Czech University of Life Sciences Prague

Department of Psychology

Department of Economics and Management

Master's Thesis

Psychological impact of working from home on scientific and academic workers during the Covid-19 pandemic

Svitlana Potapenko

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

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SVITLANA POTAPENKO

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Psychological impact of working from home on scientific and academic workers during the COVID-19 pandemic

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Objectives of thesis

To estimate the psychological impact of working from home during the COVID-19 pandemic on the academic and scientific workers of universities, evaluate their experiences and recognize their barriers, challenges. To investigate positive and negative factors influencing mental well-being during remote work.

Methodology

Collecting cross-sectional data through web-based questionnaires from the universities of the Czech Republic. Using representative and convenience sampling to invite researchers, scientists, and academic teachers to complete the questionnaires. Evaluation of the obtained data using an empirical comparison on the basis of the following criteria: procrastination, loneliness, WFC (Work-family conflict), loss of social connections, overwork, anxiety, and stress.

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Keywords
work from home, remote work, telework, psychosocial impact, COVID-19, quarantine, academic workers, scientific workers

Recommended information sources
AL-TAWEEL, D., AL-HAQAN, A., BAJIS, D., AL-BADER, J., AL-TAWEEL, A. M., AL-AWADHI, A., & AL-AWADHI, F. (2020). Multidisciplinary academic perspectives during the COVID-19 pandemic. The International Journal of Health Planning and Management, 35(6), 1295-1301
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The Diploma Thesis Supervisor
PhDr. Kristýna Krejčová, Ph.D.

Supervising department
Department of Psychology

Electronic approval: 26. 11. 2021

PhDr. Pavla Rymešová, Ph.D.

Head of department

Electronic approval: 29. 11. 2021

Ing. Martin Pelikán, Ph.D.

Dean

Prague on 22. 03. 2022

Declaration

I declare that I have worked on my master's thesis titled "Psychological impact of working from home on scientific and academic workers during the Covid-19 pandemic" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 30.03.2022   <u>Svitlana Potapenko</u>

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Psychological impact of working from home on scientific and academic workers during the Covid-19 pandemic

Abstract

The novel coronavirus (Covid-19) pandemic spreads rapidly since it was firstly identified in December 2019. National lockdowns have been implemented in many countries, affecting workers of all sectors and forcing many people to work from home. The aim of this thesis is to estimate the psychological impact of working from home during the Covid-19 pandemic on academic and scientific workers and on the basis of these findings to formulate recommendations how to reduce the negative psychological impacts while working from home.

The first part of this thesis, the literature review, presents the result of the study and analysis of books, journal articles, web resources, and materials on the relevant topics, such as a brief overview of the pandemics history, psychological impacts of remote work, and challenges faced by researchers and academics workers during Covid-19 pandemic. The second part of the thesis is my own research based on surveys provided to remote employees of Charles University and the Czech Academy of Science. The questionnaire was distributed by email and was completed by 103 participants out of the 200.

According to the results, dependency was confirmed in the cases of procrastination, overwork and loss of social connections. Based on the respondents' answers, several activities were suggested to deal with the psychological impact while working from home during the Covid-19 pandemic. Physical exercise (walking or cycling), organizing tasks, setting schedules and goals, and finding ways to stay in touch with colleagues help to reduce the negative psychological impacts while working from home.

Keywords: work from home, remote work, telework, psychosocial impact, Covid-19, quarantine, academic workers, scientific workers.

Psychologický dopad práce z domova na vědecké a akademické pracovníky během pandemie Covidu-19

Abstrakt

Pandemie nového koronaviru (Covid-19) se od prosince 2019, kdy byl poprvé identifikován, rychle šíří. V mnoha zemích byla zavedena plošná opatření na celostátní úrovni, která postihla pracovníky všech odvětví a donutila mnoho lidí pracovat z domova. Cílem této práce je odhadnout psychologický dopad práce z domova během pandemie Covidu-19 na akademické a vědecké pracovníky a na základě těchto zjištění formulovat doporučení, jak snížit negativní psychologické dopady při práci z domova.

První část této práce, literární rešerše, představuje výsledek studia a analýzy knih, časopiseckých článků, webových zdrojů a materiálů k příslušným tématům, jako je stručný přehled historie pandemie, psychologické dopady práce na dálku a problémy, kterým čelí výzkumní a akademičtí pracovníci během pandemie Covidu-19. Druhou část práce tvoří vlastní výzkum založený na dotazníkovém šetření poskytnutém vzdáleným pracovníkům Univerzity Karlovy a Akademie věd České republiky. Dotazník byl rozeslán e-mailem a vyplněn 103 účastníky z 200. Na základě výsledků byla potvrzena závislost v případech prokrastinace, přepracovanosti a ztráty sociálních vazeb.

Na základě odpovědí respondentů bylo navrženo několik aktivit, jak se vypořádat s psychickými dopady při práci z domova během pandemie Covidu-19. Fyzické cvičení (chůze nebo jízda na kole), organizace úkolů, stanovení harmonogramu a cílů a hledání způsobů, jak zůstat v kontaktu s kolegy, pomáhají snižovat negativní psychické dopady při práci z domova.

Klíčová slova: práce z domova, práce na dálku, telework, psychosociální dopad, Covid-19, karanténa, akademičtí pracovníci, vědečtí pracovníci

Table of content

Introduction

In 2019, a coronavirus disease SARS-CoV-2 (Covid-19) was identified and spread worldwide. Firstly, in the 21st century, the world has become in the grip of a global pandemic, which reached the Czech Republic in March 2020. The epidemiological situation looked so dangerous that the government was forced to take various measures directly affecting the population of the country. The so-called First wave of the Covid-19 crisis had begun. Further, there were subsequent waves associated with new strains, which became more dangerous and claimed the lives of many people. At the same time, mass vaccinations against the Covid-19 pandemic had started. However, it seems that the Covid-19 infection will stay with for a long time, albeit on a smaller scale and with fewer consequences.

Covid-19 pandemic caused rapid and unprecedented transformations in the work of universities all over the world. The first changes in the field of higher education in the Czech Republic occurred during the first national lockdown in March 2020, when the universities when universities completely switched to distance learning within a few days to prevent the spreading of the virus. After eighteen months, the development of a vaccination campaign gives hope for a return to normality, but people fear that the virus's effects will have to be tolerated indefinitely (Kissler et al., 2020).

The Covid-19 pandemic has resulted in the temporary closure of higher education institutions. Many schools, universities and institutes have discontinued in-person teaching. This will negatively impact educational and research activities since the social distance is crucial at this stage. The Ministries of Science and Education try to find alternative ways to overcome this issue. The lockdown stimulated the growth of online educational and research activities. This crisis forced the adoption of new technology in educational and scientific activities. The main goal of this research is to explore qualitatively and quantitatively the impact of the Covid-19 lockdown and work from home on the psychological statements of the researchers and academic workers.

The theoretical part of the thesis will review the previously published research related to remote work. Moreover, a review of research materials studied the psychological impact of working from home, such as particular procrastination, loneliness, WFC (Work-family conflict), loss of social connections, overwork, anxiety, and stress will be performed. In the practical part of this thesis, quantitative and qualitative analysis of the survey will be applied. Additionally, calculations will be made to check the dependencies between the variables, according to the given hypotheses. The Results and discussion chapter will present the

analysis of data obtained by means of questionnaire and their comparison with literature. Options for dealing with psychological distress while working remotely will be suggested. Furthermore, the positives and negatives of working from home during the Covid-19 pandemic will be presented according to the results of the study. As well as the main objectives and testing of hypotheses, there was also a desire to answer two questions:

- What were the biggest challenges researchers and academic workers faced while working from home?

- How did researchers and academic workers manage the psychological impacts of working from home?

The main result of this work will be the formulation of recommendations how to reduce the negative psychological impacts while working from home.

1. Objectives and Methodology

1.1 Objectives

The main aim of this thesis is to estimate the psychological impact of working from home during the Covid-19 pandemic on the academic and scientific workers. The particular tasks are:

- Evaluate experiences and recognize barriers or challenges of academic and scientific workers during Covid-19 pandemic.
- To investigate positive and negative factors influencing mental well-being during remote work.

The theoretical part aimed to define and describe the current state of knowledge in the field of psychological impact of working from home. There, the basic concepts, the most important work theories and factors affecting the psychological state were described and explained.

The aim of the practical part was to find a correlation between working from home during the Covid-19 pandemic and negative psychological states. Moreover, the practical part describes and showed graphically the respondents' answers to all the questions in the questionnaire.

Hypotheses:

H1: There is a relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and the type of workplace.

H2: There is a relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and the possibility to collect data remotely.

H3: There is a relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and educational duties at work.

H4: There is a relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and presence in the workplace.

H5: There is a relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and personal workspace.

H6: There is a relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and home equipment.

H7: There is a relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and working time at home.

H8: There is a relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and living situation.

H9: There is a relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and the expected negative impact on the research results and future funding

1.2 Methodology

This thesis is divided into two sections to achieve the objectives: a literature review and a practical part. The first step in the preparation of this thesis was to study the literature in order to obtain a sufficient amount of theoretical information on the topic of work motivation. The different variables were described in the theoretical part of this thesis. The second step was to determine the hypotheses, which became the basis for the construction of a structured questionnaire. The hypotheses were formulated based on the literature and personal experience.

The web-based questionnaires from the Charles University, Prague, Czech Republic were used for collecting cross-sectional data. Purposive Sampling was used were used to invite researchers, scientists, and academic teachers to complete the questionnaires. In conclusion, the obtained data were evaluated using an empirical comparison on the basis of the following criteria: procrastination, loneliness, work-family conflict, loss of social connections, overwork, anxiety, and stress. The data, which were obtained from 103 selected employees, were processed using the Microsoft Excel (MS Excel) and Statistical Analysis System (SAS). Data from the questionnaire were interpreted in the practical part of this thesis using tables.

2. Literature Review

2.1 Work from home

2.1.1 The history of pandemics and quarantine

Nowadays, the problem of the psychological state of humans is becoming more and more relevant. The investigation of the mental well-being in professional activity is an urgent trend in modern psychology of professional activity, especially in a situation of global unpredictability caused by political issues, economic slowdowns, and natural phenomena. Under the last term, not only tornadoes, earthquakes, tsunamis and floods can be understood, but also the epidemics. Along with war conflicts and natural cataclysms, infectious and epidemic diseases are responsible for the most deaths in human history (Zhang, Wang, Zhu, Wang, 2020). The history of humankind knows the consequences of many terrible epidemics of infectious diseases. During the whole history of human dispersal, infectious diseases constantly followed them. Even now, in the age of modern science and developed medicine, outbreaks of flu, chickenpox or rotavirus infection continuously occur. The most severe pandemics in human history are collected in Table 1, starting with the Antonine Plague and ending Covid-19.

Table 1: Most deadly pandemics

Name of pandemic	Time period	Death toll
Antonine Plague	165-180	5 million
Plague of Justinian	541-542	30-50 million
Japanese Smallpox Epidemic	735-737	1 million
Black Death (Bubonic Plague)	1347-1351	200 million
New World Smallpox Outbreak	1520-onwards	56 million
Italian Plague	1629-1631	1 million

Source: LePan, 2020.

Table 1: Most deadly pandemics, Continued

Great Plague in London	1665	100 000
Cholera pandemic 6 outbreak	1817-1923	1million
The Third Plague	1855	12 million (China and India)
Yellow Fewer	the late 1800s	100 000 - 150 000 (US)
Russian Flu	1889-1890	1 million
Spanish Flu	1918-1919	40-50 million
Asian Flu	1957-1958	1,1 million
Hong Kong Flu	1968-1970	1 million
Human immunodeficiency virus (HIV) /acquired immunodeficiency syndrome (AIDS)	1981-present	25-35 million
Severe Acute Respiratory Syndrome (SARS)	2002-2003	770
Swine Flu (A/H1N1pdm09 or H1N1)	2009-2010	200000
Middle East Respiratory Syndrome (MERS)	2012-present	850
Ebola	2014-2016	11300
Severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2)	2019-present	6,1 million (27/03/22)

Source: LePan, 2020.

