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**Mutations de l'environnement, mutations
des organisations, mutations de la GRH ?**

ENGAGEMENT, EXHAUSTION, AND PERCEIVED PERFORMANCE IN TIME OF COVID-19: BASED ON A JOB DEMANDS-RESOURCES MODEL¹.

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ABSTRACT

At the outset of the COVID-19 pandemic, governments around the world implemented regulations to cope with the spread of the coronavirus. Among these measures, the lockdown prompted a majority of private and public organizations to implement teleworking solutions for their employees. In this context, this study aims to examine the impacts of forced teleworking on the work characteristics and climate, engagement, exhaustion, and self-rated performance of employees. We develop a research model based on the job demands-resources framework and test our hypotheses using a survey of 1,373 public sector employees. While the lockdown positively influenced telecommuting employees' work autonomy and work-life balance, it negatively influenced their degree of collaboration and perceived job strain and performance and did not affect their engagement levels. The freedom to organize own work and collaboration with colleagues were identified as resources that positively influence employees' engagement and perceived performance while limiting exhaustion.

1. INTRODUCTION

The COVID-19 crisis led governments around the world to impose restrictions in order to contain the spread of the coronavirus. These restrictions included recommendations or injunctions made to public and private organizations to introduce new ways of working and, more specifically, to favor remote working or teleworking. This shift in working conditions changed the work design and execution. In the case of public organizations, these changes led public servants to work remotely and those obligated to work in traditional office spaces were confronted with empty workplaces and social isolation. These new working conditions significantly impacted public employees' job dimensions—the way they have to do their work (remote workspace), work characteristics, the organizational climate, and the relationship between supervisors and colleagues—which, in turn, influenced their performance and well-being at work.

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To date, in the context of the COVID-19 crisis, there are no empirical data to assess whether teleworking exerts an influence—positive or negative—on work engagement, work exhaustion, and self-perceived individual performance. To bridge this gap, this study examines public agents' perceptions of telecommuting's impact on their day-to-day activities, work engagement, exhaustion, and perceived performance, before and during the COVID-19 lockdown. To the best of our knowledge, this is the first study that discusses the implications of the new ways of working (which mainly include teleworking) on public sector employees' work characteristics, work climate, engagement, exhaustion, and self-rated performance.

We conduct an ad hoc survey of a sample of 1367 public sector employees to collect data on their working conditions' perceptions *before* and *during* the lockdown. A comparison of their survey responses helps us to assess whether remote working conditions (during the lockdown) impacted, in a way or another, public agents' perceptions of their job. First, we assess how remote working conditions affect different dimensions of their work—new ways of working (NWW – or the modalities of carrying out the work), the job characteristics, the organizational climate, and collaboration at work. Second, we analyze their perception of the impact of the lockdown on their engagement, work exhaustion, and perceived performance at work. Finally, we identify the most important antecedents of their engagement, exhaustion, and perceived performance. This will also help us to identify resources that will enable organizations to manage such work situations effectively if they recur.

Therefore, the main research questions in this article are as follows:

- How do the new working conditions imposed by teleworking influence the NWW and job characteristics of public employees?
- What are the impacts of these working conditions on the engagement, exhaustion, and perceived performance of public employees?
- What are the main resources and constraints that explain engagement, exhaustion, and perceived performance of our research sample?

The article is structured as follows. The first part presents the theoretical framework and the literature review. The second part focuses on the study's context and methodology. Subsequently, we present and discuss the main results. We conclude the study with proposals for future research and recommendations for public organizations facing the challenges of remote working conditions.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Theoretical framework: The job demands-resources model

This study's theoretical framework is based on the job demands-resources (JD-R) model. It is very popular in the scientific literature and aims to identify factors that can affect employees' work engagement, health, and performance. The advantage of such a model is that it is adaptable and can include variables that function as resources or constraints for the actors. It has been used various work settings, producing empirically sound results (Bakker & Demerouti, 2007).

The JD-R model categorizes work environments on the basis of two central concepts—job demands and resources (Bakker et al., 2014). Demands refer to the physical, social, emotional, cognitive, and organizational dimensions of work that incur physical or psychological costs, while resources include aspects that enable individuals to achieve work objectives, reduce demands and their costs, and engage in personal learning and development. These demands and resources can comprise factors that are work-related (e.g., decision-

making latitude, work autonomy, social support, and career opportunities), organization-related (e.g., reorganization and participation in decision-making), or individual-related (e.g., sense of self-efficacy, self-esteem, and optimism).

Constraints and resources lead to two different processes. Constraints are at the root of processes (health impairment processes) that affect the health of employees and can be considered the best predictors of occupational health problems. A central assumption of the JD-R model is that high job demands erode resources of personal energy, leading to emotional exhaustion and job fatigue or exhaustion (Demerouti et al., 2001; Schaufeli & Bakker, 2004). According to empirical studies using the JD-R model to understand the health issues in organizations, work overload, red tape, emotional demands, work-home conflict, and interpersonal conflict are the demand dimensions that lead to stress if they exceed employees' resources for managing tasks (Giauque et al., 2013; Van den Broeck et al., 2008). However, resources enhance the understanding of motivational processes, which increase job satisfaction, work engagement, and motivation. The resources that foster a healthy work atmosphere include the opportunities for skill utilization, supervisor and colleague support, financial rewards, career opportunities, team cohesion, harmony, autonomy, and coaching (Bakker et al., 2014; Beurden et al., 2020; Borst, 2018; Borst et al., 2019; Demerouti et al., 2001). An organization's performance significantly depends on the interactions between these demands and resources in terms of, for example, turnover, sick leave, work engagement, and job satisfaction.

For our purposes, it is worth mentioning that the JD-R model draws from several related theories. This is particularly the case for the job design and job characteristics models of work motivation (Hackman & Oldham, 1976; Karasek, 1979; Wood et al., 2012). Indeed, the JD-R model identified the job characteristics that contribute toward employees' motivational dynamics or their health impairment process. Besides the job characteristics, the JD-R model included several dimensions of the NWW (Blok et al., 2016; Kingma, 2019; Moll & de Leede, 2017; Van Steenberghe et al., 2017). The NWW notion tries to capture the work conditions that are adapted to the recent transformations of productive organizations owing to the digitalization process and the tertiarization of the economy. This concept is particularly suitable for the study on the impact of teleworking on job satisfaction, work exhaustion, and the perception of employees' performance, in the context of lockdown linked to the COVID-19 pandemic.

