Politická ekonomie
2024, Volume 72, Issue 6
https://doi.org/10.18267/j.polek.1441
Open Access

VŠE / PRAGUE UNIVERSITY OF ECONOMICS AND BUSINESS

Impact of Organizational Culture and Work-related Factors on Burnout Syndrome Among Public Sector Employees During COVID-19 Pandemic

Vojtěch Koňařík, Jakub Vontroba, Kateřina Kashi, Veronika Kociánová

Vojtěch Koňařík (*corresponding author*, e-mail: vojtech.konarik@vsb.cz), VSB – Technical University of Ostrava, Faculty of Economics, Ostrava-Poruba, Czech Republic

Jakub Vontroba (e-mail: jakub.vontroba@eruni.org), European Research University, Ostrava, Czech Republic

Kateřina Kashi (e-mail: katerina.kashi@vsb.cz), VSB – Technical University of Ostrava, Faculty of Economics, Ostrava-Poruba, Czech Republic

Veronika Kociánová (e-mail: vkocianova14@gmail.com), Brose CZ spol. s r.o., Kopřivnice, Czech Republic

Abstract

Burnout is a widely studied issue that can have negative consequences for individuals. In this paper, we examine whether organizational culture and other included factors contribute to the presence of burnout symptoms (burnout indicators) during the COVID-19 period among public sector (public university) employees. Using factor and regression analysis, we found that organizational culture together with other individual aspects such as work-life balance and respondents' age can significantly influence the burnout indicators. The results are significant and robust at a given significance level. Our main contribution consists in the following: Firstly, we show that specific parts of organizational culture can significantly influence individuals during remote work. Secondly, by using different measurements, we contribute external validity to current burnout studies. Finally, the results can inspire managers and leading workers in both public and private sectors in terms of organizational culture settings to create working environments that are more suitable for individuals during normal and critical times.

Keywords: Burnout, remote work, working conditions, regression analysis, factor analysis
JEL Classification: M14, J81, M54

Citation: Koňařík, V., Vontroba, J., Kashi, K., Kociánová, V.: Impact of Organizational Culture and Work-related Factors on Burnout Syndrome Among Public Sector Employees During COVID-19 Pandemic. *Politická ekonomie*, 2024, 72 (6), 923–957, https://doi.org/10.18267/j.polek.1441

1. Introduction

Burnout is considered an occupational phenomenon. It is defined as a "*syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed*" (WHO: ICD-11, 2019). Burnout is characterized by a feeling of exhaustion, negativism and cynicism related to the work performed and a feeling of ineffectiveness and lack of achievement (WHO: ICD-11, 2019). According to McKinsey Health Institute survey, approximately 25% of employees worldwide can face burnout symptoms (Brassey *et al*., 2022).

Burnout is a widely studied issue. Research has focused on the occurrence of burnout in specific professions, on determining its factors and characteristics of workers who have experienced or are experiencing burnout (see Kretová-Lisá and Budaiová, 2007; Takeda *et al*., 2005), on the relationship between burnout and organizational culture or environment (see Huhtala *et al*., 2015; Janz *et al*., 1986) or on the relationship between burnout and types of jobs (see Hayes *et al*., 2021; Hoffman *et al*., 2020).

Research into burnout in relation to specific types of jobs such as hybrid or remote/distant is highly relevant due to the spread of the use of these types of jobs in recent years, which was accelerated by the COVID-19 pandemic. Additionally, research into burnout in relation to organizational culture and environment is very important, since it can help identify the organizations' weaknesses and take steps and prepare strategies that will prevent or at least reduce stress and the presence of burnout in the workplace (see DeSimone *et al*., 2021; Shanafelt *et al*., 2017).

Study of burnout within the public sector, especially in public universities, is also important due to the special outcomes which these institutions provide to the national economy. Universities are centres of education and research; thus, their outcomes support economic growth and foster economic advancement (see Jin and Jin, 2013; Marquez-Ramos and Mourelle, 2019). Prevention of burnout (and other things that negatively influence workplaces) is a difficult but necessary challenge confronting managers across all sectors of economy to achieve the best possible outcomes of organizations.