In the early 2000th, the international community faced a daunting global public health emergency with the pandemic of Severe Acute Respiratory Syndrome (SARS).

Severe Acute Respiratory Syndrome is unusual pneumonia that spreads in an uncontrollable manner (Peiris, Yuen, Osterhaus, Stöhr, 2003). It was firstly discovered in November 2002 in the Chinese province of Guangdong and eventually affected more than 25 countries. According to a consolidated report from the World Health Organization (WHO) (Papa, Maitoza, 2013) (Segovia, Moore, Linnville, Hoyt, 2015), China was one of the worst-hit countries and Beijing was one of the worst-hit cities in the world. This pandemic demonstrated the one of the consequences of globalization. Infectious diseases can be transferred very quickly from one continent to another. This problem highlights the importance of international coordination of efforts to respond to new outbreaks of infectious diseases. After SARS, there were several dangerous epidemics like Swine Flu (many people have been infected in Mexico City, other regions of Mexico, and parts of the United States. This flu has led to the death of about two hundred thousand people), MERS, and Ebola. Moreover, only in 2019, two effective medicines for the Ebola treatment with effectiveness of more than 90% were firstly utilized (Maxmen, 2019).

In 2020, humanity faces new challenges, which again test the professional health of many specialists. On March 11, the WHO declared a pandemic due to the spread of a new type of coronavirus infection, officially called SARS-CoV-2 or Covid-19 (Ali et. al., 2020). After 2 years, it can be stated that it became one of the severest outbreaks in our history. SARS-CoV-2 is a new coronavirus that was firstly revealed in the city Wuhan in Hubei province in China at the end of 2019 (Huang et al., 2020). To date, the main symptoms of Covid-19 reported are mainly related to acute respiratory distress, ultimately leading to death in the most severe cases. They include respiratory symptoms, such as fever, cough and shortness of breath (Fu et al., 2020). According to the WHO, the Covid-19 can cause pneumonia, severe acute respiratory syndrome, and around 3% mortality.

Besides health problems, the Covid-19 causes psychological ones. Previous epidemiological studies have shown depression, anxiety, psychoactive effects, panic attacks, agitation, psychotic symptoms, delusions, and even suicidal tendencies in SARS survivors (Maunder et al., 2003; Lee et al., 2007). Considering the reports of numerous instances of patients worldwide, the WHO has recognized and declared an emergency state (Kong, Agarwal, 2020).

Regardless of pharmacological interventions, non-pharmacological ones play an important role in slowing the progression of the disease spreading, reducing its peak and the prevalence of new cases over time (Morse, 2007). Self-isolation, quarantine of infected populations,

closures of borders, schools and workplaces, hand washing, surface cleaning, etc. are related to this group of measures (Wu et al., 2010).

Quarantine is one of the oldest and most effective methods of combating the spread of infectious diseases. This term became widely used during the 14th century in Italy and meant the isolation method of an infected person. When in the 14th century the plague decimated all of Europe, Venice wanted to protect its citizens from the infection potentially present on merchant ships. The quarantine rules were applied to arriving vessels that were required to anchor for 40 days before the crew and passengers could disembark. The Italians called it "Quaranta giorni," which is translated as "Forty days." Therefore, this practice was called "quarantino" – a derivative of the Italian "forty," which contributed to the use of the term quarantine (Gensini, Yacoub, Conti, 2004).

Quarantine was successfully introduced as a practical measure during the 2003 SARS epidemic and further outbreaks. Moreover, it was recognized as an essential component of pandemic influenza programs (Wilder-Smith, Freedman, 2020). Quarantine means isolation and limitation of the movement of potentially infectious people to ensure that they will not spread a disease to others (Centers for Disease Control Prevention, 2017). Quarantine is often unpleasant for its objects. Most people in quarantine experience short-term and long-term mental health problems, including stress, insomnia, emotional exhaustion, and substance abuse (Brooks et al., 2020). Even cases of suicide have been reported (Barbisch, Koenig, Shih, 2020).

During quarantine, a sense of autonomy and control over people's daily affairs is lost or minimized, leading to anxiety and confusion. The longer the quarantine period lasts, the more serious the psychological problems will be and the more durable they will be even after the quarantine has expired (Zhang, Wang, Zhu, Wang, 2020). The study performed on the medical staff working during the MERS epidemic showed that they were at greater risk of developing symptoms of post-traumatic stress disorder (PTSD) (Lee et al., 2018). Governments of different countries have developed several restrictive measures against citizens to slow down the spread of the infection. For example, measures adopted by the Czech Government during first (March-April 2020) and second (October-December 2020) lockdowns against the coronavirus include (Czech Republic Government, 2021):
- students and teachers of all levels of education were transferred to online learning;
- all sport, cultural, religious and other activities both public and private involving more than 30 people are forbidden;

- public access to swimming pools and tourist information centres is forbidden;

- retail sales and the sales of services in business premises are forbidden;

- free movement is limited except travel to and from work;

- all re-export of medicines and medicinal products registered for the Czech market to the EU and any export of such outside the EU is forbidden;

- all persons are required to wear a face mask or respirator (FFP2 protection level) outside of their place of residence;

- two meters distance between people;

- a nightly curfew was imposed;

- shopping on Sunday was forbidden;

-the consumption of alcohol in public places was prohibited;

- restriction on movement between administrative regions in the Czech Republic etc. was introduced.

The Czech Republic managed the first months of the Covid-19 lockdown surprisingly well due to its time shifting compared to the main European countries (i.e., the first cases were detected only in March). The government has rapidly taken a number of comprehensive public health measures, including general isolation and mandatory wearing a face mask (Löblová, 2020). Thus, most of the population was forced to carry out their work duties remotely.

The first signs of a second wave appeared in August 2020, but the Czech government did not respond properly. The prime minister and government pretended that everything was under control until the end of September, while the number of Covid-19 cases since mid-July was relatively low. As a result, in early autumn 2020, the country's rules were relaxed; and there were no measures until the number of infected persons reached a record. Only then, Czech Prime Minister Andrej Babiš apologized for the late response. However, some local and regional governments in the country were more susceptible to the development of the epidemic, and their response was much faster. However, this could not prevent the pandemic, and the Czech Republic became one of the most affected EU states by the end of the summer (Klimovský, Nemec, Bouckaert, 2021). The health implications of the second wave were more critical than those of the first wave (Figure 1). The Czech Republic had almost 1,000,000 cases of Covid-19 by the end of January 2021. (Klimovsky, Malý, Nemec, 2021).

Figure 1: Indicative curve illustrating the development of the number of newly infected cases in Czech Republic (Source Klimovsky, Malý, Nemec, 2021)
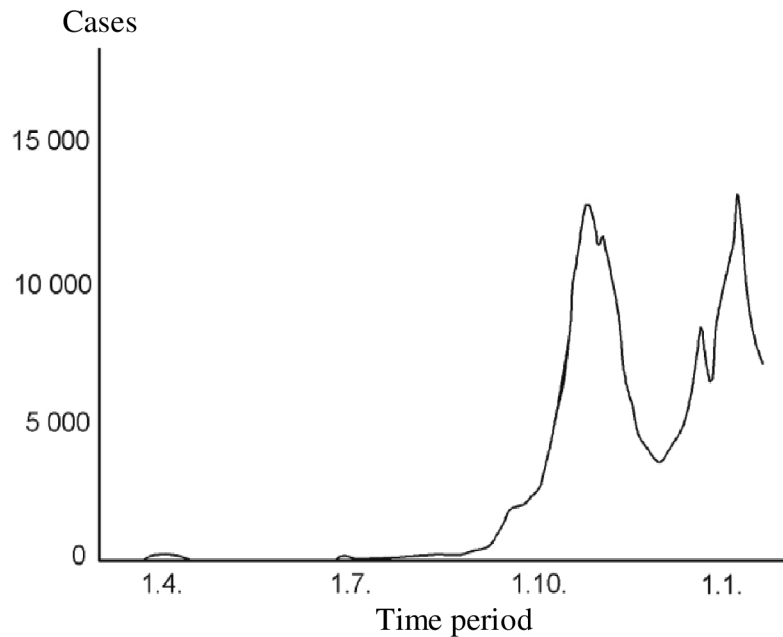
Isolation-related outcomes of remote working are closely related to its impact on relationships with colleagues. Working in a space away from the office and employees can lead to employees' physical, social, and/or professional isolation. Physical isolation refers to an employee performing work activities in an environment separate from the work environment of his colleagues (Bartel et. al., 2012). The feelings of a person who is not involved or connected to the work environment are characterized by social isolation (Bentley et al., 2016). Occupational isolation is associated with the developmental disabilities offered to employees; employees may be concerned that teleworking limits their ability to communicate, learn and mentor informally (Cooper, Kurland, 2002). However, isolation must not be specific to remote work; employees may feel the isolation even if they work in the exact physical location as their colleagues (Rokach, 1997; Smith, 1998).

Throughout history, humankind has dealt with infectious disease outbreaks and other health emergencies that claimed an unprecedented number of lives and threatened public health security. In the absence of more effective ways to combat diseases, patients were isolated from the healthy population and waited until the epidemic ended by itself. Recently, humanity has entered the most unusual period in terms of work organisation. Since then, humanity is still using quarantine and isolation to contain the spread of viral diseases. The world has changed dramatically in early 2020, and governments with the support of scientific and medical communities have had to take decisive action to save lives. As a result of

restrictive measures realized by governments, many employees in Europe have switched to remote work. The transition of the workforce to a flexible work organisation has become a necessity in the context of the Covid-19 pandemic. Physical distancing measures — closing schools, refusing to hold meetings and transferring to the remote working — were only the first step in the fight against the coronavirus and a means to slow its spread.

2.1.2 Psychological impacts of working from home (WFH) and information and communication technologies (ICTs)

Working from home has many meanings, synonyms, and variations such as remote work, dispersed work, working from a distance, telework or virtual work, homeworking, etc. Hill et al. (2003) defines work from home as intermittent work from home (outside the head office). This mechanism was discovered as an alternative way of organizing work to provide workers with flexibility in terms of work hours, the balance between work and non-work responsibilities, and saving time on the way from home to work and back (Felstead, Jewson, 2000). Hardill and Green (2003) include e-working, telecommuting, mobile working, and teleworking in their study, emphasizing the diversity of terms for this mode of work and the variety of locations. Moreover, some researchers suggested teleworking may eradicate commuting, a feature particularly emphasized using the term "telecommuting" (Kurland, Bailey, 1999).

For modern people, remote work is associated with computers, communication networks, and, in general, with information technology, which is called telecommuting. Telecommuting is often defined as the usage of telecommunication technology to replace (partially) the work in person (Nilles, 1998); however, it is not an invention of our time. In the 1970s and 1980s, Jack Nilles (Nilles, 1975, 1988) and Allan Toffler (Toffler, 1980) predicted that the work of the future would be moved to or near employees homes using modern technology – the so-called "teleworking" or "telecommuting." Thus, to fully understand the impact of new information and communication technologies on the world of work, it is essential to make a conceptual link between the early days of telework/telecommuting and such arrangements today. Technological advances are the engine of change in this context, and they have contributed to the development of telework.

Personal computers and landline phones replaced long hours of commuting between home and office; it was the first generation of telecommuting, home office. Since then, laptop computers and mobile phones have provided portable wireless work "on the go" from

places other than home or office, accompanied by the rapid expansion of the Internet and the World Wide Web. This was the beginning of mobile work, a mobile office. Finally, online connections via radio channels and the reduction in the number of transistors have triggered the development of new ICTs (e.g., smartphones, tablet computers). New ICTs have made possible the mobile virtual connection of employees to the "office" from virtually anywhere at any time (Messenger, 2019).

The analysis of the advances in technology and their influence on the development of telecommuting from the 1970s to the present sheds new light on the term telecommuting. New technologies have revolutionized the way people work, allowing many employees to work from anywhere (Eurofound, 2017; Henke et al., 2016). The digitalization of intellectual work is often used, which has changed the approach to a job (Balsmeier, Woerter, 2019), supporting the recommendations and goals of the United Nations in the field of sustainable development (Nino, 2015).