2.2 Resources and demands related to teleworking imposed by the COVID-19 pandemic

There are very few studies on the impacts of the COVID-19 and the working conditions, though there are several publications based on descriptive data. A quick search, using the Web of Science tool, with keywords such as “telework* AND COVID-19” or “homebased working* AND COVID-19” yielded 49 references. We restricted research to year 2020 is because we are featuring the current pandemic; the ongoing COVID-19 scenario is unique in the contemporary world of work and is definitely not comparable to other home office experiences, notably owing to the lockdown and the closure of shops and schools. Thirteen references were specifically developed in management, business, or sociology disciplines. Among these references, some articles focused on the impacts of the Covid-19 crisis on job security and the labor market (Almeida & Santos, 2020; Dalton, 2020; Gallacher & Hossain, 2020). Other studies were dedicated to the new requirements in terms of leadership in contemporary organizations confronted with social distancing rules (Antonacopoulou & Georgiadou, 2020). Another study tried to better assess the proportion of workers who teleworked during the first wave of the pandemic (Dey et al., 2020). The

challenges posed by the development of teleworking were also examined from different angles—environmental, security, and legal challenges (Belzunegui-Eraso & Erro-Garces, 2020). A study also investigated the mechanisms of control, surveillance, and resistance to teleworking (Hodder, 2020). Nagel (2020) investigated whether the pandemic accelerated digital transformation in the workplace. The responses from a survey conducted during the pandemic, from March to April, showed an acceleration in the digital transformation of work. Other studies have approached the problem from a gender perspective. For instance, Mallett et al. (2020) developed a “thought piece” to highlight the pitfalls and challenges of gender discrimination that are likely to persist in the context of home-based working during and after the pandemic. Another study investigated gender gaps in work-related outcomes, in regard to perceived work productivity and job satisfaction, in the pandemic context (Feng & Savani, 2020). The authors found that, before the pandemic, there were no gender differences in self-rated productivity and job satisfaction. However, during the lockdown women reported lower work productivity and job satisfaction than men.

Some other studies are more clearly dedicated to the effects of teleworking, or home-based working, on the day-to-day working conditions of employees. For instance, Bolisani et al. (2020) measured the involvement and usefulness perception of smart working and tried to single out different categories of employees in regard to their attitudes toward these new work modalities. They highlighted the importance of and difficulty in maintaining social relationships and contacts in this smart working context. Nevertheless, they concluded that it was neither possible to derive fully positive or negative conclusions about work from home, nor feasible to get a clarity about the effectiveness of these new working modalities. Diab-Bahman et al. (2020) conducted a survey of 192 work from home employees from Kuwait. They tried to determine how lockdown circumstances impacted their conventional work expectations, by comparing the old working conditions (OWCs) with that of the current working conditions (lockdown conditions) (CWCs). The survey responses highlighted the need to revise and review OWCs. Nevertheless, a majority of respondents expressed a positive perception toward the flexible conditions attached to CWC.

Another article investigated the impact of telecommuting on the ability of remote employees to manage work–life interplay (Palumbo, 2020). Based on the data provided by the sixth European Working Conditions Survey (EWCS, 2015), the findings showed that home-based telecommuting negatively affected the work-life balance of public servants. They specifically suffered from increased work-to-life and life-to-work conflicts. According to this research, telecommuting increased the work-related fatigue. Having said that, work engagement was found to positively mediate the negative effects of work from home on work-life balance. On the same subject, a study (Mohring et al., 2020) assessed whether the lockdown policies (remote work, short-time work, and closure of schools and childcare) exerted an effect on family and work satisfaction among the population. Relying on individual panel data collected before and during the lockdown, they demonstrated a general decrease in family satisfaction. They also found an overall decline in work satisfaction; it was most pronounced for mothers and those without children, who had to switch to short-time work. Fathers’ well-being was less affected negatively, and their family satisfaction increased after changing to short-time work.

2.3 New ways of working and their impact on work-related outcomes

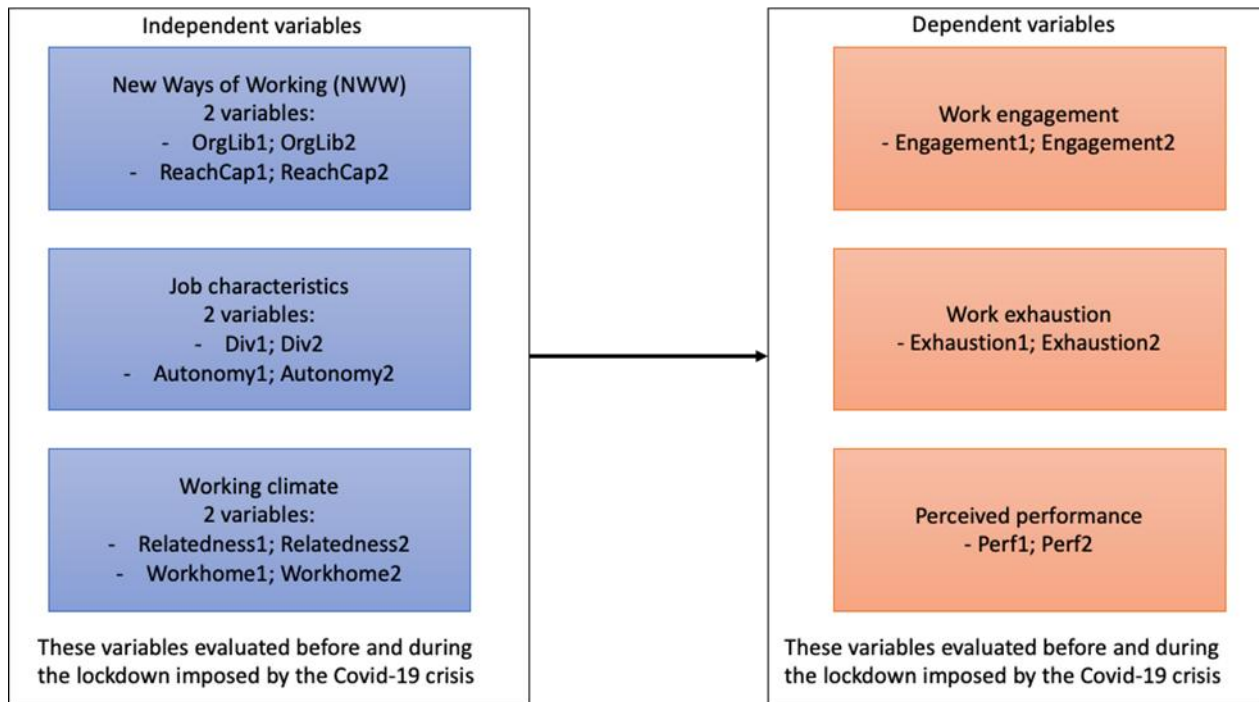
The stream of research on NWW is particularly relevant to the study’s context. It is related to the impacts of NWW on work-related outcomes, such as organizational performance and employees’ well-being. The NWW is a human resources approach, which was introduced in many organizations globally and facilitated by the development of new

