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***Abstract*— The 2020 Covid-19 pandemic caused a sudden and massive change in work organizations. One of the major consequences of the crisis was the acceleration towards teleworking, through the specific phenomenon of Mandatory Work From Home: the situations in which workers overnight found themselves to work seven days a week from their home environment, constantly online, often without adequate equipment and little to no preparation. Different workers reacted in different way to this important change, depending on age, gender, family characteristics and other impacting factors. Mandatory work from home and these other variables impacted employees' physical and mental health, triggering or increasing symptoms of overwork and emotional exhaustion among others. This paper contributes to the literature on the impact of the pandemic on workers' health by giving an overview of the effects of MWFH on university staff, using Politecnico di Torino as a case study.**

Keywords— gender, work from home, covid-19, work-family conflict, academia, remote work, university, mental health

I. INTRODUCTION

Before the Covid-19 pandemic changed the shape of the world and our conception of work in 2020, multidisciplinary academic research has already started to investigate the advantages and disadvantages of new forms of working. Many terms have been used: "teleworking", "agile working", "remote working" and "telecommuting" have entered the discourse in the literature to identify new way through which workers can do their job in in locations other than the central offices or production facilities - their homes or other spaces - often thanks to computer-based technology that grant them to communicate with their co-workers without personal contact [1; 2; 3]. However, there has been little consensus on the exact definition of teleworking [4]. Scholars highlighted both the advantages and disadvantages of this transformation in working methods. On one thing, the pre-pandemic literature seemed to be unanimous: the implications of teleworking impacted a wide range of issues - from work-life balance to new working opportunities - and fields, both from the point of view of multidisciplinary research and practical applications [5]. However, before the pandemic, work organizations both in the private and in the public sphere experimented very little with teleworking or other forms of agile working arrangements, even though the extent of experimentations varied according to the geographical area and legal framework and prevalence rates varied significantly through the types of studies [4; 6]. In Italy, for example, before the pandemic few work organizations and public administrations especially experimented with forms of remote working or "smart" working, as it was called by the existing legal sources [7].

We want to contribute to the literature on the changes imposed by the Covid-19 pandemic and especially by the advent of teleworking that was provoked by the pandemic, in the specific circumstances of the emergency. To do so, we will explore the results of a survey that was administered to two different types of remote workers within the university context: academic and research staff, and technical-administrative staff (TAS). We will focus specifically on the impact of working remotely during the emergency on academics' mental and physical health, exploring the potential moderators of certain health issues related to remote working. We will examine these aspects through gender lens, highlighting potential differences both between male and female researchers and according to the issue of work and family conflict, which has a specific gendered dimension.

The next section will be dedicated to set the theoretical background on the impact of remote working on mental and physical health, especially in relation to academic work, work-family conflict and the Covid-19 pandemic, and to formulate the research questions. The following sections will focus on, respectively, describing the methodology, the results, and the conclusions, with a final section of acknowledgements.

II. CONCEPTUAL FRAMEWORK AND RESEARCH QUESTIONS

When the pandemic hit at the beginning of 2020 the consequences for employees in all the fields were sudden and meaningful. In particular, the need to contain the spread of the virus and the wide lockdowns imposed by the

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governments overnight transformed many of them into "work from home" employees, while other categories of workers either classified as "essential workers" or furloughed or laid off [8]. Focusing on the "work from home" employees, Kniffin et al., 2021 made an important distinction on the classification of the forms of teleworking that were discussed even before the pandemic and the specific circumstances following the outbreak of 2020. Teleworking, remote work and agile working are broader categories to describe many different working methods, what happened during the first outbreak of the pandemic can be described as Mandatory Work From Home (MWFH): a situation in which worker were overnight forced to work from their home spaces fulltime, with little to no training and often inadequate equipment, while the emergency forced a shut-down of basic services. Through the following waves of the pandemic, MWFH assumed different forms according to the restrictive measures, and even after the end of lockdowns and social distancing, remote working has been employed to a greater extent in comparison with pre-pandemic times. Moreover, MWFH continues to be applied to employees who test positive for the virus. This has led to a so-called "new normal" [8; 9; 10; 11] (Gartner, 2020; Kiffin et al., 2021; Rudolph et al., 2021; Wang et al., 2021).