Widespread access to technologies has allowed for great flexibility in determining the location and timing of work, which benefits employers and employees. However, teleworking has no commonly accepted definition. Telework practice widely varies between countries and even between companies in the same region or, moreover, the same sector and occupational group (Milasi, González-Vázquez, Fernández-Macías, 2021). For example, the International Labor Organization (ILO) defines teleworking as the use of information and communication technologies, including smartphones, tablets, laptops, or desktop computers, for work performed outside the employer's sphere of activity (Eurofound, 2017). It is then necessary to classify the various forms or styles of teleworking.

Information and telecommunication technologies have significantly developed in recent years. Several previous reports in the literature assessed the impact of teleworking on mental health and productivity (Di Martino, Wirth, 1990; Bailey, Kurland, 2002; Martin, MacDonnell, 2012; Baert et al., 2020; Steidelmüller et al., 2020). One of the reasons that caused a sharp deterioration in the psychological state of the population was the phenomenon of infodemia (Mirbabaie et al., 2020). In 2003, infodemic was used in connection with SARS (Rothkopf, 2003) and has seen renewed usage during the Covid-19 pandemic. The WHO and the United Nations began using the term "infodemic" during the Covid-19 pandemic from 31 March 2020 (UN, 2020). It is mainly characterized by the dissemination in the media and social networks of diverse and uncertain information about the international situation and the nature of the pandemic (Zarocostas, 2020).

The central factors negatively impacted the psychological state of the population are self-isolation with a deteriorating economic situation in the world, infodemia, job loss, or inability to fulfil labor duties. During the Covid-19 pandemic, people are everyday exposed to severe stress due to fear for their health (their own and their families), uncertainty about their own future, as well as due to the need to restructure their work activities or look for new ways of earning money (Talaee et al., 2020; Bendau et al., 2021). It was impossible to overcome stress in the usual ways, such as walking, visiting gyms, communicating with art in a real format during the period of self-isolation. An increased level of stress, in turn, contributes to the emergence of conflict and crises in interpersonal relationships, which negatively affects all other areas of a person's life (Tuzovic, Kabadayi, 2021). The lack of the opportunity of a normal life outside the house (work, school, entertainment, etc.) leads to conflicts even in the most close-knit and loving families. Working conditions have also changed significantly: thousands of jobs were lost. It was determined that women suffer from this more significantly than men (Wenham, Smith, Morgan, 2020; Alon et al., 2020). For those employed in sectors capable of working remotely, e.g mostly office workers, their homes now have become their place of work and recreation area. Working from home can have negative or positive consequences, depending on various systemic moderators, such as the demands of the home environment, the level of organizational support, and social connections outside of work (Gajendran, Harrison, 2007).

Suh and Less (2017) considered the impact of technostress, which is defined as work overload. They compared employees of IT companies doing low-intensity work at home (<2.5 days a week) with those who do high-intensity work at home (> 2.5 days a week). Low-intensity employees who worked from home experienced high stress associated with overload and invasion of privacy associated with work complexity, the pace of IT change, less autonomy of work, and constant electronic contact with work. On the other hand, high-intensity remote workers may easier get used to a new model of work with the help of digital tools. Thereby, they cope with technostress more easily than low-intensity employees. It can be concluded that work autonomy in reducing privacy invasion is much more substantial in the high teleworking intensity group than in the low-intensity group.

Later, Suh and Less (2017) and Gabr et al. (2021) found a predominance of technostress during the Covid-19 pandemic. The research aimed to study the technostress and problems of the remote virtual work environment among the staff of the University of Menufia, Egypt. A cross-sectional study was conducted among faculty members at the

University of Menufia in Egypt. It was found that the high level of technostress was significantly influenced by age, higher professions, female gender and poor work environment.

Bentley et al. (2016) studied the effect of organizational (social and managerial) support on the health of employees working from home and found a relationship between a lower level of organizational support and higher psychological stress. The authors investigated the impact of organizational support through workforce and requirements. Sardeshmukh et al. (2012) identified relationships between working from home and less time pressure, less role conflict, and more autonomy. However, they also found that respondents associated remote working with lower feedback, lower social support, and greater role uncertainty, which increased wasting. In general, these negative moments did not exceed the positive effects of working from home. Vander Elst et al. (2017) found that increased WFH hours resulted in more emotional exhaustion and less cognitive stress, mediated by colleagues' support. Those who worked more days at home experienced greater emotional exhaustion and cognitive stress associated with decreased social support from their colleagues. Grant et al. (2013) interviewed WFH staff and identified support and communication as important factors in psychological well-being.

The unprecedented crisis caused by the Covid-19 pandemic has demonstrated the vital role of digital technologies. The coronavirus pandemic has forced millions of people to work, study, and communicate remotely for a long time. While WFH culture was associated with the software services/IT sector, the Covid-19 pandemic has forced more services and sectors to adopt this method. The lack of a dedicated workspace and multiple family members working from home at the same time became new challenges for households in terms of the WFH concept. During this difficult time, information and communication technologies clearly showed their role in society.

The digital infrastructure available at the pandemic demonstrated its supportive role in society, ensuring people's social and economic interaction in conditions of isolation. For many people, a personal computer with Internet access has become the key to staying employed during a crisis. Mass teleworking combined with digital technologies offer many opportunities and come with certain risks. Nevertheless, it is hard to feel like part of a team staying far from the colleagues.

2.2 Psychological impacts

2.2.1 Loss of social connections

An increase in employee productivity is one of the essential advantages of remote working. It is associated with several factors among which the most productive timetable, the absence of informal communication in the office with colleagues and reduced home to work travel time (Golden, Veiga, 2008; Martinez-Sanchez et al., 2006; Tremblay, Genin, 2007). However, the condition of isolation from communication with colleagues during breaks between work can have negative consequences (Toscano, Zappalà, 2020).

Social isolation is the most cited disadvantage of telecommuting. Huws conducted a study in the United Kingdom in 1983 and found that 60% of remote workers mentioned this as their biggest disadvantage (Huws, 1984). Loss of social connections or social isolation can negatively affect workers who have to stay home to work. Research by Mogilner, Whillans, Norton (2018) has shown that social interaction including informal conversations between colleagues is essential for mental and physical health. Handshakes, which are also necessary for social connections (e.g., Schroeder, Risen, Gino, Norton, 2019), have been limited. Research by Sparrowe et al. (2001) suggests that lack of interaction with colleagues can lead to social isolation and worsen individual and group outcomes. Moreover, the densification of jobs due to physical distancing is likely to be detrimental to people's mental and physical health (Brooks et al., 2020).

Researches show that traditional collaboration problems such as conflict and coordination can quickly escalate (Mortensen, Hinds, 2001) because virtual teamwork lacks the connectivity available to personal teams (Martins, Gilson, Maynard, 2004). Key recommendations for virtual teams are to create structural wireframes to mitigate conflicts, coordinate teams, and ensure that information is processed safely and thoroughly. For example, Gibson and Gibbs (2006) have shown the need to formalize team processes, clarify team goals, and build structural solutions to facilitate psychologically safe discussions.

Employees with high levels of social connectedness and those who highly valued openness to experience were more likely to have positive affective improvements on teleworking days. At the same time, those with a tendency to ruminate were less likely to have positive affective achievements. In addition, researchers have found more evidence of mental health problems in teleworkers compared to their counterparts in the office (Mann, Holdsworth, 2003).

The lack of face-to-face connections with colleagues represents the main differences between working in ordinary times and remotely during Covid-19. The impact of remote work on social relationships between colleagues is associated with isolation. Performing work activities remote from the office and colleagues may lead to physical, social and/or occupational isolation among colleagues. Teams with remote employees heavily rely on regular electronic communication to promote collaboration, trust and openness.

Social isolation is becoming a real problem. As a result, employees feel lonely if the organization does not properly develop a culture of virtual collaboration and does not support communication between employees. Situations in which a person loses the ability to satisfy basic social needs become stressful. It can lead to a state of tension and a sharp increase in the requirements for the mechanisms of mental adaptation. Moreover, it can cause various social conflicts in professional and social life and decrease the effectiveness of activities. Video calls cannot wholly replace live communication.

2.2.2 Procrastination, loneliness, anxiety, and stress

Robert Weiss (1973) presented loneliness as perceived social isolation, which was described as a severe chronic illness with no compensating properties. Loneliness is painfully unhappy, hopeless, and undesirable condition. Nevertheless, each aspect of this motivational phenotype can have important adaptive implications for complex social species, on which our genetic survival significantly depends, such as caring, trust, cooperation, and group life, when alliances and attachments can vary dramatically as the situation changes (Cacioppo, Hawkley, 2009). Feelings of loneliness can also negatively affect human mental health, especially if it continues for a long time. Research by Xiao et al. (2020) suggests that loneliness is associated with an increased risk of specific mental health problems, including depression, anxiety, sleep problems, and increased stress.

Stress is a condition that can occur in a person when the ability to cope with a situation does not well-match the requirements that perceive an individual's environment (Arnold et al., 2020). There is conflicting evidence about the nature of stress associated with teleworking. Telecommuters tend to work longer and can put in more effort at work, and these factors can contribute to work-related stress, unlike office staff. (Tietze, Monsoon, 2005). However, research shows that while telecommuters may work more overtime, they also report less time pressure compared to office workers. This is especially true for those who spend more than one day a week working from home (Hill et al., 2001; Peters, van der

Lippe, 2007). According to Kelliher and Anderson's study, UK teleworkers did not experience negative results from hard work. Instead, remote workers voluntarily increased their efforts in exchange for the opportunity to work from home (Kelliher, Anderson, 2010).

Special attention in the literature has focused on the fact that teleworking is associated with significantly lower levels of work stress than work in the office (Gajendran, Harrison, 2007; Golden, 2006; Raghuram, Wieselfeld, 2004). Remote employees working at least three days a week from home report less stress caused by frequent meetings and interruptions from colleagues and are less influenced by office politics (Fonner, Roloff, 2010).

Kossek et al. (2006) found that formal participation in teleworking was significantly associated with higher rates of depression. However, for one particular group of female teleworkers with children, rates of depression were lower than those of office workers. Another study showed that telecommuters experience fewer work stressors, such as role conflict and ambiguity than office workers. Their lower work-related stress levels, in turn, contribute to higher job satisfaction and loyalty to the organization (Igbaria, Guimares, 1999).

The interconnections between teleworking and mental health outcomes, such as stress, quality of life, good health, and depression, were also examined. Henke studied (2016) employees who worked either all the time or partly remotely and did not find a direct relationship between working from home and stress levels. In contrast, Vander Elst et al. (2017) found that increased stress was associated with teleworking. Filardí et al. (2020) interviewed public sector employees. The quality of life was improved by working from home based on the results. Bosua et al. (2013) studied employees from the public, educational and private sectors working from home for several weeks who felt better than working in an office. It should be noted that participants reported that they prefer to combine telecommuting with some office time to communicate with colleagues.

Ahmed et al. (2020) conducted an online survey of 1,074 Chinese people during the epidemic of Covid-19 and mass isolation in China. They found increased anxiety, depression and decreased mental well-being. Rates of depression and anxiety were higher among young people aged 21-40. Huang and Zhao (2020) performed an online survey of 7,236 people in China. The overall prevalence of generalized anxiety disorder, depressive symptoms and sleep disorders were 35.1%, 20.1% and 18.2%, respectively. Hao et al. (2020) compared the psychological impact of the Covid-19 epidemic on people with and without mood and

anxiety disorders. In psychiatric patients, physical anxiety, anger, impulsivity, and suicidal thoughts were significantly higher than in healthy controls. The unprecedented social distancing measures during the Covid-19 pandemic that limit access to social support systems such as extended family, friends, acquaintances, community connections, etc., may affect mental health and cause feelings of loneliness, anxiety, and stress (Leigh-Hunt et al., 2017).

Procrastination was identified as a problem for home-based workers in a telecommuting review by Allen et al. (2015). An empirical study by O'Neill et al. (2014) revealed procrastination as a personality variable. In contrast, qualitative and quantitative analysis by Wang et al. (2021) revealed that procrastination is a problem because it can significantly affect worker productivity and cause an emotional drain. The results showed that virtual performance characteristics could shape procrastination, however, they differ from the conclusions of Metin et al. (2016). Metin et al. (2016) argued that employees with many jobs and demands would be more focused on work, reducing procrastination. According to Metin et al. (2016), employees with higher workloads experience less procrastinate.

