ready-for-permanent-wfh>
- Tietze, S., & Nadin, S. (2011). The psychological contract and the transition from office-based to home-based work. *Human Resource Management Journal*, 21(3), 318–334.
- Toniolo-Barrios, M., & Pitt, L. (2020). Mindfulness and the challenges of working from home in times of crisis. *Business Horizons*. <https://doi.org/10.1016/j.bushor.2020.09.004>
- Wagh, S. (n.d.). *Public Health Research Guide: Primary & Secondary Data Definitions*. <https://researchguides.ben.edu/c.php?g=282050&p=4036581>
- Wang, B., Liu, Y., Qian, J. and Parker, S.K. (2021), Achieving Effective Remote Working During the COVID-19 Pandemic: A Work Design Perspective. *Applied Psychology*, 70: 16-59. <https://doi-org.ezproxy.libproxy.db.erau.edu/10.1111/apps.12290>
- Weldon, D. (2019). Developers are more remote-based, company connected and burnt out: DigitalOcean has released the results of its global developer survey, which looks at how software pros view their work and their working conditions. *Employee Benefit News (Online)*, Retrieved from <http://ezproxy.libproxy.db.erau.edu/login?url=https://www-proquest-com.ezproxy.libproxy.db.erau.edu/trade-journals/developers-are-more-remote-based-company/docview/2284664592/se-2?accountid=27203>

Appendix A

Recruitment Script

Script for individual candidates:

Dear (insert name),

I am conducting a research study for my Master's Thesis on at-home remote-based work systems and I would like to know if you would be interested in participating, or share this information with someone you think might be interested in participating. I attached a link to the survey for your convenience, which contains all of the eligibility requirements. The total estimated time to complete this survey is approximately 10 to 15 minutes. I would greatly appreciate your participation, but you are under no obligation to do so. Feel free to let me know if you have any questions.

Thank you for your time!

Warmly,

Angela Arias

(link will be inserted here)

Script for online post:

Hello All!

I am conducting a research study for my Master's Thesis on at-home remote-based work systems and I would like to know if you would be interested in participating, or share this information with someone you think might be interested in participating. I attached a link to the survey for your convenience, which contains all of the eligibility requirements. The total estimated time to complete this survey is approximately 10 to 15 minutes. I would greatly appreciate your participation, but you are under no obligation to do so. Please feel free to send me a direct

message if you have any questions.

Thank you for your time and have a wonderful day!

Warmly,

Angela Arias

(link will be inserted here)

Appendix B

INFORMED CONSENT FORM

Survey of Employee Experiences in At-Home Remote-Based Work Systems

Purpose of this Research: You are being asked to take part in a research project for the purpose of evaluating at-home remote-based work systems. During this study, you will be asked to complete a brief online survey about your personal experience working remotely from home. The completion time for this survey will take approximately 10-15 minutes.

Eligibility: To participate in this study, you must have at least one-year experience working from a non-remote location, at any point in time, prior to the Covid-19 pandemic, and must currently work at least 75% of your work time remotely from home for the same job to which you were working in prior to the Covid-19 pandemic.

Risks or discomforts: The risks of participating in this study are no greater than what is experienced in daily life.

Benefits: While there are no benefits directly to you as a participant, your assistance in this research will help provide insight into the lived experiences of at-home remote employees to serve as a basis for employers and researchers in developing effective, contemporary at-home remote-based work systems, policies, and procedures that are congruent with current societal conditions. In addition, the information obtained will serve as a baseline for future research.

Confidentiality of records: Your individual information will be protected in all data resulting from this study. Your responses to this survey will be anonymous. No personal information will be collected other than basic demographic descriptors. The online survey system will not save IP address or any other identifying information. In order to protect the anonymity of your responses, I will keep your responses in a password-protected file on a password-protected computer. No one other than the researcher will have access to any of the responses. Information collected as part of this research *will not be used* or *distributed* for future research studies.

Compensation: There is no compensation offered for taking part in this study.

Contact: If you have any questions or would like additional information about this study, please contact the Principle Investigator, Angela M. Arias, arias6@my.erau.edu, or the faculty members overseeing this project, Dr. Clint R. Balog, balogc@erau.edu, and Dr. Dennis A. Vincenzi, vincenzd@erau.edu. For any concerns or questions as a participant in this research, contact the Institutional Review Board (IRB) at 386-226-7179 or via email teri.gabriel@erau.edu.