The aim of this paper is to answer two research questions: (1) Does organizational culture lead to higher stress or burnout? (2) What factors (together with organizational culture) lead to higher risk of burnout in remote work?

To answer the research questions, a questionnaire survey was carried out, which yielded 260 responses from employees of Czech public institutions. The results were obtained using factor and regression analysis.

The following section presents a review of the relevant empirical literature. This is followed by Section 2, which contains a detailed description of the methodology and data used. Section 3 contains the results and their discussion. The final section concludes.

2. Literature Review

There is a wide variety of studies that deal with burnout. The first group of studies is oriented towards research into burnout within specific professions. These are often professions in public services, such as social services. For example, Takeda *et al*. (2005) dealt with the relationship between the social service job type and burnout among social workers in a prefecture on Kyushu island in Japan. The data were obtained using a questionnaire survey. The sample consisted of 189 social workers working in social welfare offices. They answered questions about burnout and job characteristics. Based on correlation and regression analysis, the authors found that there are differences between social service job types and the burnout syndrome. The greatest tendency towards burnout exists in the public assistance job type, which means a higher proportion of time spent making home visits; also, a greater aversion to the job and overall lower job satisfaction were found among these workers. Kretová-Lisá and Budaiová (2007) dealt with the burnout syndrome among social workers from the Rimavská Sobota district office in Slovakia. They used the Maslach Burnout Inventory (MBI) test. The overall MBI scale is composed of three subscales: emotional exhaustion, depersonalization and personal accomplishment. In a sample of 65 social workers from the district office, the authors found that 42.7% of the social workers struggle with a medium burnout degree, while 23.1% of the social workers belonged to the high burnout degree group. The authors further found that there is no statistically significant relationship between burnout and length of practice; on the other hand, a lower level of education is associated with a higher level of emotional exhaustion. Furthermore, it was not confirmed that burnout was related to family type or family status. Social workers with higher levels of emotional exhaustion showed a statistically higher need to change their jobs more frequently.

With respect to the research questions asked, the results of studies focused on research into the relationship between burnout and organizational culture or organizational environment and studies on burnout in relation to individual job types are highly relevant for this work. Janz *et al*. (1986) investigated whether organizational culture influences burnout, at the level of both individual employees and organizational departments. For this purpose, they used data collected in a questionnaire survey. A so-called corporate culture survey was used to collect information about organizational culture. Factor analysis was applied to determine three factors – rules, power and shared values – from a total of 24 items of the questionnaire. The authors obtained 381 completed questionnaires from three organizations. A modified version of the MBI was used to collect information about the burnout syndrome. The authors hypothesized that burnout would be positively (directly proportionally) related to power and rules and negatively (indirectly proportionally) to shared values. At the level of individual workers (two sets, a total sample of 44 respondents), it was confirmed that higher power and lower values are associated with a higher level of overall

reported burnout. At the department level (the third set, a total of 103 respondents in seven departments), it was proven that there is a negative correlation between shared values on the one hand and the percentage of workers in advanced stages of burnout on the other. Huhtala *et al*. (2015) investigated the influence of ethical organizational culture on burnout and engagement. For this purpose, they used data from a questionnaire survey of 2,146 employees of a public sector organization. They found that a higher level of ethical organizational culture is associated with lower burnout and higher employee engagement. These results were confirmed at both the individual level and the level of organizational units/departments. The authors stated that management of organizations should support an ethical organizational culture and pay attention to those organizational units that show low ethical culture, as it may be the reason for their employees' burnout. Jourdain and Chênevert (2014) investigated whether organizational values affect the relationship between absenteeism and burnout. The data were collected using a questionnaire survey of 358 employees of public social and health service centres. The questionnaire included questions about, among other things, perceived organizational values and symptoms of burnout. Absenteeism data were obtained from the organization's internal systems. It was confirmed that the values of humanity and innovation have a positive (directly proportional) effect on the relationship between voluntary sickness absenteeism and burnout. In other words, if employees perceive that their organization promotes these values, people with the burnout syndrome will be less likely to go to work or will be voluntarily absent. Matziari *et al*. (2017) looked at the relationship between organizational values and practices on the one hand and burnout and engagement on the other. Their research was performed in a hospital setting in Greece. The sample consisted of 214 nurses. The questionnaire survey included questions related to four categories: values, practices, burnout and engagement. The authors found that organizational values and practices representing support, goals, innovation and rules are negatively connected with burnout (emotional exhaustion and depersonalization) and positively with engagement (vigour and dedication). Based on a questionnaire survey and a sample of 5,666 workers, Norling and Chopik (2020) found that coworker support is associated with better work-life outcomes. Work and family outcomes were made up of two summary variables, namely interference and enhancement. A positive relationship between coworker support and work-life outcomes is achieved because coworker support is positively associated with work environment and negatively associated with burnout. A positive work environment and lower burnout positively influence work-family outcomes. Kalinienė *et al*. (2021) looked at the incidence and factors of burnout among women working in a retail network. In a sample of 254 female respondents, they found that personal, work-related and client-related burnout is associated with psychosocial work environment factors. While there is a positive relationship between variables expressing the demandingness of work on the one hand and burnout on the other, it was found that a higher level of managers' support is associated with lower burnout.