Anderson et al. (2015) aimed to determine whether the workplace affects the emotional well-being of employees. The impact of working from home on the mental well-being of government employees was investigated (all participants had a WFH more than one day in two weeks). It was found that teleworking provides both positive (feelings of ease, gratitude, enthusiasm, happiness and pride) and negative (bored, frustrated, angry, anxious, and tired) effects on well-being. The study also found that individual traits of openness, higher level of thought, and greater social connectedness soften the relationship between teleworking and positive well-being. In comparison, higher levels of social connectedness (outside of work) were associated with lower negative health effects. The place where a person works affect his/her phenomenological emotional experiences. The results showed that working from home leads to feeling different from working in the office.

Song and Gao (2020) found that workers who work at home on weekdays had less happiness than in the workplace. Remote work on weekdays or weekends/holidays is also stressful. According to the study, the subjective well-being of working from home was highly dependent on parental status and gender, and it was not highly dependent on the location of work on weekdays. Thus, parents reported high levels of well-being when working from home on weekends/holidays and lower levels when working from home on

weekdays. Childless men did not feel uncomfortable working from home on weekdays, but childless women experienced more stress. General public studies have shown lower psychological well-being and higher rates of anxiety and depression compared to the period before the Covid-19 pandemic. (Vindegaard, Benros, 2020)

The pandemic conditions and self-isolation led to many negative aspects of human behaviour, such as fear for the health of relatives and anxiety about future plans, which may not realize. Uncertainty in private and work life is increasing by a constant stream of negative news about changes on a global scale: a deep economic crisis, rising numbers of infections and the prospect of severe consequences of a pandemic in many areas of public life. In addition, many people are afraid of the potential introduction of strict quarantine, which will lead to isolation. Isolation can also be problematic for people living together with a partner, family or neighbours. It deprives them of the opportunity to have the necessary personal space and forces them to communicate with the same people every day.

The leading reason for the decline in productivity is procrastination. It can occur due to high anxiety and a depressed emotional state provoked by self-isolation. During quarantine, the usual way of life changes dramatically. Maintaining an optimal daily routine for work becomes challenging. Contributing to the loss of productivity is the tendency of people in a state of uncertainty to constantly update news and information about the coronavirus, which only increases the feeling of uncertainty and cause anxiety and stress.

2.2.3   Work-family conflict (WFC) and Work-life Balance (WLB)

Work-family conflict is a universal problem, regardless of countries and cultures worldwide. Greenhouse and Beitell (1985) summarize research that reveals several different terms for work-family conflict that are used synonymously. They suggest that work-family conflict exists when: devoted time to the requirements of one role makes it difficult to fulfil the requirements of another role; the stress of participating in one role makes it difficult to fulfil the requirements of another role; the specific behaviour required by one role makes it difficult to fulfil the requirements of another role.

Similarly, King (2013) defines work-family conflict as difficult to take part in one role due to participation in another role. Today, the conflict between work and family (work interferes with the family) is more common than conflict between family and work (family interferes with work), although both may be valid. Thus, conflict and increased stress occur when one area is not compatible with another area. The author identifies two types of

conflicts: interference with the family's work (for example, children's illness prevents them from going to the workplace) and family interference with work (a long working day prevents them from doing household chores). Organizations suggest working from home for various reasons, in most cases to help balance work and personal life (Been et al., 2016). However, working from home can break boundaries and conflict between work and private life (Glass, Noonan, 2016).

Several researchers investigated the home environment as a mediator between WAH and health-related outcomes. WFC occurs when the demands of a job conflict with domestic and family obligations. For example, a study by Golden (2012) of computer company employees who worked at home for a longer period than in the office showed high levels of exhaustion combined with high levels of WFC. When the WFC was low, the same employees only rarely experienced low fatigue levels compared to those who worked from home.

Working from home reduces conflict between work and family because it allows employees to control their work schedules. Employees can choose a place to work, and this allows them to use their time and plan various activities (Gajendran, Harrison 2007; Parasuraman, Greenhaus, 2002), which leads to fewer conflicts more efficiently. Employees often use electronic communication while WFH, which saves time by staying connected with work (Ten Brummelhuis et al., 2012). Furthermore, WFH can also save time. Employees save time that they would have spent on the road to work. They may use this time for work or family affairs (Hill et al., 2003; Kossek, Thompson, 2016). For these reasons, WFH is associated with higher time control and higher levels of autonomy (Madsen 2003). Thus, it is used to reduce conflict between work and family.

Kaduk (2019) found that forced WFH and work schedule uncertainty was associated with more serious WFC among professionals and managers, stress, burnout, and decreased job satisfaction. Voluntary teleworking protects against stress, psychological distress, and intentions to leave the firm without obvious negative consequences. Opposing views are also not excluded. Suggesting that employees have multiple roles (e.g., employees, spouses, and parents) that share the same limited resources; WFH can interfere with domestic responsibilities, such as doing household duties, leading to conflict. (Peters, Van der Lippe, 2007; Voorpostel, 2014; Kossek, Thompson, 2016).

WFH removes the boundaries between work and non-work areas (Shamir, Salomon, 1985; Guest, 2002). If boundaries are removed, thoughts and emotions from the workplace

can impact the household, leading to conflict between work and family and leading to additional household work and care work (Clark, 2000). Finally, effective WFH also requires more self-control from workers, which can become a severe trap that could lead to overtime and more interference at WFH (Sullivan, Lewis, 2001). The pressure associated with WFH can lead to further conflict between work and family (Golden et al., 2006). Family support or conflict plays an important role in how well an employee adapts to teleworking. For example, working with children, working in a noisy home environment, or being alone while working at home can affect stress responses and productivity (Darouei, Pluut, 2021).

Research on teleworking has often shown that teleworkers work longer than in the workplace. WFH has become engraved in modern working life. The health implications in the workplace and increasing psychosocial risks due to teleworking during the pandemic are increasing. On the one hand, the increase in work demands and the intensification of work manifest in a context saturated with two areas - family and work, coexisting in the same physical environment for workers working from home due to the Covid-19 pandemic. This reality leads to a high level of conflict between work and family.

Working activities are replacing commuting time, daily routines are changing, and the lines between paid work and personal life are blurring. Telecommuting may result in longer working hours including evenings and weekends. The current situation with the pandemic has shown that teleworking is the best solution to prevent the spread of the disease. This measure contributes to flexible working hours and the maximum use of technology. These measures, among others, make it possible to maintain a balance between work and family and more effectively manage time on the part of the employee. The transition to remote work has become a challenging but successful operation.

2.2.4 Work-life conflict (WLC)

WFH was presented as a reliable and rewarding way of working for employees and employers before the self-isolation during Covid-19, (Aboelmaged, Subbaugh, 2012). From an employer's perspective, several benefits of WFH include attracting and retaining highly skilled employees, increasing employee commitment/engagement, and improving timing and workflow alignment (Bailey, Kurland, 2002). According to Gajendran, Harrison (2007), remote work has a number of positive benefits, such as improved family and work integration, reduced fatigue, and increased productivity. This is fundamentally important for organizations because employees' requirements and working conditions have been

diversified due to various sanitary restrictions in the face of the pandemic. Enterprises that cannot adjust their work constraints according to the circumstances will be less likely to recruit the necessary staff or maintain a good workforce (Clarke, Holdsworth, 2017).

There are potential negative consequences such as constant phone calls and balancing the demands of family and community life with working from home (Felstead, Jewson, 2000). Bouziri et al. (2020) argue that remote working creates an overlap between work and family issues, emerging conflicts between work and life (Hyman et al., 2005). Reynolds (2005) and Brauchli et al. (2011) also mentioned in their research that working from home facilitates the invasion of family and social affairs into the working time-space and leads to conflicts between life and work.

The research of Palumbo, Manna, Cavallone (2020) confirmed that teleworking from home can cause work-life conflicts by blurring the lines between work and daily life. They also distinguished that soft tools such as organizational relevance and work-related well-being, showing the relationship between work from home and work-life conflict, reducing the negative impact of work from home on work-life balance. However, the lack of boundaries between work and home can also negatively affect a person's mental health due to increased working hours, lack of unclear distinction between work and home, and limited support from organizations (Allen, Golden, Shockley, 2015).

Employees that worked for many years in offices associate their workplace with working and the house with rest. In the conditions of remote work, the meaning of Work-Life Balance is uncertain. As a result, employees spend more time at work and are often not completely disconnected from work issues. The compulsory work-at-home situation is complex and requires a systematic study to identify the impact of organizational, physical, biological, and psychosocial factors on people's mental health. Negative factors also include adverse changes in the 24-hour cycle of activity (Rosenberger et al., 2019), less physical activity (Hall et al., 2021), worse sleep quality (Altena et al., 2020), longer screen time, unhealthy eating habits (Mattioli et al., 2020), and worsening mental health.

One of the reasons for the lengthening of the working day may be the fact that in many companies, during remote work, communication between employees is difficult. Despite the development of digital technologies, the virtual community cannot provide the same level of interaction as personal ones. The lack of direct visual contact, difficulty in understanding the non-verbal signals from the interlocutor, the distortion of voice timbre, and reproduction of answers with a small delay - all creates personnel of the interlocutor's

feeling and complicates communication. Because of this, many companies note an increase in the total time spent at the meeting, in comparison with the usual mode of operation. In addition, virtual meetings require increased concentration from a person leading to faster fatigue (Cao et al., 2021).

Lifestyle factors may change due to the impact of working from home on personal life, which can disrupt work-life balance manifested in various behaviours such as eating, sleeping, physical activity etc. It became actual during the Covid-19 period when many public places were closed at the beginning of the pandemic as a means of social distancing. This resulted in reduced time outside the home, behavioural changes have begun to put workers at risk of developing chronic and non-infectious diseases in the future. On the other hand, workers in this study preferred WFH, which increased the variety of daily activities, reduced stress at work, flexible relaxation, and the ability to spend more time with family, lead a healthy lifestyle and a happy life (Ekpanyaskul, Padungtod, 2021).

In the modern world, forced isolation is an occasion to reflect on what mode of work may be more comfortable in the future and why. Greater autonomy, including working from home, improves employee well-being. At the same time, for women engaged in housework and childcare, flexible hours and lack of attachment to the workplace turned out to be more important than for men. Remote work has a positive effect on job satisfaction and productivity, and it can increase the sense of cohesion of employees. Contrary to expectations, working from home tend to work harder than in an office.

One of the most frequently cited results of remote work is that it gives people more control over the demands of their work and non-work roles, reducing the experience of work-life conflicts. Remote work does not always have a positive effect. Relations between colleagues become worse if they are small. Disadvantages of telecommuting include a sense of social isolation, the risk of rapid burnout and the blurring of boundaries between personal and professional life. Despite this positive impact on work-life conflicts, telecommuting is not a quick path to improving work-life balance for all employees. Since work takes place in the same physical space reserved for a person's personal or family life, it can sometimes be challenging to establish and maintain clear boundaries between work and non-work areas. It all comes down to that remote work is not precisely wrong and not always ideal.

2.3   Challenges and ways of dealing with stress while working from home.

2.3.1   Challenges of the remote work

Teleworking problems are consequences of the psychological experience of workers in the realization of tasks, interpersonal communication, and interacting with family and friends. Wang, Qian, Parker (2021) conducted a mixed-method study to examine the challenges remote workers currently face and what virtual performance and individual differences contribute to those challenges. They highlighted the following challenges in working remotely: procrastination, ineffective communication, work-home interference, and loneliness. These four issues have had a detrimental effect on the performance and well-being of people.

Prasad, Vaidya, Mangipudi (2020) conducted empirical research and provided results on the impact of occupational stress and telecommuting on the psychological well-being of employees in the information technology industry. Remote working is a challenge for employees because of workplace isolation, family disturbance, peer absence, lack of suggestions, and working too much or not working at all. However, the positive side is time-saving in commuting, working hours, job control, use of new technology and saving resources like office space and other opportunity costs. There are several tangibles and intangible benefits to both employee and employer.