The pre-pandemic literature focused on both the advantages and disadvantages of forms of remote and agile working for employees, often with a lack of unanimity and mixed findings [6; 11; 12]. Among the positive factors associated with remote working, we can find a link between more flexibility and a higher job satisfaction and morale, increased flexibility and autonomy, and a positive impact on work-family balance - although the results were mainly mixed on this last point – [5; 6; 13; 14]. Negative side effects that were connected to teleworking before the pandemic included experiencing higher social and professional isolation, tendency to overwork, workaholism and presenteeism, with an impact on workers' performances and health [5; 14; 15]. However, a consistent part of the post-pandemic literature tended to focus on the negative impact that MWFH, in the light of the emergency situations, had on teleworkers, especially in terms of consequences on physical and mental health. MWFH and extended lockdowns meant a sudden lack of separation between personal and working space, a constraint or interruption of in-presence social interactions to contain the spread of the virus and the suspension of caretaking related services such as schools and kindergartens. This have led to the tendency to execute working tasks or to use technology for work reasons during non-work hours and in general to overwork or to work around the clock [16] and created new or exacerbated already present conflict between work and personal sphere, especially when it comes to work-family balance [17; 18]. MWFH also forced many employees to exclusively work from their computers, often with inadequate equipment, which have led to amplify an already perceived technostress [19]. All these consequences of the pandemic and MWFH are positively correlated to higher levels of cognitive demands for workers, which led to a rise in mental issues such as depressions, emotional exhaustion, and burnouts [20], plus an increase in problems related to the quality of sleep, sleep cycle and insomnia, which can also contribute to deteriorating physical and mental health [21].

Moreover, MWFH amplified an already perceived technostress, which has been defined by the pre-pandemic literature as the stress that ICT users in organizations experience as a result of "application multitasking, constant connectivity, information overload, frequent system upgrades and consequent uncertainty, continual relearning and consequent job-related insecurities, and technical problems associated with the organizational use of ICT" [22] and which has been shown to have an impact on work-life balance and exhaustion, among others [23; 24; 25].

Studies on the impact of MWFH and its impact on workers' health intersect with the literature on academia and how the working culture in the academic environment affects these very same aspects. The pre-pandemic literature highlighted how the recent-year transformation of academic work already had consequences on the mental and physical conditions of researchers. Some authors referred to this transformation as the "neo-liberal turn" of academia [26; 27; 28], to describe the increasingly identification of academia as "knowledge economy" [29; 30] which led to and a market-oriented management of academic work and gave priority to high level of scholar productivity, especially in terms of publication rates, key to career progression. The neo-liberal turn of academia has been associated with an increase in workload and cognitive demands for researchers, often justifying overwork as the only way to reach academic excellence and tenure [29; 30; 31]. The increase in overwork within this framework has been positively linked to higher level of occupational stress and emotional exhaustion [30; 32; 33; 34] and higher level of workaholism [35; 36], also linked to emotional exhaustion and burnouts [37; 38]. The post-pandemic literature on academic work and its relationship with MWFH confirmed the increased tendency in these behaviours and health issues for overall all the researchers population [7; 39; 40].

However, the phenomenon has not only a general, but also a gendered dimension. The gender gap in academia, in terms of female participation and opportunities, is well documented and manifests itself on different levels of segregation. Specifically, the literature talks about "glass ceiling" or, more recently, "glass labyrinth", to describe the sum of invisible obstacles that prevents women to achieve tenure or leadership roles and impairs women's opportunities in every step of their careers, especially from early stages which are characterized by more precariousness and biases for female academics [41; 42; 43; 44]. In the framework of the neo-liberal turn of academia, one manifestation of the gender gap is the so-called "productivity puzzle", i.e. the lower publishing rates and lower recognition for female contributors and authors, that constrains female researchers' career progression [45; 46]. This gap in scientific productivity is linked to many causal factors, including gender biases and discrimination in the publishing process, but it has been often connected by the literature to a problem of work-life balance. Women in different family structures are often disproportionately burdened by housekeeping, care and family duties in comparison with their male partners and peers, and female researchers are no exception [47; 48], something that has been proven to impact women's well-being and health: despite having lower productivity rates, female academics are more exposed to job strain, occupation

stress and work-related emotional exhaustion, one of the core causal factors of burnouts [49; 50; 51]. The Covid-19 pandemic and MWFH exacerbated both the work-family conflict with heavier results for female scientists [52; 53; 54], and a correlated impact on both their productivity gap and their occupational stress.