Kowalska *et al*. (2010) dealt with the occurrence of the burnout syndrome in a group of 487 office workers. The MBI method was used. They found that the burnout syndrome concerned 4.15% of workers. Differences were found within both gender and age; a higher incidence of burnout was noted in women compared to men and younger age was associated with higher depersonalization, while in the case of emotional exhaustion and personal accomplishment, age was not statistically significant. Hoffman *et al*. (2020) dealt with the relationship between working from home and burnout in a hospital environment. The online survey was completed by 575 radiation oncology employees. The authors found that the change to working from home was not accompanied by an increased incidence of burnout; on the contrary, this transition was evaluated positively by the majority of the employees. The authors stated that maintaining the option of working from home after the COVID-19 pandemic can help reduce the incidence of burnout. Hayes *et al*. (2021) investigated the impact of involuntary remote work during the COVID-19 pandemic on perceived stress and burnout and how these impacts differ between workers who had experience of remote work before the outbreak of the pandemic versus those who did not. Based on a questionnaire survey, they collected data on 256 respondents. The respondents were mostly well-educated professionals. The study found that a remote job can be associated with higher stress and burnout. Burnout is mainly associated with those workers who worked remotely even before the pandemic. At the same time, there are differences within gender and age groups. Increased perceived stress was noted in younger men, middle-aged and older women and older men; the highest burnout score was found in middle-aged men. Respondents in the questionnaire identified perceived difficulties associated with remote jobs, such as communication and cooperation with colleagues. Kotowski *et al*. (2022) dealt with stress and burnout among teachers in the USA, due to the COVID-19 pandemic and subsequent changes in teaching, such as remote and later hybrid teaching. For this purpose, they used data from an online survey performed in 2021, which was completed by 703 teachers from private and public schools in the Greater Cincinnati Area. The authors found that most teachers experienced high levels of stress and burnout. The results show that the level of stress and burnout had increased during the COVID-19 pandemic and had not decreased even a year after the pandemic. Higher stress and burnout may be related to changes in the way of teaching. The authors drew attention to the necessity of adopting such changes in the school system to avoid a significant exodus of teachers from their profession. Stasiła-Sieradzka *et al*. (2023) looked at the gains and losses of psychosocial resources after the outbreak of the COVID-19 pandemic. The authors investigated whether these gains and losses of resources are associated with the burnout syndrome and compared the results among three groups of workers: remote, non-remote and hybrid. Gains or losses mean improvement or deterioration in the assessed aspects of life over the past 12 months. The research was conducted online in March 2021 and the sample consisted of one thousand workers. The authors found that gains and losses are

associated with burnout (gains negatively, losses positively). It was found that hybrid workers experienced the highest gains and losses compared to non-remote and remote workers. The authors argued that the hybrid work model is probably associated with the biggest changes, whether negative or positive.

An overview of the studies presented in this chapter is provided in Annex 1.