In the study results, Xiao et al. (2021) determined that decreased physical activity, increased consumption of unhealthy foods, lack of communication with colleagues, and having a child at home were significant predictors of physical and mental health deterioration. In addition, more distractions was a significant predictor of decreased mental well-being. About two-thirds of respondents reported one or more new mental health problems, and nearly three-quarters of respondents experienced at least one new mental health problem. Respondents reported increased physical and psychological health problems with less exercise, more unhealthy food intake, at least one baby at home, being distracted during WFH, limited communication with colleagues, higher workload, longer working hours, and changes in working hours with other people. Respondents who lived with at least one adolescent were more satisfied with indoor environmental quality factors at home, had a definite workplace and had a good workstation. All had a lower chance of experiencing new physical and mental health problems.

As remote work is just one of the factors affecting workers' mental health and productivity, the effects of job stressors, the surrounding environment, and personal factors,

such as sleep, should be adjusted when discussing the impact of remote work on workers' mental health and productivity (Furuichi et al., 2020). An empirical study by Shimura et al. (2021) provides evidence that teleworking reduces psychological and physical stress responses by controlling confounding factors such as work stressors, social support, and sleep status as personal interventions.

While the number of people working remotely, part-time or full-time, has been gradually increased over the years, the pandemic has undoubtedly accelerated the adoption of remote working methods by employers. During the Covid-19 pandemic, remote work is essential for business continuity. Under normal circumstances, its benefits include:

- reduced travel time;

- increased opportunities for workers to focus on their work tasks without being distracted by the office;

- an opportunity for a better work-life balance.

Remote work offers the opportunity for more flexible work schedules for workers and the freedom to work from a location away from the employer's premises. There may also be risks such as isolation (especially for individuals living alone) and loss of contact with work colleagues that are important to anticipate and prevent.

2.3.2 Academical workers and researchers and the impact of teleworking on their psychological state

Before the pandemic, there were serious concerns about the well-being of early-stage researchers. Data suggested a high prevalence of mental disorders. The early-stage researchers constitute the most vulnerable group of people with no career experience or job security. In addition, they are often the first to suffer from the stress that occurred in this system. (Evans et al., 2018; Levecque et al., 2019). Research doctoral students face role uncertainty and conflict, with high job demands for relatively small remuneration or support (Schmidt, Hansson, 2018). This, combined with a lack of positive progress feedback, may contribute to high levels of self-deprecation (Byrom et al., 2020). These problems are getting worse because of a culture of poor work-life balance, poor relationships with supervisors, financial and career problems, and social exclusion (Byrom et al., 2020).

Low career confidence is a significant factor contributing to distress among doctoral students (Byrom et al., 2020). This lack of confidence is not surprising, as there is a substantial discrepancy between the expectations of doctoral students and the harsh reality

of career-building within higher education (Cornell, 2020). Current employment conditions in this community do not too much to increase the confidence of aspiring researchers, most of whom have multi-year short-term contracts and ongoing job insecurity (Dorenkamp, Süß, 2017). During the pandemic, these existing problems may have been exacerbated by the time-limited nature of fixed-term contracts and doctoral programs, as quarantine-induced delays or shutdowns in research could endanger their research and career development. Thus, the higher education sector should stay abreast of the profound impact quarantine measures have had on doctoral students and early career researchers (Corbera et al., 2020).

Unexpected problems caused by the new coronavirus disease (Covid-19) in many countries worldwide are changing the structure and management of organizations. It requires new approaches to dealing with organizational issues (Chesbrough, 2020). Teleworking was proposed as a quick solution to prevent disruption to the normal functioning of organizations (Choudhury et al., 2020; Hayes, 2020). According to the social distancing rule published by health agencies at the national and international levels, working from home allows employees to work safely (WHO, 2020).

Due to the 2020 outbreak of Covid-19, Universities worldwide are shifting to online learning. Travel bans, campus closures and social distancing measures have forced students and university staff to go home to teach and learn, requiring them to adapt to work and study remotely. University professors in infected countries and regions have begun giving lectures online, administrative tasks are handled online, and meetings are organized online. According to the impact of the Covid-19 pandemic on Higher Education Institutions (HEIs), the International Association of Universities (IAU) indicated that 67% of HEIs worldwide have replaced their classrooms with online distance learning and teaching (Marinoni et al., 2020).

The current pandemic has led to the most significant reshuffle of employees to do their jobs remotely. Academic institutions were severely affected as teaching and assessment activities were hampered and graduation ceremonies were cancelled. In addition, there was an inevitable breakdown in academic and research activities, including personal conferences and conventions. Apart from many challenges, scientists struggled to stay involved in professional and social life with students and colleagues. Digital technology, an integral part of life, has become essential for connecting and communicating (Al-Taweel et al., 2020).

Face-to-face teaching has stopped in many universities. This harmed educational activities since social distancing is critical at the epidemic stage. Educational institutions

tried to find alternative ways to cope with this challenging circumstance (Dhawan, 2020). This shutdown has spurred the growth of online educational activities to prevent interruption in learning. Many departments offered online course materials, engaged students, and conducted assessments (Mukhtar et al., 2020). This crisis will force the adoption of new technology by organizations that previously resisted adaptation (Kaur et al., 2020).

Online learning is a learning experience using various electronic devices (e.g. computers, laptops, smartphones, etc.) with Internet access in synchronous or asynchronous environmental conditions. Online learning can become a platform that will make the learning process more student-centred, creative, and flexible (Singh, Thurman, 2019). Online course delivery is cost-effective and easily accessible, especially when delivering curricula to students in rural and remote areas (Dhawan, 2020). Cooperative online learning is considered by the UN and WHO as a helpful tool to meet educational needs, especially in developing countries (Colace et al., 2006). Educational institutions have implemented numerous creative strategies to deal with the crisis, using various programs, such as Google Classroom, Zoom and Microsoft Teams to take online courses to not only complete the course but also to stay in constant contact with the students. The virtual e-learning classroom was initiated to increase student's confidence in their teachers during the Covid-19 pandemic (Kaur et al., 2020). The introduction of e-learning transformed the role of educators from a traditional teacher-centred model to a student-centred model that serves the current new curriculum applied in colleges.

Similarly, Symonds (2020) reported that 50% of tertiary education professionals at universities worldwide switched some of their planned courses online, a number that only increased as the coronavirus continued. In a short period, teaching and administrative staff, management and students were forced to adapt to remote teaching, learning and administration, in many cases without prior experience. The necessity to work from home and telecommuting particularly affected the education sector. Achievements in information and communication technologies make it possible to educate students without compromising the quality of their learning (Li et al., 2014).

Researchers worldwide have opened up a new social and academic reality during the Covid-19 pandemic. In both the short- and long term, researchers and academic workers are also directly impacted by Covid-19. The biggest obstacle for this social group was closing academic campuses and laboratories worldwide. It was forbidden to attend classes physically. Thus, some lectures were transferred to an online format, and researchers stayed

to work remotely from home. Working and researching from home requires specific and stable equipment and a stable and fast internet connection. In some cases, even reliable computers, commodities that are not always available at home.

Scientific work was limited either by the temporary closure of laboratories or by the lack of researchers due to staff reduction and the delay of equipment delivery and materials for experiments, which affected the results of research in the long term (Servick et al., 2020). In the early stages of the pandemic, researchers urged their community to seize this opportunity to reorganize priorities, focus on collective rather than individual goals, and focus more on student mentoring and support (Corbera et al., 2020).

Doctoral researchers and early-stage researchers are critical to scientific advancement and represent the future of academic leadership. Their research efforts have changed drastically due to the lockdown in response to the Covid-19 pandemic. The problems associated with quarantine are mainly related to a poor work environment, limited access to resources, a sense of pressure, and negative psychological consequences. Jackman et al. (2021) also highlighted several benefits in the early stages of a pandemic: switching to work from home allows more time, resulting in increased productivity and improved work-life balance. The results point to the importance of considering individual researchers' circumstances and needs.

Gibson et al. (2020) argue that supporting doctoral students and early career researchers should be a key priority for higher education institutions because the lack of support could cause the pandemic to have an even more significant negative impact on the scientific community. Postdoctoral and early career researchers are vital to economic growth, innovation, scientific knowledge and are leaders in future research (OECD, 2019). In addition, since a large proportion of this cohort is likely to remain in academia (Woolston, 2019), investing in the future of doctoral students and early-career researchers is vital to protecting the education of future generations of university students (Greener, 2021).

In a dynamic world constantly undergoing economic, social, environmental and political changes, the higher education sector remains under constant pressure. These dynamics and demands, combined with the rapid growth and development of technology at the beginning of the twenty-first century, have been an excellent catalyst for change in higher education. While universities tend to adopt new technology platforms, their use of technology to improve teaching and learning has been slow for various reasons. More recently, there is a lack of a new reform that will revolutionize the practice of higher

education. The Covid-19 pandemic has exposed the challenges of higher education systems worldwide, especially in digital technologies, and the need to provide adequate training for teachers/academicians to prepare them for a rapidly changing educational climate. Undoubtedly, the Covid-19 pandemic has forced educational institutions to teach and learn online, and this sudden migration has exacerbated existing and new technology-enabled learning challenges.

2.3.3   How to manage psychological impacts of working from home

Wolor et al. (2020) recommend six approaches to prevent uncontrollable stress on employees. Approaches include family communication, work communication, planning and safety, staying healthy, complying with government regulations and being limited to watching the news about the outbreak of the Covid-19 pandemic. While working remotely, improving productivity and reducing stress responses may be possible through enhanced work conditions such as quantity/quality workload, physical demands, job control, skill use, interpersonal conflict, physical environment, suitability for work, and job relevance. In addition, maintaining and encouraging social support between workers and their supervisors, colleagues, family and friends, and good sleep will be possible through improved sleep hygiene (Stepanski, Wyatt, 2003). For example, avoiding night restraints, avoiding using electronic devices in bed, being in sunlight in the morning, eating at regular intervals, and eating enough vegetables are very important. Some of these factors are the responsibility of companies, while others must be taken care of by workers in self-help (Shimura et al., 2020).

Self-discipline is an essential skill for effective telecommuting (e.g., Haddon, Lewis, 1994; Kinsman, 1987). However, using self-discipline as a desirable attribute was more of a criterion for selecting the right people as remote workers (Baruch, 2000). It could have resulted in most telecommuting employees having relatively higher levels of self-discipline, which may have led to limited human understanding of the broader influences of self-discipline (Rigotti et al.,2021).

Teleworking is becoming the norm, and everyone is moving to work from home. Self-discipline is no longer just a selection criterion but becomes something that every remote worker seeks to gain or improve (Wang et al., 2021). By showing the regulatory role of self-discipline in the relationship between the characteristics of virtual work and the challenges of teleworking, the study by Wang et al. (2021) highlighted the critical role of self-discipline among all telecommuters. Researchers have determined that self-discipline

can motivate many remote workers to develop the self-discipline to achieve efficiency and well-being at work.

As a measure against Covid-19, maintaining a social distance is required for public health, and improving workers' mental health is also required (Fingret, 2000). Remote work could be a helpful tool to balance them, although there are few studies to date assessing effective methods for improving occupational mental health (Richardson, Rothstein, 2008). Firms that switched to telecommuting during the Covid-19 pandemic believe teleworking will remain more prevalent in their company even after the pandemic ends (Bartik et al., 2020).

Gomez-Pinilla (2008) mentioned that a healthy diet, physical activity, and other lifestyle changes affect mental health. Since both genetic and environmental factors are involved in the development of mental disorders, and nutrients strongly influence brain structure and function, prevention, and treatment strategies through lifestyle changes, such as changes in diet and physical activity, may be effective (Matsuoka, Hamazaki, 2016). Reports suggest that Covid-19 isolation has affected dietary habits (Di Renzo et al., 2020; Ruiz-Roso et al., 2020). One reason may be the ability of healthier anti-inflammatory diets to increase immunity, which may influence the host's response to infection (Iddir et al., 2020). It is necessary to implement the intervention programs to inform and guide the importance of diet, physical activity, and ways to motivate the masses during these unprecedented times.