information technologies (e.g., mobile devices and internet facilities) (Blok et al., 2011; de Leede & Nijland, 2017; Gerards et al., 2018). NWW constitutes forms of work that allows workers to choose when and where they work using information and communication technologies (ICT) (Nijp et al., 2016; ten Brummelhuis et al., 2012). Indeed, there is a proximity between the context of NWW, which emphasize new working arrangements such as teleworking or home-based work, and the first wave of the COVID-19 pandemic during which employees were asked to work from home owing to the lockdown measures. Thus, some studies pointed out that NWW may positively impact employees' well-being (Gerards et al., 2018; Peters et al., 2014; van der Voordt, 2003), and others suggested that NWW may positively impact employees' performance (ten Brummelhuis et al., 2012). Several studies have highlighted that NWW does not exert any positive or negative effect on employees' well-being or performance (Blok et al., 2012; Nijp et al., 2016; Van Steenbergen et al., 2017). Kingma (2019) pointed out that employees had great difficulty coping with these NWWs, highlighting its negative impacts on employees' health, work engagement, and social cohesion. Nijp et al. (2016) showed that NWW may prompt employees to invest additional hours at work, but they did not identify any particular impacts of NWW on work-life balance, performance, or employee health. There are no conclusive or definitive results concerning the effects of NWW on employee engagement, performance, and health. Hence, this area calls for further empirical studies.

2.4 Research model

Based on an empirical research on the JD-R Model and the implications of NWW, in the COVID-19 context, we identified several dependent (engagement, exhaustion, and perceived performance of our respondents) and independent variables; now, we analyze the relationships between these variables. Thus, we will consider these dimensions in this study. Indeed, our literature review underlines the importance of investigating the NWW, job characteristics, social relationships, and the relationships between work and private life. The existing research also underlines the importance of investigating several important dimensions identified as central in the JD-R conceptual framework; these dimensions are NWW (work modalities), job characteristics (work diversity and autonomy), and the working climate (relationships between colleagues and work-life balance climate). These considerations lead us to the development of the research model.

Figure 1: Research Model



Taking into account the findings of the previous inconclusive research, we examine employees' perceptions with respect to NWW and their job characteristics and working climate, *before* and *after* the lockdown. The same applies to work engagement, work exhaustion, and self-rated individual performance. Second, we identify which factors, among our independent variables, exert the greatest impact on the dependent variables. In this regard, and based on the research, we formulate some of the following theoretical expectations or research hypotheses:

- H1: NWW variables are positively related to engagement, negatively related to exhaustion, and positively related to perceived performance, both before and during lockdown.

In accordance with the NWW literature, we posit that NWWs can be a resource for stakeholders and have a positive impact on their engagement and perceived performance and a negative impact on exhaustion.

- H2: Job characteristics are positively related to engagement, negatively related to exhaustion, and positively related to perceived performance, both before and during the lockdown.

As stated earlier, the scientific literature has already demonstrated that certain characteristics of employment, including the variables considered in this study, can be considered as resources for the actors. Hence, we expect positive effects on engagement and perceived performance, but a negative relationship between our variables and exhaustion.

- H3: Working climate variables are positively related to engagement, negatively related to exhaustion, and positively related to perceived performance, both before and during the lockdown.

The climate variables (the relationships between colleagues and the degree of openness of the organization toward work-life balance measures) are considered as resources for the actors. As stated earlier, studies on the effects of the pandemic underline the importance of these two factors. Therefore, we expect these variables to be positively

correlated with engagement and perceived performance, but also negatively correlated with fatigue.

3. METHOD

3.1 Sample and Procedure

To answer our research questions, we collected data from an important Swiss Cantonal administration, located in the French-speaking part of the country. Therefore, this study used a very large sample from almost all the departments of this administration. To optimize the response rate in our online survey, we contacted the HR Department of the Canton, whereupon its executive members gave their official approval of this study. The questionnaire was developed in partnership with the leaders of the HR Department. After the test phase, an Internet link to the questionnaire was sent to the HR Department, which invited the employees to fill the electronic questionnaire within 3 weeks (May 25, 2020–June 12, 2020). A reminder was sent after 1.5 weeks, prompting all the employees to complete their questionnaires. Further, to ensure complete privacy, answers were directly saved on a server belonging to our university. Thus, no Cantonal employees had access to the data, and the respondents were completely and transparently informed about the research procedure. These announcement of procedures served the following two purposes: to increase the participation rate and to function as a baseline requirement to prevent common method bias (Podsakoff et al., 2003).

Out of 3,223 public officials, 1,373 officials completed our questionnaire. This corresponded to a return rate of 42.6%, which is quite substantial for a research of this type. We are unable to confirm the representativeness of the actual population in the absence of the complete HR data, which would have allowed us to know all the socio-demographic characteristics of their employees. Nevertheless, having such a large sample leads to robust statistical analyses and results. The following table presents the main characteristics of our sample:

Table 1: Sample Characteristics

Variables	Sample characteristics
Gender	70.5% women 29.5% men
Children at home	48.9% No 51.1% Yes
Manager (with subordinates)	80.9% No 19.1% Yes
Age	6.4% 19-30 23.8% 30-40 34.1% 40-50 30.1% 50-60 5.6% 60 and more
Level of education	6.8% other 0.7% elementary school 15.9% apprenticeship diploma 8.3% professional baccalaureate

Organizational tenure	2.7% college degree 8.7% federal diploma, high school degree 56.9% university diploma 7.4% less than 1 year 13.1% 1-3 years 9.7% 3-5 years 18.3% 5-10 years 51.5% more than 10 years
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3.2 Measures

The questionnaire items associated with all the measures of the study are presented in Appendix 1. Most of the items were measured using 5-point Likert-type scales, with the endpoints *strongly disagree* (1) and *strongly agree* (5). The instruments relied on self-reports. It should be recalled here that the respondents became acquainted with the variables by putting themselves in a situation before and during the lockdown. They answered the same questions (same variables) for the two time periods—before and during the Covid-19 crisis. Hence, the explanations of the measures below concern responses for the periods before and during the lockdown—items before and during the lockdown were placed in two separate parts of the questionnaire, to avoid bias and confusion in responses.