3. Methodology and Data

We set following research questions: (1) Can organizational culture contribute to burnout? (2) What factors (together with organizational culture) lead to higher risk of burnout in remote work? We assume that organizational culture influences the whole work environment. We work with the definition of Bercea *et al*. (2018), describing organizational culture as created by people representing daily work, habits, values, beliefs and behaviour models formed over time that influence new members. We understand burnout as many consequences occurring while making a person uncomfortable and suffering. We base our understanding of burnout on WHO: ICD-11 (2019), Gross *et al*. (2020) and Valsania *et al*. (2022), as a result of exhausting work or stress situations. Going on, burnout is an individual matter, so there can be several indicators pointing to the existence of burnout across many individuals, but it is difficult to find a clear boundary. Thus, inspired by the MBI, we present burnout as a sum of eight indicators (symptoms), while assuming that higher probability of burnout occurs with higher presence of symptoms. We focus on examination of burnout among employees working in the public sector during the COVID-19 pandemic.

Following our research questions, we conduct a questionnaire consisting of 33 questions. Our research draws on contemporary literature pertaining to organizational culture and work-related variables known to affect various burnout indicators. Moreover, we follow works of Hoffman *et al*. (2020), Matziari *et al*. (2017) and other aforementioned authors, paying special attention to public universities during the COVID-19 pandemic. The questionnaire consists of three blocks: (1) organizational culture aspects (leadership, employees' characteristic perception, strategic agenda, values characterizing the organization, success, dominant characteristics of work relationships) comparing three different time-frameworks: before, during and after the pandemic; (2) aspects related to remote work during COVID-19 within a complex framework: form, intensity, background conditions as well as employees' satisfaction and personal evaluation of individual situations including burnout symptoms and work satisfaction; (3) socio-demographic characteristics including gender, age, education, length of work in the public sector, length of working experience and job position . The questionnaire was sent to eight Czech public universities in April 2022. We collected data from 260 respondents.

We modified our dependent variable, originally based on eight questions (indicators) with Likert-scale answers reflecting frequency of occurrence of burnout during COVID-19 times. For each respondent, we summarize frequencies on a scale by intensity of occurrence of a given indicator (1 never, 2 almost never, 3 sometimes, 4 often, 5 always) and get a score that is normalized by the highest possible number of frequencies of occurrence (as the sum on the row, which is 40). With a higher number, the presence of indicators of burnout is higher.[1]

Because all eight questions consider the same element (burnout), we use Cronbach's alpha to see whether there is internal consistency and how close the indicators are. Based on the results, we perform factor analysis and get one factor called *Factorburnout*, which is used as the dependent variable in terms of the robustness check for our model. These results tell us that we measure only one concept: burnout. The higher the number of *Factorburnout*, the higher the frequency of occurrence of burnout symptoms.

Then, we perform a graphic analysis of the data collected and factor analysis to reduce the number of indicators (items) among several research questions. This is followed by a correlation analysis. We chose only variables with respect to the time frame before and during COVID-19. Based on the correlation results, we use OLS and logistic regression analysis. After obtaining results, we perform econometric and statistical verification. Finally, we standardize final regression coefficients and do a robustness check by using different function forms on different burnout variable modifications and adding other variables to the model. Thus, we perform two different regression forms (OLS and logistic regression) to see whether the burnout variable can be considered a relevant measurement or our approach can be assumed to be biased by subjectivity. We are aware that we lose some information in the further burnout variable forms. The reason is to support the approach mentioned above and make our findings robust.

3.1 Variables

Variables included within regression estimates are selected by performing correlation analysis. We considered only variables that are significant to the explained variable. Within the regression, we work with the following variables:

(1) Organizational culture and value variables: (A) values binding the organization together before COVID-19 (*Orgunifbefore*), (B) values supported within leadership (*Leadershipbefore*), (C) values supported within management (*Empmanagbefore*);

1 Beside this, we also transform our ordinal variables into a dichotomous form. We assign 0 to the intensities never and almost never, and we assign 1 to the intensities sometimes, often and always. This tells us whether more intensive occurrence is present within an individual indicator. Then we summarise all 1s in the row and get the score number. We continue by asking, "*Is the sum of the occurrence of indicators at least /a) four, (b) two, (c) one?*" If the answer is yes, we assign a 1. It means that at least in a given number of indicators of burnout there is frequent occurrence of burnout indicators.