Recommendations for dealing with loneliness include increasing social support in the workplace, clarifying expectations, and setting appropriate work-related boundaries (Parkman, 2016). These ideas are reflected in a group of questions related to the academic support network, an area of doctoral work where there is room for improvement. According to Byrom et al. (2020)., only slightly more than half of the respondents (54%) believe that their role in the broader academic community is evident. Interventions to clarify the role of doctoral students and support them to feel included and confident in communicating with other scientists can help to cope with self-deprecation. Achievement orientation strongly predicted mental well-being. A goal orientation of self-improvement and growth is associated with adaptive social-emotional functioning and mental well-being (Dykman, 1998). Increasing self-efficacy should improve mental well-being and reduce stress (Grøtan et al., 2019; Burger, Samuel, 2017).

Sleep and general health were strongly associated with stress and mental well-being. While encouraging students to take the time to take care of their physical health and develop good sleep habits can be helpful, it's important to recognize that the causal relationship in this study is unclear. Stress and poor mental health usually have a negative impact on sleep and overall health. Stress and mental well-being among doctoral students depend on health, sleep, and social support factors. Likewise, self-discipline is necessary to achieve good remote work.

3. Practical Part

3.1 Company profile

Charles University is a standard of quality in the Czech higher education system. Its high scientific potential, experienced teaching staff and unique historical traditions make it the main public university of the Czech Republic. Currently, the university is presented by 17 faculties (14 in Prague, 2 in Hradec Králové and 1 in Plzeň) and more than 53,000 students. More than 300 accredited programs in 642 specialties are accredited in Charles University. According to official evaluations of scientific results (e.g. the evaluation of the Research, Development and Innovation Council), Charles University is the most effective scientific institution in the Czech Republic. Over 7,800 employees work at the university; more than 50% of them are academics and researchers (Charles University Prague, 2022).

The Czech Academy of Sciences has three scientific divisions, namely the Division of Mathematics, Physics, and Earth Sciences, the Division of Chemical and Life Sciences, and the Division of Humanities and Social Sciences. The Academy currently manages a network of sixty research institutes and five supporting units staffed by a total of 6,400 employees, over one-half of whom are university-trained researchers and Ph.D. scientists (Czech Academy of Sciences, 2022).

3.2 Research methods

The research of the diploma thesis was focused on the employees of Charles University and the Czech Academy of Sciences. The data were obtained using a structured questionnaire. The questionnaire survey was chosen because it meets the requirements for simplicity, fastness of data acquisition and low cost. Moreover, it guarantees anonymity for respondents. The questionnaire consisted of 24 questions with proposed answers. The questionnaire was distributed among employees via e-mail in English. The online service Google Forms (https://docs.google.com/forms) was used for questionnaire completion.

Purposive Sampling approach was used. The purpose of sampling for quantitative studies is to represent the population of respondents according to their position and other similar characteristics in educational institutions. The sample population consists of employees of Charles University and The Czech Academy of Sciences. The purpose of the qualitative research sample is to represent the psychological influences on respondents working remotely during a pandemic and to find ways dealing with these influences.

The final version of the questionnaire includes 24 multiple choice questions with the additional option of entering the respondent's own response. In the introductory text of the questionnaire, respondents could familiarise themselves with the purpose of the questionnaire and be assured of anonymity. The questionnaire itself consisted of three parts. The first part contained five questions begun with those relating to personal data - gender and age. The remaining three questions defined the academic position, area of research and type of workplace.

A review of the literature showed that remote working problems can lead to psychological impacts such as: procrastination, loneliness, WFC, loss of social connections, overwork, anxiety, and stress. Therefore, the remaining multiple choice questions were designed to analyse factors affecting scientific and academic workers during the Covid-19 pandemic, verifying the relationship between working from home and the presence or absence of psychological effects.

The data, which were obtained from 103 selected employees, were processed using MS Excel. The sub-objectives that sought answers to the set questions were evaluated using an arithmetic mean. MS Excel and function Chi-square test were used for an accurate evaluation of hypotheses.

3.3   Analysis of the Survey Results

All respondents met the basic requirement of employment as workers at Faculty of Mathematics and Physics, Charles University and the Division of Mathematics, Physics, and Earth Sciences, The Czech Academy of Sciences. The socio-demographic questions obtained served to obtain data for determining the characteristics of the respondents. The obtained data are shown in figures and tables on absolute and relative frequency.

Question No. 1 examined the structure of respondents by gender. Among 103 respondents, 60.2 % are men. Among the applied employees who submitted the completed questionnaire, 39.8 % were women. It is worth noting that the obtained result supports the resent trend of gender equality in science.

Table 2 Structure of respondents by gender

Gender of respondents	relative frequency	absolute frequency
Men	60.2 %	62
Women	39.8 %	41
Intersex	0.00 %	0
Total	100 %	103

Source: Own calculation, 2022.

Question No. 2 examined the structure of respondents according to the age of the respondents. The results show that the age group 25-34 is the most represented among the university's employees, where 62.1% of respondents completed the questionnaires. Another large group are respondents aged 35-44, which is 20.4%. This can be explained by the higher number of early stage researchers in comparison with experienced ones as well as their more active participation in sociological surveys.

Table 3 Characteristics of respondents by age

Age of respondents	relative frequency	absolute frequency
Under 24	5.8 %	6
25-34	62.1 %	64
35-44	20.4 %	21
45-54	6.8 %	7
55-64	2.9 %	3
65-74	1.00 %	1
75-84	1.00 %	1
Total	100 %	103

Source: Own calculation, 2022.

Question No. 3 examined the structure of respondents according to an academic position. As expected, according to the survey results most of the respondents were Ph.D. students (47.57 %) and postdoc researchers (22.33 %). This observation directly confirms the conclusions made in the previous paragraph.

Table 4 Characteristics of respondents according to an academic position

Academic position	relative frequency	absolute frequency
Full professor	1.94 %	2
Assistant professor	8.74 %	9
Associate professor	8.74 %	9
Ph.D. student	47.57 %	49
Postdoc researcher	22.33 %	23
Research assistant	7.77 %	8
Other(laboratory technician)	2.91 %	3
Total	100 %	103

Source: Own calculation, 2022.

Question No. 4 examined the structure of respondents according to the area of research. Expectedly, the field of research for most respondents is the Mathematical and Physical Sciences which is 66.02 % of the total number of respondents. However, in addition to this specialization, there are also respondents from other fields of research. The presence of responses from researchers in other fields can be an interdisciplinary character of modern science, when many innovative topics are situated on the border of different fields, such as physics and chemistry, physics and biology, chemistry and medicine etc.

Table 5 Characteristics of respondents according to the area of research

Area of research	relative frequency	absolute frequency
Biological Sciences (BIO)	4.85 %	5
Computer and Information Science and Engineering (CISE)	4.85 %	5
Education and Human Resources (EHR)	0.00 %	0
Engineering (ENG)	4.85 %	5
Environmental Research and Education (ERE)	0.97 %	1
Geosciences (GEO)	12.62 %	13
Integrative Activities (OIA)	0.00 %	0
International Science and Engineering (OISE)	1.94 %	2
Mathematical and Physical Sciences (MPS)	66.02	68

Source: Own calculation, 2022.

Table 5 Characteristics of respondents according to the area of research, Continued

Social, Behavioral and Economic Sciences (SBE)	3.88	4
Total	100 %	103

Source: Own calculation, 2022.

Question No. 5 examined the structure of respondents according to the type of workplace: University – 82.52 % and Academical institute 17.48 %. This can be explained by the fact that the University has more employees than the Academy of Sciences.

Table 6 Characteristics of respondents according to the type of workplace

Type of workplace	relative frequency	absolute frequency
University	82.52 %	85
Academical institute	17.48 %	18
Total	100 %	103

Source: Own calculation, 2022.

Question No. 6 examined the structure of respondents according to the possibility to collect data remotely. According to the results, 41.75 % of respondents can collect data for the research remotely, even if someone else can do it instead of them. But the rest 58.25 % of respondents cannot do it remotely. This represents a large proportion of the respondents. Thus, in the face of unpredictability and limitations during a pandemic, can have negative consequences for science in general.

Table 7 Characteristics of respondents according to the possibility to collect data remotely

Possibility to collect data remotely	relative frequency	absolute frequency
Yes (including if someone else can do it instead of you)	41.75 %	43
No	58.25 %	60
Total	100 %	103

Source: Own calculation, 2022.

Question No. 7 examined the structure of respondents according to the possibility to analyze the results and to write papers from home. All respondents, except one person, answered yes to this question. This can mean that for most of respondents home is more comfortable place for the paper writing required concentration and lack of distractions.

Table 8 Characteristics of respondents according to the possibility to analyze the results and to write papers from home

Possibility to analyze the results and to write papers from home	relative frequency	absolute frequency
Yes	99.03 %	102
No	0.97 %	1
Total	100 %	103

Source: Own calculation, 2022.

Question No. 8 examined the structure of respondents according to the educational duties at work. Almost half of the respondents do not have educational responsibilities at work. These results are consistent with the fact that almost half of the respondents are Ph.D. students and often they do not teach students.

Table 9 Characteristics of respondents according to the educational duties at work

Educational duties	relative frequency	absolute frequency
Yes	41.75 %	43
No	58.25 %	60
Total	100 %	103

Source: Own calculation, 2022.

Question No. 9 examined the structure of respondents according to their effectiveness in teaching remotely. The majority of people who responded «Yes» on question No. 8 graded their effectiveness in teaching remotely as «Less efficient » (27.18 %). «Similarly efficient» was chosen by 11.65 % of respondents. However, only 2.91 % of respondents evaluate their effectiveness in teaching from home as «More efficient». It can be concluded that remote teaching is less effective from the point of view of academic workers and Ph.D. students. The transfer of the educational process into the Internet environment with using of modern gadgets does not ensure a similar level of information translation as the educational process in person.

Table 10 Characteristics of respondents according to their effectiveness in teaching remotely

Effectiveness in teaching remotely	relative frequency	absolute frequency
Similarly efficient	11.65 %	12
Less efficient	27.18 %	28
More efficient	2.91 %	3
Total	100 %	43

Source: Own calculation, 2022.

Question No. 10 examined the structure of respondents according to the travel time to work from home. It takes less than thirty minutes to get from home to work for 51.46% of those who answered the survey. Similarly, most respondents are Ph.D. students, and they often live in dormitories that are not too far away from their educational institutions, while it takes more than 30 minutes for the rest of respondents.

Table 11 Characteristics of respondents according to the travel time to work from home

Travel time to work from home	relative frequency	absolute frequency
<30 min	51.46 %	53
30-60 min	41.75 %	43
>60 min	6.80 %	7
Total	100 %	103

Source: Own calculation, 2022.

Question No. 11 examined the structure of respondents according to the necessity to be at work. Most respondents (75.73 %) need to be directly at work to carry out their job duties. This is similar to the results presented in question No. 6, which examined the structure of respondents according to the possibility to collect data remotely. Moreover, bureaucratic issues cannot be resolved remotely.

Table 12 Characteristics of respondents according to the necessity to be at work

Necessity to be at work	relative frequency	absolute frequency
Yes	75.73 %	78
No	24.27 %	25
Total	100 %	103

Source: Own calculation, 2022.

Question No. 12 examined the structure of respondents according to the experience of WFH before the Covid-19 pandemic. According to the survey, 40.78% of respondents had experience working from home before the Covid-19 pandemic, and 59.22% had no such experience. These mean that researchers and academic workers were somehow prepared to the remote working. But there are limitations to the research that respondents who agreed with the statement were working remotely, not in a pandemic and probably not for such a long period.

Table 13 Characteristics of respondents according to the experience of working from home before the Covid-19 pandemic

Work from home before the Covid-19 pandemic	relative frequency	absolute frequency
Yes	40.78 %	42
No	59.22 %	61
Total	100 %	103

Source: Own calculation, 2022.

Question No. 13 examined the structure of respondents according to the equipment at their homes for remote work. Among the applied employees who submitted the completed questionnaire, 67.96 % have fully equipped workplaces at home. From the 103 respondents, 32.04 % have underequipped workplaces at home.