Independent variables

NWW. To measure this variable, we relied on items already tested in previous research on NWW. Based on a factorial analysis of these items, we were able to isolate two variables related to work arrangements. The first relates to the actors' ability to decide freely their work schedule and place of work. We will call it *OrgLib1* (before lockdown) and *OrgLib2* (during lockdown) (three items). The second isolated variable related to work arrangements is linked to the ability of the actors to quickly reach colleagues, team members, or their hierarchy. This variable, created on the basis of three items, is called *ReachCap1* and *ReachCap2*.

Job characteristics. We created two variables related to the dimension of job characteristics. These two variables are inspired by the job characteristics model (Hackman & Oldham, 1975, 1976) and the items used to construct these variables are extracted from an already tested measurement scale (Kim, 2016). The first variable measures the diversity of the tasks and skills involved in the job. We will call it *Div1* and *Div2*. The second variable is related to the respondents' autonomy in doing their job as well as the possibility of taking initiatives. We will call it *Autonomy1* and *Autonomy2*.

Working climate. This variable focuses on the actors' perception of the work climate in which they work. Based on a factorial analysis, we were able to develop two variables related to this dimension. The first relates to the actors' perception of their relationships with colleagues. This measure is taken from a validated scale and includes three items (Euromed, 2015). We will call it *Relatedness1* and *Relatedness2*. The second variable is related to the perception of the actors regarding the presence or absence of a favorable organizational climate in terms of work-life balance. Two items are drawn from a measure already used in research as well (Thompson et al., 1999). We refer to this variable as *Workhome1* and *Workhome2*.

Dependent variables

Work engagement. Our first dependent variable is work engagement. This is a well-known variable in management research. The five items of our variable comprises were selected from previous studies (Seppälä et al., 2008). We will call it *Engagement1* and *Engagement2*.

Work exhaustion. This second dependent variable comprises three items extracted from a measure that has already been tested and validated (Kim, 2005). We will call it *Exhaustion1* and *Exhaustion2*.

Self-rated performance. This third dependent variable is a measure of performance, which is referred as an in-role performance measure (Palvalin et al., 2015). Our three items are also taken from a previous study. We call these *Perf1* and *Perf2*.

Control variables. The control variables are as follows: gender (0 = men; 1=women); children, which is related to the fact that some respondents have children (0=no; 1= yes); the level of education (0=other to 6 University degree); organizational tenure (from 1 = less than 1 year to 5 = more than 10 years); age (in number of years); and managing or having to manage a team and individuals (0= no; 1= yes).

3.3 Statistical Analysis

Prior to assessing the reliability of our different variables, two supplementary indicators were used to test the condition of the dataset. The data were reviewed to ensure that the assumptions of normality were upheld and determine the presence of multicollinearity. The tolerance and variance inflation factor (VIF) scores of our data also fell within the acceptable range for all the variables. On the basis of this evidence, we conclude that the dataset was in a good condition.

The first phase of our statistical tests focused on applying tests of means on the variables in order to determine whether our respondents responded significantly differently to the same items when they related to the situation before and during the lockdown. Using the Stata 16 software, we were carried out the tests by comparing the differences in the means of the responses obtained on our items before and during the lockdown (t-test procedures).

In the second step, we wanted to better understand the impacts of the independent and control variables on the dependent variables. Hence, we conducted three regression analyses (ordinary least square regressions using Stata 16). This was done in order to identify which variables correlated most closely with the three dependent variables, before and during the crisis. Multicollinearity and heteroskedasticity tests were performed on each regression. We did not detect multicollinearity problems; using Stata 16, we corrected the heteroskedasticity problems.

4. RESULTS

4.1 Two-tailed t-tests results

We will begin by presenting the results of our means tests in relation to our respondents' answers regarding their perceptions before and during the lockdown. We performed independent t-tests to check whether the means/averages of our variables before and during the pandemic significantly differed from each other. The results are summarized in Table below.

Table 2: Two-tailed tests summary

Two-tailed test (without any direction):	Interpretation of the results: mean answers to the different variables before
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	and during the Covid-19 crisis
OrgLib1 <-> OrgLib2	Two-tailed test (t(1368)= -38.12, $p < 0.0000$) statistically significant.
ReachCap1 <-> ReachCap2	Two-tailed test (t(1367)= 5.93, $p < 0.0000$) statistically significant
Div1 <-> Div2	Two-tailed test (t(1366)= 4.85, $p < 0.0000$) statistically significant
Autonomy1 <-> Autonomy2	Two-tailed test (t(1365)= -7.60, $p < 0.0000$) statistically significant
Relatedness1 <-> Relatedness2	Two-tailed test (t(1363)= 4.38, $p < 0.0000$) statistically significant
Workhome1 <-> Workhome2	Two-tailed test (t(1363)= -6.39, $p < 0.0000$) statistically significant
Engagement1 <-> Engagement2	Two-tailed test (t(1366)= 1.36, $p < 0.1742$) not statistically significant
Exhaustion1 <-> Exhaustion2	Two-tailed test (t(1366)= 8.31, $p < 0.0000$) statistically significant
Perf1 <-> Perf2	Two-tailed test (t(1351)= 7.84, $p < 0.0000$) statistically significant.

In Table 2, based on the averages of the responses, respondents feel that their freedom to organize work, in terms of schedule and location, was higher during than before the lockdown. On an average, respondents feel that it was easier to contact colleagues and supervisors before than during the lockdown. They also felt that the period before the lockdown allowed them to engage in more diverse activities and, therefore, to apply a wider range of skills. However, the lockdown situation allowed them to enjoy a higher autonomy, as their independence and personal initiatives increased during this period compared to the prevailing situation. Cooperation between colleagues suffered during the lockdown; on an average, several employees felt that the lockdown situation was less favorable to social relationships with colleagues than the situation before lockdown. On an average, they also believed that the climate for the work-life balance was more favorable during the lockdown than before it.

In terms of engagement, our statistical analyses do not show differences in average responses between the situation before the lockdown and during the crisis. Therefore, these averages remain more or less the same. However, the means in relation to exhaustion show that our respondents perceive the period of lockdown as being more favorable to their health. Finally, our respondents also believe that the lockdown period negatively impacted their work performance; on an average, they perceived the period before the lockdown to be more favorable to their individual performance than that during the lockdown.

4.2 Results of the OLS regression analyses

We identify the antecedents of the three dependent variables (engagement, exhaustion, and perceived performance). In accordance with our theoretical framework, this allows us to identify the demands or resources related to these dependent variables, before and during the lockdown. Table 3 presents the details of the test of our three hypotheses, which were supported only partially.