(2) Work-related variables: (A) character of previous experience with distant work (*Experdiswork*), (B) existing rules of distant work before COVID-19 (*Rulesbefore*), (C) BALANCE between working and personal time (*Workprivbalance*), (D) job position (*Jobposition*) as a control for a leadership position; (E) total energy from work before COVID-19 (*Enwork*), (F) total fulfilment from work before COVID-19; and

(3) Socio-demographic variables: (A) age of respondents (*Age)*, (B) sex at birth (*Sex*), (C) highest education achieved (*Education)*.

We describe all our variables used in regression in Table 1 below. For more details on the other variables used for the robustness check, see Annex 3.

As aforementioned, our explained variables have continuous form (C), except *Indoccur* (indicator occurrence), which is dichotomous (D). On the other hand, explanatory variables have nominal (N), continuous (C) or ordinal (O) form. If the explained variable is continuous (C), we perform OLS regression, but when the explained variable is dichotomous (N), we perform logistic regression analysis.

Altogether, we expect the results being similar across the OLS method, while we expect the results to vary in the case of logistic regression. Performing logistic regression can provide additional information. Nevertheless, we are aware that transformation of our data into this form of variable leads to loss of information. To avoid simplification, we ask about relatively intensive occurrence of at least 1, 2 or 4 indicators of burnout. The reason is that the presence of individual factors can have different power on the subject. By setting an ordinal approach from low to medium indicator occurrence, we are relatively sensitive to the presence of burnout indicators in general. Another problem of logistic regression is that we assume in the interpretation of regression coefficients that even if using OR, boundaries may be unclear. Because of the reasons mentioned, we focus primarily on *Burnoutscore* and *Factorburnout*, while the logistic regression results are additional.

Table 1: Variables used in regression model

Variables	Description
Explained variables	
Burnoutscore	Normalized score of frequency of burnout indicator occurrence (C)
***Factorburnout Indoccur* (1, 2, 4, 6, 8)**	Factor burnout incorporating all 8 indicators as only factor (C) Indicator occurrence of relatively higher frequency (at least 1, 2, 4, 6 or 8)
Explanatory variables	
Rulesbefore	Presence of remote work rules before COVID-19 (N): a) No rules of remote work exist b) Remote work was allowed by employer rarely c) Remote work was always used
Experdiswork	Evaluation of previous experience with distant work before COVID-19 (N): a) Positive experience prevails b) Negative experience prevails c) No difference between positive and negative experience d) No remote work
Workprivbalance	Balancing of private and work life (N): a) Both without problem b) Work at the expense of my private life c) Private life at the expense of my work d) Cannot manage either, congestion, impossible concentration on one thing only
Orgunifbefore	What bound the organization together before COVID-19 (N): a) Loyalty and mutual trust b) Striving for innovation and development c) Emphasis on success and achieving goals d) Formal rules and policies
Enwork	Total work energy before COVID-19 (C)
Fulwork	Total fulfilment from work before COVID-19 (C)
Age	Age of respondents (O): a) Less than 25 b) 26–-41 c) 42–57 d) 58–76 e) 77+

Notes: Names of variables are represented by shortcut (left) based on the question and variants of answer (right). Letters in parentheses symbolize continuous variable (C), dichotomous (D), nominal (N), ordinal (O).

Source: Authors' own elaboration

3.2 Factor analysis

We perform factor analysis on the explained and explanatory variables. First, we use Cronbach's alpha to measure whether there is internal consistency within various indicators (items) among the questionnaire questions. Then, we use the Kaiser–Meyer–Olkin (KMO) test of sampling adequacy to see whether it is adequate to perform factor analysis. We follow Azevedo (2006), who described the concept of the KMO test, which is based on comparison of magnitudes of correlation coefficients with the magnitudes of partial correlation coefficients. The higher the value, the more relevant the factor analysis. We assume that a sufficient value of KMO is 0.70. We follow Stata (2022) and scale interpretation given by Kaiser (1974).