Given this background, we want to contribute to the empirical studies that give a photograph of the impact on workers mental and physical health during the peak of the emergency and MWFH measures. To do so, we take into consideration a specific type of working environment that has been heavily affected by the sudden implementation of MWFH during the first waves of the pandemic, i.e., the one related to universities and academia. Specifically, we ask ourselves: what is the relationship between perception of the workload, workaholism, emotional exhaustion and psycho-physical health issues and gender and family characteristics? What is the relationship between these same factors and MWFH? What are the effects of mediation between gender and, family characteristics and on health issues generated by MWFH?

We try to answer these questions by considering the results of a survey administered to the academic staff of Politecnico di Torino.

III. DATA AND METHODOLOGY

We analysed the results of an online self-report questionnaire that was administered between December 2020 and March 2021, taking into consideration the responses of the academic staff of the Politecnico di Torino. The participants were 372, the average rate response was 22,55%. The study was built in the framework of the Job Demands-Resource-Recovery model [55] and measured workload and cognitive demands, workaholism and healthy and obsessive passion for work, emotional exhaustion, work-family conflict internet addiction, insomnia and other psycho-physical health issues related to lockdowns and MWFH, using different scales [7].

The variables were collected using perceptual measures. A limitation of this approach is that perceptions often differ from reality, and self-reported measures might be affected by statistical problems, such as common method variance (CMV) and response trends. To pre-empt such concerns, perceptual measures are usually validated through econometric tests and factor analyses, which have demonstrated satisfactory reliability. We thus followed such an approach and performed a confirmatory factor analysis. Moreover, Cronbach's alpha was used to assess the internal consistency of the constructs. Results reveal a good consistence of the constructs.

To verify the differences based on gender and different levels of work-family conflict, t-tests were performed on the survey participants' responses related to the perception of workload and cognitive demands, workaholism and healthy and obsessive passion for work, emotional exhaustion, work-family conflict internet addiction, insomnia and other psycho-physical health issues related to lockdowns and MWFH. Since the t-test is an appropriate analysis to compare the mean of a variable among two or more groups [56]. Building on this, we use this approach to assess possible differences in the means of the selected variables between two groups. Specifically, we perform the t-tests on two different levels: first, we compare the differences in the average responses between male and female respondents; second, we compare the differences in the average responses between participants who perceived a low work-family conflict during the examined period, and those who perceived a high one.

To assess the association between respondents' characteristics and perceived health issues, we then performed multivariate regressions analyses. As our dependent variables (workload and cognitive demands, workaholism and healthy and obsessive passion for work, emotional exhaustion, internet addiction, insomnia) take continuous values between 1 and 5 (with the exception of phsyco-physical health issues related to lockdowns, which take continuous values between 1 and 4), we use OLS regressor. Our independent variables in order: gender, average number of days of MWFH in the time period considered. As control independent variables, we used age, the presence of children in the family structure and possible care duties performed by the respondents. Plus, we take into consideration the moderating effect of gender in the relationship between work-family conflict and health issues.

IV. RESULTS

Table I reports the results of the t-test we executed to highlight any possible gender differences in the responses to the different variables taken into consideration.

TABLE I. T-TEST - GENDER

Variable	***Average Male***	***Average Female***	***diff = Avg Female – Avg Male (H0: diff=0)***	***p-value Ha: diff>0 / Ha: diff<0***
Workload and cognitive demands	3,8750	3,9811	0,1061*	0.0687
Workaholism	2,7005	3,0689	0,3683***	0.0000
Healthy passion for work	3,7099	3,5453	-0,1647**	0.0317
Obsessive passion for work	2,0643	2,2360	0,1717**	0.0483
Emotional exhaustion	2,9465	2,9677	0,0212	0.3078
Internet addiction	2,1588	2,0649	-0,0939	0.1174
Insomnia	2,3405	2,6688	0,3284***	0.0019
Other psycho-physical health issues	2,0345	2,4139	0,3795***	0.0000

*** p<0.01, ** p<0.05, * p<0.1

The results show that significant gender differences are present in most of the issues examined. Specifically, female participants suffer significantly more of high workload and cognitive demands, workaholism, obsessive passion for work, insomnia and other psycho-physical health issues related to MWFH, while presenting lower levels of healthy passion for work.

Next, we examine the differences in responses between participants who declared low levels of work-family conflict and participants who declared higher ones.