Table 3: Synthesis of the variables identified as job resources or job demands according to our dependent variables, test of our three general hypotheses

Outcome	Identified job	Identified job	Identified job	Identified job
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variables:	resources before lockdown	resources during lockdown	demands before lockdown	demands during lockdown
Engagement	Div1 (+) Autonomy1 (+) Relatedness1 (+) Workhome1 (+)	ReachCap2 (+) Div2 (+) Autonomy2 (+) Relatedness2 (+) Workhome2 (+)	--	--
Exhaustion	Autonomy1 (-) Relatedness1 (-) Workhome1 (-)	OrgLib2 (-) ReachCap2 (-) Autonomy2 (-) Workhome2 (-)	Div1 (+)	Div2 (+)
Perceived performance	ReachCap1 (+) Div1 (+) Autonomy1 (+) Relatedness1 (+)	OrgLib2m (+) ReachCap2 (+) Div2 (+) Relatedness2 (+)	--	--

(+) = positively and statistically significantly related to the dependent variable ($p < .05$)

(-) = negatively and statistically significantly related to the dependent variable ($p < .05$)

4.2.1 Antecedents of engagement before the lockdown

Our first OLS regression analysis (Table 4) explains about 33% of the variance of respondents' engagement, which is significant. We observed high engagement in the case of women, younger people, those with the least organizational tenure, and those with lower levels of education. Respondents with hierarchical responsibilities were more likely to report high levels of engagement with their work. At an organizational level, variables related to job characteristics and organizational climate were found to be important explanatory factors for respondents' job engagement. In fact, the job characteristics such as the ability to conduct a variety of activities, the use of a variety of skills, greater freedom to organize work, and the opportunity to take personal initiatives are considered resources for the actors. These resources increase the work engagement of the actors. We also observe the significance of aspects related to the work climate. A good working atmosphere with colleagues as well as an organizational climate conducive to work-life balance are also important resources for the respondents. It is important to point out that, before lockdown, the two aforementioned variables related to NWW were not statistically significantly related to engagement.

4.2.2 Antecedents of engagement during the lockdown

If we now turn to our regression (Table 5) in relation to the engagement of our respondents during the lockdown (43% of the variance of engagement explained by our variables), we get somewhat similar results, except for the socio-demographic aspects. Older respondents and those reporting a low level of education are more likely to declare themselves engaged during the lockdown. However, the same organizational variables identified in the previous regression had a statistically positive impact on our respondents' work engagement. The only difference is that, during the lockdown, the ability of the actors to collaborate with colleagues, supervisors, and team members plays a crucial role in increasing engagement. Hence, this aspect determines the engagement of respondents during teleworking.

4.2.3 Antecedents of exhaustion before the lockdown

The variables included in our regression (see Table 6) explain 13% of our respondents' exhaustion. Surprisingly, respondents without children at home reported higher levels of exhaustion than those with children. Respondents with a less tenure also reported

higher levels of exhaustion. Respondents who feel they have a variety of tasks to perform, and therefore a variety of skills to apply in their work activities, also reported higher levels of exhaustion. However, independence, autonomy at work, and organizational climate aspects (good relationships with colleagues and a climate favorable to work-life balance) are factors that can protect the respondents from exhaustion. Once again, the two variables related to NWW were not related to exhaustion before the lockdown.

4.2.4 Antecedents of exhaustion during the lockdown

Variables included in this regression also explain 13% (Table 7) of exhaustion during lockdown. Our male respondents were more likely (just statistically significant) to report higher levels of exhaustion. Two factors related to the NWW are negatively related to exhaustion—(1) the ability to determine freely the work schedule and location, and (2) the ability to collaborate with colleagues, supervisors, and team members. High work autonomy and the freedom to use personal initiatives are negatively related to exhaustion. The other one (Div2) is positively related to exhaustion during lockdown (a result similar to exhaustion before lockdown). Finally, a climate favorable to work-life balance is also negatively related to exhaustion during lockdown, in the present study.

4.2.5 Antecedents of perceived performance before the lockdown

Our regression analysis reveals that our variables explain 14% of the perceived performance during lockdown (see Table 8). Respondents with lower levels of education report higher levels of perceived performance. ReachCap1, Div1, Autonomy1, and Relatedness1 are statistically significantly related to higher levels of perceived performance.

4.2.6 Antecedents of perceived performance during the lockdown

Finally, our last regression analysis shows that all the included variables explain 33% of the variance of the perceived performance during the lockdown (see Table 9). Respondents who are less educated and have higher tenure are more likely to report higher levels of perceived performance. Furthermore, five out of six organizational factors are positively and statistically significantly related to perceived performance—OrgLib2, ReachCap2, Div2, Autonomy2, and Relatedness2.

5. DISCUSSION

In general, our data reveal a major impact of the lockdown situation on employees' perception of their working conditions and climate. First, we report the positive effects of the lockdown and the new working arrangements (teleworking, working from home). On an average, our respondents feel that they have more freedom to organize their work. They also think that the lockdown period has increased their work autonomy and opportunities to use personal initiative and judgment. They also found the lockdown period to be conducive to the development of a climate that allows for a better work-life balance. This particular result calls into question certain studies that have shown that lockdown has a negative effect on work-life balance (Mohring et al., 2020).

At the same time, other results may be more worrisome for both organizations and employees. On an average, our respondents believe that the lockdown reduces their opportunities to collaborate with colleagues, team members, or supervisors. They also find a decline in the diversity of their tasks and the work skills.

The lockdown does not appear to have influenced our respondents' level of engagement, with the averages of their responses being almost identical before or during the lockdown. This sends a positive message to the organizations that employees can exhibit high motivation and work engagement even without having a physical connection with the organization. The other good news is somewhat counterintuitive to previous research results (Kingma, 2019), as the level of exhaustion drops sharply during the lockdown. Teleworking and working from home lowered the average level of perceived job strain on our respondents. One explanation may lie in the fact new work arrangements have enhanced the work–life balance by facilitating a better integration of constraints related to private activities.

Some previous studies confirmed that NNW or COVID-19 may be favorable for employees' health (Diab-Bahman & Al-Enzi, 2020; Peters et al., 2014; van der Voordt, 2003). However, this hypothesis remains to be confirmed by other studies. The lockdown exerts a negative impact on employees' perceived performance. On an average, our respondents felt that their performance dipped during the lockdown. This is not an objective measure, but perceptions are important when it comes to measuring workplace outcomes (Hewett et al., 2018). This result can possibly be explained by the decline in feedback the lockdown. A decline in the quality of relationships with co-workers and inability to collaborate with colleagues and supervisors hinders the employee feedback and work support systems. Under these conditions, it becomes functionally more difficult to perform; this scenario also affects an employee's objective evaluation of own performance.