Table 14 Characteristics of respondents according to the equipment at their homes for remote work

Home equipment	relative frequency	absolute frequency
Fully equipped	67.96 %	70
Underequipped	32.04 %	33
Total	100 %	103

Source: Own calculation, 2022.

Question No. 14 examined the structure of respondents according to the availability of a personal workspace at home. Most of the answers were «Yes, I have» 65.05 %, others 34.95 % answered that they do not have their personal place to work at home.

Table 15 Characteristics of respondents according to the availability of a personal workspace at home

Personal workspace at home	relative frequency	absolute frequency
Yes, I have	65.05 %	67
No, I am working in the kitchen, bathroom, garden...	19.42 %	20
No, I need to share it with other family members or flatmates	15.53 %	16
Total	100 %	103

Source: Own calculation, 2022.

Question No. 15 examined the structure of respondents according to the corresponding their working time at the job place to the working time from home. 47.57% of the 103 respondents agreed with the judgement that they work more at home, on the other hand, 52.43% disagreed.

Table 16 Characteristics of respondents according to the office hours from home

Work time from home	relative frequency	absolute frequency
Yes	47.57 %	49
No	52.43 %	54
Total	100 %	103

Source: Own calculation, 2022.

Question No. 16 examined the structure of respondents according to the psychological impact of working from home during the Covid-19 pandemic. Most respondents gave the answer that they experience symptoms of Procrastination (48.54 %), Loneliness (35.92 %), Loss of social connections (39.81 %), Overwork (45.63 %), Anxiety (41.75 %) and Stress (53.40 %) - sometimes. And only for work-family conflict most of the respondents choose the answer – never (56.31 %). The data show that in most cases, working from home did not have a negative psychological impact on the respondents.

Table 17 Characteristics of respondents according to the psychological impact

Psychological impact	How often	relative frequency	absolute frequency
Procrastination	never	9.71 %	10
	sometimes	48.54 %	50
	often	32.04 %	33
	always	9.71 %	10
Loneliness	never	31.07 %	32
	sometimes	35.92 %	37
	often	28.16 %	29
	always	4.85 %	5
Work-family conflict	never	56.31 %	58
	sometimes	33.01 %	34
	often	6.80 %	7
	always	3.88 %	4
Loss of social connections	never	17.48 %	18
	sometimes	39.81 %	41
	often	32.04 %	33
	always	10.68 %	11
Overwork	never	24.27 %	25
	sometimes	45.63 %	47
	often	22.33 %	23
	always	7.77 %	8
Anxiety	never	33.01 %	34
	sometimes	41.75 %	43
	often	21.36 %	22
	always	3.88 %	4
Stress	never	25.24 %	26
	sometimes	53.40 %	55
	often	17.48 %	18
	always	3.88 %	4

Source: Own calculation, 2022.

Question No. 17 examined the structure of respondents according to the challenges they faced while working from home The most frequent answers were:

- keeping a regular schedule (15.22 %);
- too many distractions at home (16.03 %);
- communication with coworkers is harder (14.67 %).

Table 18 Characteristics of respondents according to the challenges they faced while working from home

Challenges while working from home	relative frequency	absolute frequency
General anxiety about the impact of coronavirus on my life	8.42 %	31
Childcare	4.35 %	16
Internet connectivity	4.35 %	16
Getting enough food	2.99 %	11
Keeping a regular schedule	15.22 %	56
Social isolation	13.04 %	48
I don't have access to the tools or information I need to do my job at home	8.15 %	30
Too many distractions at home	16.03 %	59
I was sick or helping others who were sick	3.53 %	13
Communication with coworkers is harder	14.67 %	54
My physical workspace	9.24 %	34
Total	100 %	368

Source: Own calculation, 2022.

Question No. 18 examined the structure of respondents according to the managing psychological impacts of working from home. Physical Exercise (go for a walk or bike ride) helps with psychological difficulties 28.70% of respondents. Similarly, most of those who answered the questionnaire preferred to organize tasks, schedule and outline goals (27.31 %) and to find ways to stay connected to colleagues (15.74 %).

Table 19 Characteristics of respondents according to the managing psychological impacts of working from home

Managing of psychological impacts	relative frequency	absolute frequency
Organizing tasks, schedule and outline goals	27.31 %	59
Zoning Home (Make a work-friendly space.)	11.11 %	24
Physical Exercise (go for a walk or bike ride)	28.70 %	62
Setting clear boundaries between work and home	10.65 %	23
Setting the rules for household	5.09 %	11
Finding ways to stay connected to colleagues	15.74 %	34
Other (nothing)	1.39 %	3
Total	100 %	216

Source: Own calculation, 2022.

Question No. 19 examined the structure of respondents according to the efficiency of their research work during the coronavirus lockdown to their efficiency before the lockdown. 54.37% of respondents defined as less efficient, 30.10% chose a similar efficient but 14.56% defined as more efficient. One respondent answered differently: *«It is both ways: in one hand I obviously could not use the lab equippement, as the labs were locked down, so I could not produce data. But in the other hand, I was way more productive in calculations and writing my papers, for which I had very little time before the lockdown».*

Table 20 Characteristics of respondents according to the efficiency of their research work during the coronavirus lockdown to their efficiency before the lockdown

Efficiency of the research	relative frequency	absolute frequency
Similarly efficient	30.10 %	31
Less efficient	54.37 %	56
More efficient	14.56 %	15
Other	0.97 %	1
Total	100 %	103

Source: Own calculation, 2022.

Question 20 examined the structure of respondents on the expected negative impact on survey results and future funding 66.02% of respondents agreed with the statement and

33.98% disagreed. This can be explained by the fact that most funding during the pandemic was focused on medical and public health services.

Table 21 Characteristics of respondents according to the expected negative impact their research results in the future and depriving them of possible funding

Expected negative impact on the research results and future funding	relative frequency	absolute frequency
Yes	66.02 %	68
No	33.98 %	35
Total	100 %	103

Source: Own calculation, 2022.

Question No. 21 examined the structure of respondents according to the living situation. More respondents live alone – 37.86 %. Living only with partner 30.10 % of respondents. The rest 32.05 % of the 103 respondents live with someone, whether a partner and children or flatmates.

Table 22 Characteristics of respondents according to the living situation

Living situation	relative frequency	absolute frequency
Living alone (if so - you can skip rest of the questions)	37.86 %	39
Living only with partner	30.10 %	31
Living with a partner and non-adult child(ren)	17.48 %	18
Living with parents or other adult family members	6.80 %	7
Single-parent with non-adult child(ren)	0.00 %	0
Living with non-family others	7.77 %	8
Total	100 %	103

Source: Own calculation, 2022.

Question No. 22 examined the structure of respondents according to the fact if partners were also working from home during the pandemic. The results indicate that partners often worked too -71.43 %. Only 28.57% responded that their partners did not work remotely.

Table 23 Characteristics of those respondents who are living with their partners, if partners worked from home during the pandemic too

Partners worked from home	relative frequency	absolute frequency
Yes	71.43 %	45
No	28.57 %	18
Total	100 %	63

Source: Own calculation, 2022.

Question No. 23 examined the structure of respondents according to those respondents who have child(ren). 62.50% of 23 respondents have one child, 29.17 % have 2 children and only 8.33 % have three or more than three children. This means that the other 79 (76.69%) out of 103 respondents do not have kids.

Table 24 Characteristics of those respondents who have child(ren)

Number of children	relative frequency	absolute frequency
1	62.50 %	15
2	29.17 %	7
3 and more	8.33 %	2
Total	100 %	24

Source: Own calculation, 2022.

Question No. 24 examined the structure of respondents according to their children's ages. The predominant number of respondents have children aged 1-10 years old (65.38 %). 19.23 % of respondents have children of 11-20 years old. Hence, they are more stressed by taking care of children when kindergartens and schools were closed for quarantine.

Table 25 Characteristics of those respondents who have child(ren) (children's ages)

Age of the children	relative frequency	absolute frequency
1-10 years old	65.38 %	17
11-20 years old	19.23 %	5
20-30 years old	15.38 %	4
Total	100 %	26

Source: Own calculation, 2022.

3.4   Hypothesis testing

The main hypothesis of this diploma thesis: working from home during the Covid-19 pandemic can affect the psychological state and cause the following impacts: procrastination, loneliness, WFC, loss of social connections, overwork, anxiety, or stress. The main purpose of the practical part of this study is to determine whether respondents (employees of selected companies who agreed to take part in the study) are affected by remote working and whether there is any relationship between working conditions during the Covid-19 pandemic and psychological effects. The surveys were conducted during the period from January 01, 2022, till February 28, 2022.

Hypotheses:

H1: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and the type of workplace.

H2: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and the possibility to collect data remotely.

H3: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and educational duties at work.

H4: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and presence in the workplace.

H5: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and personal workspace.

H6: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and home equipment.

H7: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and working time at home.

H8: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and living situation.

H9: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and the expected negative impact on the research results and future funding

Independent variables: type of workplace, possibility to collect data remotely, educational duties at work, presence in the workplace, personal workspace, home

equipment**,** working time at home**,** living situation**,** expected negative impact on the research results and future funding

Dependent variables: procrastination, loneliness, WFC**,** loss of social connections**,** overwork**,** anxiety**,** stress.

To evaluate the hypotheses, the Chi-test of independence was chosen, at a significance level of P-value $\alpha = 0.05$. The smaller the p-value, the stronger the evidence that the null hypothesis should be rejected. A p-value less than 0.05 (typically ≤ 0.05) is statistically significant. It indicates strong evidence against the null hypothesis, as there is less than a 5% probability the null is correct. Several dependencies could not be tested by the Chi-square test, because the expected data had more than 20% of the data exceeding the value of 0.05. The Statistical Analysis System (SAS) was used in such cases.

Table 26. The psychological impact of working from home during the Covid-19 pandemic

Independent variables	Psychological impacts	Chi-square test
Type of workplace	procrastination	0.23811493
	loneliness	0.65938427
	WFC	0.0870136
	loss of social connections	0.43991868
	overwork	0.08940252
	anxiety	0.14936773
	stress	0.7571 (Two-sided Pr <= P Using SAS program)
Possibility to collect data remotely	procrastination	0.23175963
	loneliness	0.07473531
	WFC	0.21201928
	loss of social connections	0.03011227
	overwork	0.18279167
	anxiety	0.39370172
	stress	0.28688945

Source: Own calculation, 2022.

Table 26. The psychological impact of working from home during the Covid-19 pandemic, Continued

Educational duties at work	procrastination	0.23175963
	loneliness	0.17472084
	WFC	0.16666667
	loss of social connections	0.51001241
	overwork	0.20003293
	anxiety	0.37609811
	stress	0.37609811
Presence in the workplace	procrastination	0.93173598
	loneliness	0.34604322
	WFC	0.96818958
	loss of social connections	0.88109143
	overwork	0.72265293
	anxiety	0.74814083
	stress	0.93236272
Personal workspace	procrastination	0.0827399
	loneliness	0.25001766
	WFC	0.1860 (Two-sided Pr <= P Using SAS program)
	loss of social connections	0.96413231
	overwork	0.85789743
	anxiety	0.83007681
	stress	0.5087017
Home equipment	procrastination	0.60041109
	loneliness	0.68835753
	WFC	0.49480153
	loss of social connections	0.41661962
	overwork	0.62296505
	anxiety	0.87252085
	stress	0.12834498

Source: Own calculation, 2022.

Table 26. The psychological impact of working from home during the Covid-19 pandemic, Continued

Working time at home	procrastination	0.03533798
	loneliness	0.36179827
	WFC	0.24869982
	loss of social connections	0.75428072
	overwork	0.62445931
	anxiety	0.52575764
	stress	0.45626309
Living situation	procrastination	0.04082025
	loneliness	0.68835753
	WFC	0.08975237
	loss of social connections	0.96694204
	overwork	0.66786609
	anxiety	0.41694933
	stress	0.326949
Expected negative impact on the research results and future funding	procrastination	0.86986888
	loneliness	0.2790982
	WFC	0.5256852
	loss of social connections	0.3889573
	overwork	0.03974748
	anxiety	0.2998202
	stress	0.80918691

Source: Own calculation, 2022.