Voluntary Participation: Your participation in this study is completely voluntary. You may discontinue your participation at any time without penalty or loss of benefits to which you are

otherwise entitled. Should you wish to discontinue the research at any time, no information collected will be used.

CONSENT: By checking AGREE below, I certify that I have at least one-year experience working in a non-remote location, at any point in time, prior to the Covid-19 pandemic, currently work at least 75% of my work time remotely from home, understand the information on this form, and voluntarily agree to participate in the study.

If you do not wish to participate in the study, simply close the browser or check DISAGREE which will direct you out of the study.

Please print a copy of this form for your records. A copy of this form can also be requested from Angela Arias, arias6@my.erau.edu.

AGREE

DISAGREE

Appendix C

Pre-Screening Questions and Demographic Questionnaire

Screening questions

1. Are you at least 18 years of age?
2. Have you worked at least one year full-time in a traditional work setting prior to the Covid-19 pandemic?
3. Do you currently work at least 75% of your work time remotely from home?

Demographics Survey

1. Please select which best applies to you. In your current position, remote working was a part of your essential job function (prior to Covid-19 pandemic):
 - a) Worked primarily remotely (50% or more of your work time)
 - b) Worked remotely as needed (25% - 50% of your work time)
 - c) Was not hired for a remote position (Less than 25% of your work time)
2. Please rate your digital literacy prior to the Covid-19 pandemic (knowledge of how to use tools such as email for communication, zoom, digital filing platforms, etc.). Basic Knowledge, Intermediate, Advanced.
3. Please select your age group: 18-24, 25-34, 35-44, 45-54, 55-64, 65+
4. Please select your sex: Male or Female
5. What location do you work in? _____ (Or, what County and State do you work in?)
6. Please select the industry in which you work remotely in:
 - a. Government
 - b. Education
 - c. Social/Behavioral/Mental Services

- d. Professional/Business/Management
 - e. Health Services/Medical
 - f. Office/Administrative
 - g. Other ____ (Please Specify)
7. Do you have a designated workspace at home? Yes or No
8. Please describe your workspace. Include whether you have a shared workspace, if so, with who, if you frequently change workspace locations, and where to.

Appendix D

Survey Questions

Quantitative Questions:

Note: All quantitative questions will be measured with a 6-point Likert scale: Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree

1. Some people experience better focus on work tasks in a regular work setting, and others from home. In your experience, focusing on work tasks is often more challenging working from home than in my normal (non-remote) work setting.
2. My mind tends to wander more at home than in my normal (non-remote) work setting.
3. At the beginning of the week, I am more excited to begin my work week at home than I did at my normal (non-remote) work setting.
4. I feel more overwhelmed at the end of a work week than I did working in my normal (non-remote) work setting.
5. Working from home is often more mentally draining than working in my normal (non-remote) work setting.
6. At times, I forget little things more, now, than I did in my normal (non-remote) work setting. (e.g., passwords, small tasks, making phone calls, noting something down).
7. My workload feels more overwhelming now that I am working from home.
8. My work demands are greater now that I am working from home.
9. At the end of the week, I tend to feel more stressed now than I did when I was working from my normal (non-remote) work setting.

10. I tend to make mistakes on work tasks more at home.
11. I accomplish more work tasks working from home than I did in my normal (non-remote) work setting.
12. I work with the same amount of supervision now that I am working from home.
13. Working at home, it takes more effort to prioritize work tasks during my shift.
14. When unexpected events occur during my work shift, I have the time during the day to handle them without falling behind on my other tasks.
15. I work later than my shift, and/or, work on weekends to meet deadlines.
16. I am more involved with my work now than I was at my normal work setting. (e.g., meetings, individual projects, group projects, speaking at meetings, etc.)
17. Technological issues interfere with my work performance more at home than in my normal work setting?
18. Disruptions and interruptions occur more frequently at home than in my normal work setting?

Qualitative Questions (open-ended):

1. In your experience, what are the greatest challenges with working from home?
2. How has working from home influenced how you carry out your work tasks?
3. In your experience, what distractions in your environment make the biggest impact on your ability to complete work tasks?
4. Please describe the home/family obligations that have influenced your work performance.
5. What in your home environment makes it difficult to complete your work tasks?

6. Please describe the greatest factor(s) that influence your focus while working from home.
7. What helps you stay on track and focused while working from home?
8. What do you do at home to make your work experience more effective?