If we turn to the results obtained in our OLS regression analyses, we can identify several variables that constitute resources for the employees. Some of these resources can contribute toward lessening the negative impacts of forced telecommuting. For example, employees must have certain job characteristics—the ability to perform a diversified job, the use of a variety of skills, freedom to organize own work, and opportunity to use personal initiative and judgment. Our survey confirms that these characteristics of work, which have been extensively studied in the scientific literature (Bakker & Demerouti, 2007; Bakker et al., 2010), are important to ensure the work engagement of public employees. Moreover, aspects of organizational climate also contribute toward employee engagement and occupational health. Our data underline that the perception of a good understanding and collaboration with colleagues is central to engagement at all times. In this case, our survey confirms the results of previous studies (Destler, 2017; Pecino et al., 2019). It should also be noted that the more the respondents perceived that their supervisors and, in general, their organization, were in favor of a good work-life balance, the more was their work engagement and the less was their exhaustion (Wood et al., 2020). In summary, work–life balance is an important resource for employees, both in normal and lockdown periods.

If the aforementioned resources limit work exhaustion, then the diversity of the activities and skills can act as a double-edged variable (Div1 and Div2). We find a positive and significant relationship between this and the other two variables—engagement and exhaustion. In relation to this variable, there is a clear trade-off. It is a resource if it exerts a positive effect on engagement. However, it is also a constraint or represents a job demand because it can encourage exhaustion. Indeed, other studies (Grant et al., 2007; Van De Voorde et al., 2012) have shown that certain aspects of work can both generate more engagement or satisfaction and have a negative impact on workers' health. It can also contribute toward exhaustion, especially in times of crisis and forced teleworking. It should also be noted that the relational climate with colleagues proves to be a resource in normal times, but logically loses its protective value during a lockdown. Since teleworking is not favorable to social relations, this result seems logical.

Finally, it is also important to mention the important role played by the freedom to determine own work schedule and workplace and the ability to collaborate with colleagues and supervisors, during the lockdown (OrgLib2 and ReachCap2). Related to NWW, these variables negatively impact exhaustion, positively impact individual engagement, and contribute toward shaping a more favorable perception of self-performance. In our study, these variables are important under a lockdown situation and, therefore, in a context of a forced teleworking situation. Further research is needed to find whether those two NWW variables could be useful also in a “normal” teleworking context.

5.1 Limitations

Nevertheless, this study has several limitations. First, the research model uses a small number of variables. Even if these variables capture a non-negligible proportion of the variance of our dependent variables, they are very likely to omit other important explanatory factors. For instance, working from home or teleworking requires technological competencies and skills as well as good IT infrastructures and materials (van der Lippe & Lippényi, 2020). Some employees may have faced difficulties when coping with these new forms of work, sometimes with poor or insufficient equipment. These specific facets of teleworking need further research. Individual variables may also have to be complemented. Single parents with children (forced to contribute to home-schooling) or those with dependent relatives may not find teleworking an effective work option. In our research, we included some sociodemographic variables, but individual conditions probably have to be better investigated. However, it is also very likely that other variables may interact with the variables we have included in our own research. For example, the organizational culture, the leadership style, or even the level of trust between employees and management may interact with variables integrated in our analysis. Thus, it would be useful to better investigate, in the future, the possible moderating or even mediating effects between these interaction variables and the variables proposed in our survey. Finally, the type and nature of activities performed by employees have not been investigated. To better understand the relationships between the selected variables, it would be crucial to include the categories of occupational work.

As with all empirical and statistical research, this study has several methodological limitations. First, as our data are cross-sectional in nature, we cannot determine the causal relationships between our variables. If we follow DeHart-Davis et al.'s (2015) argument, theoretical reasoning is of great importance and certainly provides guidance when dealing with causal relationships. According to theoretical perspectives reviewed previously, our assumption is that modalities of work (NWW), job characteristics, and working climate precede work engagement, work exhaustion, and perceived performance. Our results are consistent with the theoretical argument, though future research must be developed to challenge our results.

Another important methodological issue is related to the one-sided methodology (i.e., a self-report survey to collect predictor and outcome variables) adopted in this study, which can result in common method biases (Podsakoff et al., 2003). This strategy may inflate the reported effect sizes. However, we tried to minimize this problem through the conditions of the survey. Another drawback related to our survey is the fact that respondents have to answer questions related to two different periods. The one before the lockdown and the one during the lockdown. It would have been better to develop two separate surveys to measure individual perceptions in regard to these two different time periods. However, just like epidemiologists, we did not anticipate the Covid-19 crisis, and therefore we were unable to anticipate our survey.

Finally, our sample comprises employees working in a large Swiss cantonal public administration. It would be interesting to conduct the same type of survey in private organizations, NGOs, or international organizations in order to compare the results and identify any differences. These methodological limitations may lead to new research perspectives.

6. CONCLUSION AND RECOMMENDATIONS

To the best of our knowledge, this research is the first to deal with the impacts of the Covid-19 crisis and the associated lockdown measures on public employees' perceptions of their working conditions, using validated constructs as explanatory variables. In this article, we examine whether working from home, in this case constrained teleworking, influences the different characteristics of public employees' job; the responses of the employees are classified into two time periods—before and during the lockdown. Second, we also identify job characteristics' antecedents of individual engagement, work exhaustion, and perceived performance before and during the lockdown period. This second step gives us the opportunity to identify job resources and job demands in regard to our three dependent variables, under normal or crisis working conditions. Our results demonstrate that the relationship between the measures, in terms of the NWW, job characteristics, and working climate, contributes toward increasing engagement and decreasing exhaustion. Further, our results explain the important proportion of variance for our three dependent variables, increasing the practitioners' interests in this study.

6.1 Practical Recommendations

Based on previous results, we can, quite modestly, propose recommendations for managers and HR specialists in public organizations. In normal times, it seems necessary to allow employees to benefit from autonomy and independence in their work and equip them to carry out diverse tasks requiring the use of a variety of skills. It is also very important to develop a climate conducive to social relations and consider the importance of reconciling professional and private life. These aspects are related to positive work outcomes. It should be noted that, in normal times, the way in which the work is carried out (the freedom to organize own work and the ability to collaborate) seems to be of less importance, an observation that seems to relativize the current importance devoted to NWW in comparison to other work characteristics and resources. In times of forced telecommuting, however, the ability to contact colleagues and supervisors becomes crucial to fostering employee engagement, reducing exhaustion, and promoting performance development. Similarly, during crisis, the ability to work from anywhere and at any time functions as a crucial resource. However, the option to work on diverse tasks and use a range of skills may lead to unclear consequences. While this factor can encourage employee commitment, in normal or lockdown periods, it can generate a feeling of exhaustion. It is, therefore, a double-edged sword. Caution is called for on this point.