H1: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety, or stress) and <u>the type of workplace</u>. At the level of $\alpha = 0.05$.

P-values of all psychological impacts are more than the level of significance. Therefore, there is no relationship between the above-mentioned variables.

H2: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and <u>the possibility to collect data remotely.</u>

At the level of $\alpha = 0.05$.

P-values of all psychological impacts are more than the level of significance, except loss of social connections. There is no relationship between the above-mentioned variables.

In case of loss of social connections P-value= 0.03011227, which is more than the level of significance. There is a relationship between the above-mentioned variables.

H3: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and <u>educational duties at work.</u>

At the level of $\alpha = 0.05$.

P-values of all psychological impacts are more than the level of significance. Therefore, there is no relationship between the above-mentioned variables.

H4: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and <u>presence in the workplace.</u>

At the level of $\alpha = 0.05$.

P-values of all psychological impacts are more than the level of significance. Therefore, there is no relationship between the above-mentioned variables.

H5: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and <u>personal workspace.</u>

At the level of $\alpha = 0.05$.

P-values of all psychological impacts are more than the level of significance. Therefore, there is no relationship between the above-mentioned variables.

H6: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and <u>home equipment.</u>

At the level of $\alpha = 0.05$.

P-values of all psychological impacts are more than the level of significance. Therefore, there is no relationship between the above-mentioned variables.

H7: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and <u>working time at home.</u>

At the level of $\alpha = 0.05$.

P-values of all psychological impacts are more than the level of significance, except procrastination. There is no relationship between the above-mentioned variables.

In case of procrastination P-value= 0.03533798, which is more than the level of significance. There is a relationship between the above-mentioned variables.

H8: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and <u>living situation.</u>

At the level of α = 0.05.

P-values of all psychological impacts are more than the level of significance, except procrastination. There is no relationship between the above-mentioned variables.

In case of procrastination P-value= 0.04082025, which is more than the level of significance. There is a relationship between the above-mentioned variables.

H9: There is relationship between psychological impact (procrastination, loneliness, WFC, loss of social connections, overwork, anxiety or stress) and the expected negative impact on the research results and future funding.

At the level of α = 0.05.

P-values of all psychological impacts are more than the level of significance, except overwork. There is no relationship between the above-mentioned variables.

In case of overwork P-value= 0.03974748, which is more than the level of significance. There is a relationship between the above-mentioned variables.

Based on the results, it was determined that those respondents who were most psychologically affected by working from home during the pandemic were those who did not have the opportunity to collect data remotely. Those who had longer working hours at home than at work during normal conditions and those who did not live at home alone. As well as others who suppose that working remotely might have a negative impact on the research results and future funding.

4. Results and Discussion

The psychological impact of WFH on workers today in the context of the Covid-19 pandemic should be of concern because employees cannot work effectively in the office because of the government policy of regional quarantine and social distancing. This is complicated by the fact that employees stay at home and, on the one hand, are forced to work at home, but, on the other hand, the rest of the family is also at home. This influences the psychological attitudes of employees who worked in the office on a daily basis and now work at home, gathering with their families. The balance between the obligation to combine work and family responsibilities is very important to avoid a negative impact on employees, especially in the context of the Covid-19 pandemic when the uncertainty of the spread of the virus and government policies regarding social distancing will end.

Poorly equipped and not private workplace, overwork and living situations can lead to psychological impacts such as procrastination, loneliness, work-family conflict, loss of social connections, overwork, anxiety, and stress (Tuzovic, Kabadayi, 2021). According to the results, dependency was confirmed in the cases of procrastination, overwork and loss of social connections.

The survey also included questions regarding previous experience of working remotely, as well as identifying barriers or challenges of academic and scientific workers during the Covid-19 pandemic. The answers to questions No. 17 and No. 12 of the questionnaire were used for this purpose. Gajendran and Harrison (2007) mentioned that working from home can have negative or positive consequences, depending on various systemic moderators, such as the demands of the home environment, the level of organizational support, and social connections outside of work. Respondents indicated that the biggest challenges for them were keeping a regular schedule, too many distractions at home and communication with coworkers is harder (see Table 18). The impact of remote work on social relationships between colleagues is associated with isolation. Kaduk (2019) found that forced work from home and work schedule uncertainty was associated with more serious work-family conflict among professionals and managers, stress, burnout, and decreased job satisfaction. But the practical part did not find dependence between psychological impact and work-family conflict.

As answered in question number 12 (see Table 13), almost half of the respondents had experience working from home before the Covid-19 pandemic. This means that for many respondents the situation of working from home is not new and they have already been

prepared for such circumstances. Of course, it should be pointed out that early experience of working remotely is not comparable to working in isolation and quarantine. However, isolation must not be specific to remote work; employees may experience isolation even if they work in the exact physical location as their colleagues (Rokach, 1997; Smith, 1998).

Parkman (2016) recommended increasing social support in the workplace, clarifying expectations and setting appropriate work-related boundaries for a stable mental state especially for dealing with loneliness. According to respondents, physical exercise (walking or cycling) helped with psychological difficulties the most. It also helped to organize tasks, set schedules and goals, and find ways to stay in touch with colleagues (see Table 19). Gomez-Pinilla (2008) also confirms that physical activity and other lifestyle changes have an impact on mental health.

4.1 Limitations

This study, like all others, contains limitations that can be exploited in future research. Only two educational institutions were used in the survey. In addition, only 103 employees who received a link to the survey completed the questionnaires out of the 200 that were distributed. The limited number of participants, as well as the limited number of companies, have influenced the results of this study. Nevertheless, future research could develop the results of this study and, by comparing participants' responses, determine whether there is a link between the psychological problems faced by employees working from home and psychological well-being.

It should be noted that the questionnaire only suggested the negative psychological impacts of remote work. Most hypotheses aimed to test the relationship between the negative psychological effects of working from home, during the Covid-19 pandemic and the circumstances of working from homes such as the type of workplace, the possibility to collect data remotely, educational duties at work, the need for a presence in the workplace, personal workspace, home equipment, working time at home, living situation and the expected negative effects on the research results and future funding.

5. Conclusion

The aim of this thesis was to estimate the psychological impact of working from home during the Covid-19 pandemic on academic and scientific workers and on the basis of these findings to formulate recommendations on how to reduce the negative psychological impacts while working from home. The questionnaire was chosen as the main approach for the survey. The respondents from the Charles University and the Czech Academy of Sciences participated the research. It should be noted that psychological impacts can be both positive and negative. Based on the information presented in this thesis, it can be concluded that the mental state of the employees at Charles University and the Czech Academy of Sciences was not significantly influenced by working from home during the Covid-19 quarantine.

According to the results, dependency was confirmed in the cases of procrastination, overwork and loss of social connections. Early-career researchers represented the majority of respondents. This means that they did not have families with children and working remotely during the pandemic may not much impact on their psychological well-being. In the modern world, it is also a category of young people who may be psychologically influenced by procrastination. However, they may not lose their social connections because they can use social media and the convenience of working remotely. On the other hand, the elder generation may be affected by the loss and limitation of social contacts when working from home. Based on the results of the survey, physical exercise (walking or cycling), organizing tasks, setting schedules and goals, and finding ways to stay in touch with colleagues help to reduce the negative psychological impacts while WFH.

This study highlights factors that impact workers' physical and mental health well-being while WFH and provides a foundation for considering how to best support a positive WFH experience. Further research is needed into the problems of remote working, its impact on employee well-being and solutions to overcome these problems, especially for researchers and academics, which are part of today's global, hyper-competitive environment.

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7. List of tables, figures and abbreviations

7.1 List of tables

7.2   List of figures

7.3   List of abbreviations

AIDS - Acquired Immunodeficiency Syndrome

HEIs - Higher Education Institutions

HIV - Human immunodeficiency virus

IAU - International Association of Universities

ICTs - information and communication technologies

ILO - International Labor Organization

MERS - Middle East Respiratory Syndrome

MS Excel - Microsoft Excel

NPIs - Non-pharmaceutical interventions

PTSD- post-traumatic stress disorder

SARS-CoV-2 - Severe Acute Respiratory Syndrome - related coronavirus 2

SAS - Statistical Analysis System

US- The United States of America

WFC - Work-family conflict

WFH - working from home

WHO- World Health Organization

WLB - Work-life Balance

WLC - Work-life conflict

Appendix

Questionnaire

1. Gender

   o Male

   o Female

   o Intersex

2. Age group

   o Under 24

   o 25 – 34

   o 35 – 44

   o 45 – 54

   o 55 – 64

   o 65 – 74

   o 75 – 84

3. Your academic position

   o Full professor

   o Associate professor

   o Assistant professor

   o Postdoc researcher

   o Research assistant

   o Ph.D. student

   o Other (Please specify)

4. Your area of research

   o Biological Sciences (BIO)

   o Computer and Information Science and Engineering (CISE)

   o Education and Human Resources (EHR)

   o Engineering (ENG)

   o Environmental Research and Education (ERE)

   o Geosciences (GEO)

   o Integrative Activities (OIA)

   o International Science and Engineering (OISE)

   o Mathematical and Physical Sciences (MPS)

   o Social, Behavioral and Economic Sciences (SBE)

- o   Other (Please specify)

5. Type of workplace

   - o   University

   - o   Academical institute

   - o   Other (Please specify)

6. Is it possible for you to collect data for your research remotely?

   - o   Yes (including if someone else can do it instead of you)

   - o   No

   - o   Other (Please specify)

7. Is it possible for you to analyze the results and to write papers from home?

   - o   Yes

   - o   No

8. Do you have educational duties at work?

   - o   Yes

   - o   No (if so - you can skip the next question)

9. Evaluate your effectiveness in teaching remotely

   - o   More efficient

   - o   Less efficient

   - o   Similarly efficient

10. How far is your office from home?

   - o   <30 min

   - o   30-60 min

   - o   >60 min

11. Does your job require presence in the workplace?

   - o   Yes

   - o   No

12. Did you utilize the possibility to work from home before the Covid-19 pandemic?

   - o   Yes

   - o   No

13. Is your home fully equipped for remote working?

   - o   Fully equipped

   - o   Underequipped

14. Do you have a personal workspace at home?

o   Yes, I have

o   No, I need to share it with other family members or flatmates

o   No, I am working in the kitchen, bathroom, garden...

15. Did your working time at home corresponds to your working time at the job place (for example your working day is 8 hours, do you work at home more)?

o   Yes

o   No

16. How often have you faced … during remote work?

	never	sometimes	often	always
procrastination				
loneliness				
Work-family conflict				
loss of social connections				
overwork				
anxiety				
stress				

17. What were the biggest challenges you faced while working from home? (You can choose several options here.)

o   General anxiety about the impact of coronavirus on my life

o   Childcare

o   Internet connectivity

o   Getting enough food

o   Keeping a regular schedule

o   Social isolation

o   I don't have access to the tools or information I need to do my job at home

o   Too many distractions at home

o   I was sick or helping others who were sick

o   Communication with coworkers is harder

o   My physical workspace

o   Other (Please specify)

18. How did you manage the psychological impacts of working from home? (You can choose several options here.)

- Organizing tasks, schedule and outlining goals
- Zoning Home (Make a work-friendly space.)
- Physical Exercise (go for a walk or bike ride)
- Setting clear boundaries between work and home
- Setting the rules for household
- Finding ways to stay connected to colleagues
- Other (Please specify)

19. Try to compare the efficiency of your research work during the coronavirus lockdown to your efficiency before the lockdown. My research work due to working more from home is _____ compared to my work before the lockdown.
    - less efficient
    - more efficient
    - similarly efficient

20. Do you think that working remotely during the Covid-19 pandemic will negatively impact your research results in the future and deprive you of possible funding?
    - Yes
    - No

21. Living situation
    - Living alone (if so - you can skip rest of the questions)
    - Living only with partner
    - Living with a partner and non-adult child(ren)
    - Living with parents or other adult family members
    - Single-parent with non-adult child(ren)
    - Living with non-family others

22. Did your partner also work from home during the pandemic?
    - Yes
    - No

23. Number of children
    - 1
    - 2
    - 3and more

24. Children of what age (in years) do you live with?
    - Other (Please specify)