TABLE II. T-TEST – WORK-FAMILY CONFLICT

Variable	*Average Low Work-Family Conflict*	*Average Low Work-Family Conflict*	*diff = Avg High Work-Family Conflict – Avg Low Work-Family Conflict (H0: diff=0)*	*p-value Ha: diff>0 / Ha: diff<0*
Workload and cognitive demands	3,7596	4,1591	0,3995***	0.0000
Workaholism	2,5402	3,3732	0,8330***	0.0000
Healthy passion for work	3,7451	3,4510	-0,2940***	0.0005
Obsessive passion for work	1,9125	2,4539	0,5414***	0.0000
Emotional exhaustion	2,8982	3,0351	0,1369***	0.0004
Internet addiction	1,9227	2,3765	0,4539***	0.0000
Insomnia	2,1393	2,9669	0,8276***	0.0000
Other psycho-physical health issues	2,0209	2,4617	0,4408***	0.0000

*** p<0.01, ** p<0.05, * p<0.1

The results show the clear impact of work-family conflict on all the issues examined. Specifically, respondents who indicated to suffer from high work-family conflict also reported higher level of workload and cognitive demands, workaholism, emotional exhaustion, internet addiction, insomnia and other psychological or physical health issues related to MWFH, while also presenting lower level of healthy passion for work.

Next, in Table III and Table IV, we present the results of the multivariate regressions analyses to assess the association between the respondents' personal and family characteristics and the perceived issues taken into consideration – in order, workload and cognitive demands (1), workaholism (2), healthy passion for work (3), obsessive passion for work (4), emotional exhaustion (5), internet addiction (6), insomnia (7) and other psychological and physical health issues related to lockdown (8). For gender, we used a dummy variable – female (0) and male (1).

TABLE III. OLS RESULTS

	(1)	**(2)**	**(3)**	**(4)**
Gender	*-0,9101*** (0,1774)*	*-2,0739*** (0,2166)*	*0,8072*** (0,2262)*	*-0,9787*** (0,2528)*
Gender # Work-Family Conflict	*0,3292*** (0,0611)*	*0,6667*** (0,0748)*	*-0,2637*** (0,0784)*	*0,2839*** (0,0874)*
Number of MWFH days	*0,0462** (0,0191)*	*0,0937*** (0,0235)*	*--0,0406* (0,0244)*	*-0,0369 (0,0275)*
Age	*0,0001 (0,0041)*	*-0,0060 (0,0050)*	*0,0083 (0,0052)*	*0,0120** (0,0059)*
Number of children	*-0,0534 (0,0533)*	*-0,0988 (0,0662)*	*-0,0151 (0,0676)*	*-0,0639 (0,0757)*
Care duties	*0,0751 (0,1009)*	*0,0042 (0,1231)*	*0,2004 (0,1275)*	*0,0450 (0,1433)*
Constant	*3,7950 (0,1637)*	*3,0284 (0,2005)*	*3,2569 (0,2095)*	*1,9410 (0,2368)*
Observations	*286*	*274*	*275*	*273*
R-squared	*12,08%*	*29,91%*	*7,97%*	*7,44%*

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

TABLE IV. OLS RESULT

	(5)	**(6)**	**(7)**	**(8)**
Gender	*-0,0848 (0,1146)*	*-0,8385*** (0,1941)*	*-1,3316*** (0,2800)*	*-0,9759*** (0,1751)*
Gender # Work-Family Conflict	*0,0303 (0,0395)*	*0,3807*** (0,0667)*	*0,3874*** (0,0961)*	*0,2311*** (0,0599)*
Number of MWFH days	*0,0140 (0,0125)*	*0,0247 (0,0212)*	*0,0951*** (0,0307)*	*0,0578*** (0,0193)*
Age	*-0,0021 (0,0027)*	*-0,0072 (0,0046)*	*0,0034 (0,0066)*	*-0,0016 (0,0041)*
Number of children	*-0,0351 (0,0344)*	*-0,0388 (0,0583)*	*-0,0856 (0,0834)*	*-0,0943* (0,0523)*
Care duties	*0,0155 (0,0647)*	*0,0556 (0,1107)*	*-0,0792 (0,1576)*	*-0,0419 (0,0990)*
Constant	*3,0073 (0,1059)*	*2,2326 (0,1797)*	*2,2815 (0,2614)*	*2,3794 (0,1637)*
Observations	*281*	*267*	*278*	*276*
R-squared	*1,68%*	*13,17%*	*10,92%*	*16,57%*