As noted before, there has been a significant decline in perceived performance during lockdown. To counteract this feeling, organizations can promote opportunities for performance feedback. Social isolation and distance from colleagues and supervisors may diminish support to carry out the job and are probably not conducive to a favorable perception in terms of performance; this aspect can increase employee discomfort. It should also be noted that the level of employee exhaustion decreases during lockdown. This probably indicates that

organizations need to pay more attention to a better work–life balance in the future, even after this pandemic. However, further research is needed to better inform practical recommendations.

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Appendices: Tables and Figures

Table 4: OLS regression regarding engagement before lockdown

```
. reg Engagement1 Gender Children Age Education Tenure Manager OrgLib1 ReachCap1 Div1 Autonomy1 Relatedness1 Workhome1, vce(robust)
```

Linear regression

Number of obs	=	1,243
F(12, 1230)	=	45.20
Prob > F	=	0.0000
R-squared	=	0.3356
Root MSE	=	.57947

Engagement1	Robust					
	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Gender	.1007451	.0373945	2.69	0.007	.0273809	.1741092
Children	-.0285739	.0333839	-0.86	0.392	-.0940696	.0369218
Age	.0067397	.002043	3.30	0.001	.0027315	.0107479
Education	-.0206649	.0085357	-2.42	0.016	-.0374111	-.0039187
Tenure	-.0523096	.0143849	-3.64	0.000	-.0805313	-.0240878
Manager	.112928	.0439082	2.57	0.010	.0267848	.1990713
OrgLib1	-.0214055	.0161745	-1.32	0.186	-.0531382	.0103271
ReachCap1	.0204838	.0242533	0.84	0.399	-.0270987	.0680663
Div1	.1454188	.0268553	5.41	0.000	.0927315	.1981061
Autonomy1	.1744808	.0274863	6.35	0.000	.1205555	.228406
Relatedness1	.2600728	.0283208	9.18	0.000	.2045104	.3156352
Workhome1	.2232235	.0241891	9.23	0.000	.175767	.2706801
_cons	.4656748	.1932169	2.41	0.016	.0866036	.844746

Table 5: OLS regression regarding engagement during lockdown

```
. reg Engagement2 Gender Children Age Education Tenure Manager OrgLib2 ReachCap2 Div2 Autonomy2 Relatedness2 Workhome2, vce(robust)
```

Linear regression

Number of obs	=	1,245
F(12, 1232)	=	73.25
Prob > F	=	0.0000
R-squared	=	0.4311
Root MSE	=	.59567

Engagement2	Robust					
	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Gender	.050415	.0388368	1.30	0.194	-.0257786	.1266086
Children	.0042528	.0344322	0.12	0.902	-.0632994	.071805
Age	.0047246	.0022239	2.12	0.034	.0003614	.0090877
Education	-.0312219	.0086367	-3.62	0.000	-.0481662	-.0142776
Tenure	-.0206221	.0146595	-1.41	0.160	-.0493824	.0081382
Manager	.0071121	.0440978	0.16	0.872	-.0794031	.0936273
OrgLib2	-.009382	.0188282	-0.50	0.618	-.0463208	.0275568
ReachCap2	.1567024	.0262654	5.97	0.000	.1051727	.2082322
Div2	.1745075	.028735	6.07	0.000	.1181326	.2308825
Autonomy2	.3072748	.0323616	9.50	0.000	.2437847	.3707648
Relatedness2	.1748044	.0306526	5.70	0.000	.1146672	.2349415
Workhome2	.1817299	.0274128	6.63	0.000	.1279489	.2355109
_cons	-.2267368	.1822329	-1.24	0.214	-.5842578	.1307843

Table 6: OLS regression regarding exhaustion before lockdown

```
. reg Exhaustion1 Gender Children Age Education Tenure Manager OrgLib1 ReachCap1 Div1 Autonomy1 Relatedness1 Workhome1
```

Source	SS	df	MS	Number of obs	=	1,243
Model	182.366421	12	15.1972017	F(12, 1230)	=	15.73
Residual	1187.96411	1,230	.965824477	Prob > F	=	0.0000
				R-squared	=	0.1331
				Adj R-squared	=	0.1246
Total	1370.33053	1,242	1.10332571	Root MSE	=	.98276

Exhaustion1	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Gender	-.0874359	.0635253	-1.38	0.169	-.2120659	.037194
Children	-.1414943	.0566774	-2.50	0.013	-.2526894	-.0302992
Age	-.0065872	.0033752	-1.95	0.051	-.013209	.0000346
Education	.0006446	.0144775	0.04	0.964	-.0277587	.0290478
Tenure	.0853046	.0242862	3.51	0.000	.0376576	.1329515
Manager	-.096352	.0753077	-1.28	0.201	-.2440977	.0513938
OrgLib1	.0168419	.0277245	0.61	0.544	-.0375506	.0712344
ReachCap1	-.0700142	.0383108	-1.83	0.068	-.1451759	.0051475
Div1	.1414154	.0427319	3.31	0.001	.05758	.2252508
Autonomy1	-.1636122	.0382449	-4.28	0.000	-.2386446	-.0885797
Relatedness1	-.1660478	.0450151	-3.69	0.000	-.2543627	-.0777329
Workhome1	-.2570326	.0372354	-6.90	0.000	-.3300846	-.1839807
_cons	4.591497	.3138925	14.63	0.000	3.975673	5.20732

Table 7: OLS regression regarding exhaustion during lockdown

```
. reg Exhaustion2 Gender Children Age Education Tenure Manager OrgLib2 ReachCap2 Div2 Autonomy2 Relatedness2 Workhome2, vce(robust)
```

```
Linear regression                               Number of obs   =    1,245
                                                F(12, 1232)      =    12.67
                                                Prob > F          =    0.0000
                                                R-squared         =    0.1309
                                                Root MSE         =    .96974
```

Exhaustion2	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Gender	-.1250827	.0638293	-1.96	0.050	-.250309	.0001435
Children	.0487506	.0565821	0.86	0.389	-.0622574	.1597586
Age	-.0019096	.0034481	-0.55	0.580	-.0086743	.0048552
Education	.0104751	.0134437	0.78	0.436	-.0159	.0368502
Tenure	.0251607	.0239761	1.05	0.294	-.0218778	.0721992
Manager	.1441331	.0776186	1.86	0.064	-.0081461	.2964123
OrgLib2	-.1172623	.0291212	-4.03	0.000	-.1743949	-.0601297
ReachCap2	-.102364	.0414324	-2.47	0.014	-.1836499	-.0210781
Div2	.1671396	.0413161	4.05	0.000	.0860819	.2481973
Autonomy2	-.200012	.0483928	-4.13	0.000	-.2949535	-.1050705
Relatedness2	-.0444511	.0477941	-0.93	0.353	-.138218	.0493158
Workhome2	-.1510148	.0378504	-3.99	0.000	-.2252732	-.0767565
_cons	3.983415	.3046747	13.07	0.000	3.385676	4.581153

Table 8: OLS regression regarding perceived performance before lockdown

```
. reg Perf1 Gender Children Age Education Tenure Manager OrgLib1 ReachCap1 Div1 Autonomy1 Relatedness1 Workhome1, vce(robust)
```

```
Linear regression                               Number of obs   =    1,230
                                                F(12, 1217)    =    13.57
                                                Prob > F        =    0.0000
                                                R-squared       =    0.1402
                                                Root MSE       =    .57204
```

Perf1	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Gender	.0312091	.0378735	0.82	0.410	-.0430956	.1055137
Children	-.0588414	.0330356	-1.78	0.075	-.1236545	.0059717
Age	-.0002476	.0019064	-0.13	0.897	-.0039877	.0034925
Education	-.0279912	.0084608	-3.31	0.001	-.0445907	-.0113918
Tenure	.021602	.0135027	1.60	0.110	-.0048891	.0480931
Manager	-.0303111	.0403763	-0.75	0.453	-.109526	.0489038
OrgLib1	.0041676	.0153102	0.27	0.786	-.0258696	.0342049
ReachCap1	.128656	.0255537	5.03	0.000	.0785219	.1787901
Div1	.0957588	.0317204	3.02	0.003	.0335261	.1579915
Autonomy1	.0994273	.0284466	3.50	0.000	.0436176	.155237
Relatedness1	.1227659	.0293848	4.18	0.000	.0651154	.1804165
Workhome1	.0382273	.0236522	1.62	0.106	-.0081762	.0846308
_cons	2.305501	.2015694	11.44	0.000	1.910039	2.700963

Table 9: OLS regression regarding perceived performance during lockdown

```
. reg Perf2 Gender Children Age Education Tenure Manager OrgLib2 ReachCap2 Div2 Autonomy2 Relatedness2 Workhome2, vce(robust)
```

```
Linear regression                               Number of obs   =    1,245
                                                F(12, 1232)    =    46.33
                                                Prob > F        =    0.0000
                                                R-squared       =    0.3350
                                                Root MSE       =    .70255
```

Perf2	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Gender	.0400428	.0443241	0.90	0.366	-.0469163	.1270018
Children	-.0174988	.0400806	-0.44	0.662	-.0961326	.061135
Age	-.0007791	.002262	-0.34	0.731	-.005217	.0036597
Education	-.0383277	.0100718	-3.81	0.000	-.0580874	-.018568
Tenure	.0406741	.0168916	2.41	0.016	.0075346	.0738135
Manager	-.008807	.0471549	-0.19	0.852	-.1013197	.0837057
OrgLib2	.0896484	.0222307	4.03	0.000	.0460342	.1332626
ReachCap2	.2572695	.0323541	7.95	0.000	.1937944	.3207447
Div2	.1352031	.0351496	3.85	0.000	.0662434	.2041627
Autonomy2	.3218218	.0401251	8.02	0.000	.2431006	.400543
Relatedness2	.0799175	.0374368	2.13	0.033	.0064706	.1533643
Workhome2	-.0193872	.0318833	-0.61	0.543	-.0819388	.0431643
_cons	.5950157	.2115657	2.81	0.005	.1799469	1.010085

Appendix 1: Variables, items and Cronbach's Alpha

Variables	Items	Cronbach's Alpha
Engagement1 5 items	I was overflowing with energy for my work. I was passionate about my work When I got up, I wanted to go to work. I was proud of the work I was doing. My direct supervisor helped and supported me	0.87
Engagement2 5 items	I am bursting with energy for my work I am passionate about my work When I get up, I want to go to work. I am proud of the work I do My direct supervisor helps and supports me	0.88

Exhaustion1 3 items	I felt emotionally drained from my work I felt burned out from work It was physically straining for me to get through a work day due to the demand of my job	0.86
Exhaustion2 3 items	I feel emotionally drained from my work I feel burned out from work It is physically straining for me to get through a work day due to the demand of my job	0.88
Perf1 3 items	I carried out my tasks efficiently I obtained satisfactory results in relation to my objectives The quality of my work was high	0.86
Perf2 3 items	I carry out my tasks efficiently I obtain satisfactory results in relation to my objectives The quality of my work is high	0.91
OrgLib1 3 items	I was free to determine my own work schedule. I was free to determine where I worked I had the possibility to telework	0.70
OrgLib2 3 items	I am free to determine my own work schedule. I am free to determine where I work I have the possibility to telework	0.67
ReachCap1 3 items	I could quickly reach colleagues in my team I could quickly reach my line managers I could reach colleagues who are not part of my team	0.82
ReachCap2 3 items	I can quickly reach colleagues in my team I can quickly reach my line managers I can reach colleagues who are not part of my team	0.84
Div1 2 items	The position I held required a variety of skills My job required a wide variety of activities	0.78
Div2 2 items	The position I hold requires a variety of skills My job requires a wide variety of activities	0.83
Autonomy1 2 items	My work gives me a lot of independence and freedom in the way I do it. My work gives me the opportunity to use my personal initiative and judgment.	0.72
Autonomy2 2 items	My work gives me a lot of independence and freedom in the way I do it. My work gives me the opportunity to use my personal initiative and judgment.	0.80
Relatedness1 3 items	My colleagues helped and supported me There was good cooperation between me and my colleagues. I generally got along well with my colleagues	0.83
Relatedness2 3 items	My colleagues help and support me There is good cooperation between me and my colleagues. I generally get along well with my colleagues	0.84
Workhome1 2 items	In general, my direct supervisor was in favor of measures that allowed for a good work-life balance. Generally, in my department/unit, employees could easily balance their private and professional lives.	0.82
Workhome2 2 items	In general, my direct supervisor is in favor of measures that allow for a good work-life balance. Generally, in my department/unit, employees can easily balance their private and professional lives.	0.82