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

The results show that female gender is positively correlated with higher perception of workload and cognitive demands, workaholism, obsessive passion for work, internet addiction, insomnia and other health issues related to lockdowns, while being negatively correlated with healthy passion for work. Work-family conflict is a moderator with significant results for all the dependent variables, with the exception of emotional exhaustion, being positively linked to perception of workload and cognitive demands, workaholism, obsessive passion for work, internet addiction, insomnia and other health issues related to lockdowns, while being negatively correlated with healthy passion for work. MWFH also shows significant correlation with some variables, being positively linked to higher perception of workload and cognitive demands, workaholism, insomnia and other health issues related to lockdowns, while being negatively correlated

to healthy passion for work. Age was significantly associated with higher obsessive passion for work, while negatively linked to workaholism, emotional exhaustion, internet addiction and other health issues related to lockdowns. The other independent variables show no significant correlations to the dependent variables.

V. CONCLUSION

We investigated the correlation between gender, work-family conflict and MWFH with some of the most psychophysical and behavioral issues that have been highlighted commonly by the literature on neo-liberal academia and the post-pandemic literature on the impact of MWFH on workers' health. We were particularly interested in the gender perspective on these issues, to see if, during the peak of the pandemic and of the social distancing measures that impacted so profoundly work and academic life, the gender gap that characterize academia widened in relation to some physical and mental health problem. We took into consideration the results of a survey administered to the academic staff of the Politecnico di Torino.

The t-tests indicated that there are significant differences in the responses of male and female academics, and respondents which different levels of work-family conflict. Female academics reported higher many of the domains inquired, despite not showing significant differences in emotional exhaustion in comparison with their male peers – something in contrast with the literature examined above. Respondents who reported higher work-family conflict also reported higher averages for all the dependent variables, with the exception of healthy passion for work.

The results of the regression analysis are less clear-cut but still in line with when verified in the t-tests: female gender has significant impact on many of the dependent variables, including a negative correlation with healthy passion for work, even though also in this case it does not seem to be significatively linked to emotional exhaustion. Work-family conflict operates as a moderator for all the variables, except for emotional exhaustion, indicating that female researchers with high work-family conflict are more exposed to all the other issues examined and less prone to develop healthy passion for work. This might not necessarily relate to the presence of children or the execution of specific care duties, as it is shown but the lack of significance of the related results. Finally, MWFH and age also play a significant role in the association with the issues examined. MWFH positively influences higher workload and cognitive demands, workaholism, insomnia and other health issues related to lockdown, while being negatively linked to healthy passion for work. On the other hand, older age is significatively linked to less frequent workaholism behaviours, emotional exhaustion, internet addiction and other health issues related to lockdown, while being positively linked with both higher healthy and obsessive passion for work.

The research was conducted during the peak of Covid-19 emergency and the consequences of remote working were influenced by the extraordinary circumstances of that time. However, while the impact of the pandemic continues to evolve, what we have learnt from the MWFH experience constitute the base to develop better policies, both in case of new lockdowns or just to handle individual workers' quarantines and with the prospect of further implementation of remote working. Regulated forms of remote or agile working have been proven to be helpful and advantageous for many workers [57]. However, it is still necessary to understand the roots and causes of disadvantages and problems, based on the pandemic experiences, to identify which services and policies to implement in order to avoid, in the future, the very same problems that workers had to face during the emergency. The results in terms of gender and work-family conflict indicate that MWFH might have exacerbated the gender imbalances already present in academia, leaving female academics exposed to psychological and physical issues and calling for better support in favour of work and life balance. In the future, it might be interesting to explore the relation between these inequalities and both age and professional roles: these preliminary results, when it comes to age, might suggest that the conditions of early-stage researchers could play a role in deepening health issues related to both MWFH and the structure of neo-liberal academia.

This research has limitations. In the future, we aim to expand the investigation to all the university staff, in order to better understand all the aspects of academic work in relation to gender and remote working.

Second, we acknowledge that this paper has a binary approach to gender, adopting the classical division male-female. However, we are aware that many studies have abandoned a strictly binary approach to gender identity and recognized that many identities don't fall within the two categories of male and female. Our goal is to expand our research beyond the binary perspective.

Finally, when examining the advantages and disadvantages of remote working, it is important to adopt an intersectional approach that take into consideration not only gender identity, but also other important characteristics of the individual – such as economic background and race – that have an impact on the work and private sphere. In our future research we will try to incorporate intersectionality in analyze the impact of MWFH or remote working, especially in order to understand benefits or discrimination against other marginalized group in universities and academia. .

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