We apply a principal component factor that gives us the number of our components (factors). Following this, we rotate the factors using the orthogonal varimax method to divide factors obtained across indicators by more specific identification. Thus, we include and specify all indicators within our factors. Moreover, we are sure that there is no correlation between new factors obtained. Then we create our factor variables based on the total number of factors. The indicators and individual items of factors, including their names, are listed in Annex 3.

After obtaining the factors, we want to be sure that there is no mutual causal relationship, especially in the case of the explanatory variables. Thus, we apply regression between those factors and see that there is no causal relationship.

We include results of our factor analysis in Table 2 below the in following order. First, we report Cronbach's alpha. Then, we mention the KMO test. Next, we show factors obtained and their (a) eigenvalues, (b) absolute and (c) relative proportions.

It is obvious from Table 2 that all the factors obtained are supported by the pre-analysis. The KMO value is higher than 0.80, which can be considered meritorious. As with *Factorburnout*, the factors *Enwork* and *Fulwork* resulting from principal component analysis explain more than half of the total variance. Besides, according to the eigenvalues, all our variables fit the assumptions. We follow Kaiser's criterion that the eigenvalue should be higher than 1. Thus, the factors obtained both fit the assumptions of the factor analysis performed and are relevant in terms of variance explanation.

Particular attention must be paid to Cronbach's alpha, which shows internal consistency among items. Thus, we can assume high reliability of the questions in our questionnaire. This is very important in terms of the explained variable because it says whether it is relevant to regard the items as relevant indicators of burnout.

Table 2: Factor analysis: results of pre-analysis and factors obtained

Variable name	Question (Questionnaire)	Num. of items	Cronb. α	KMO	Factor	Eigen-value	Absol. proport.	Relat. proport.
Factor-burnout	Try to complete the questionnaire based on how you felt during the pandemic.	7	0.8571	0.84	Burnout	4.01996	0.5025	0.5025
Enwork	The following 9 statements are about how you felt at work before the pandemic.	9	0.8166	0.85	Energy for work	3.69292	0.4103	0.4103
Fulwork	The following 9 statements are about how you felt at work before the pandemic.	9	0.8166	0.85	Fulfilment from work	1.04024	0.1156	0.5259

Note: KMO is Kaiser–Meyer–Olkin test of sampling adequacy.

Source: Authors' own calculations

3.3 Regression analysis

We perform OLS regression to examine whether burnout represented by the burnout variable (*Burnoutscore*) and the burnout factor (*Factorburnout*) is driven by the explanatory variables. We work with the following equation:

$$Y = \beta_0 + \beta_i \vec{\boldsymbol{X}}_{\boldsymbol{i}} + \beta_j \overrightarrow{\boldsymbol{FaX}}_{\boldsymbol{j}} + \beta_k socdem + \varepsilon \tag{1}$$

where Y is the explained burnout variable, β_0 is a constant, β_i represents the regression coefficient of the Appeof the explanatory variables of organisation culture and work organization $\vec{\boldsymbol{X}}_{\boldsymbol{i}}$ with the vector $\overrightarrow{\boldsymbol{FaX}}_{\boldsymbol{j}}$ representing factors of work satisfaction. *Socdem* is an abbreviation for the socio-demographic variable, ε means the residual. We expand Equation (1) based on the explained variables *Burnoutscore* (2) and *Factorburnout* (3). Also, we work with a frequency indicator in Equation (4):

$$\begin{aligned} Burnoutscore = {} & \beta_0 + \beta_1 Rulesbefore + \beta_2 Experdiswork + \beta_3 Workprivbalance + \\ & \beta_4 Orgunifbefore + \beta_5 Enwork + \beta_6 Fulwork + \beta_7 Age + \varepsilon \end{aligned} \tag{2}$$

where β_0 is a constant, β_1, …, β_7 are the regression coefficients of the explanatory variables (see Table 1) and ε means the residual. The variable *Age* is the only significant socio-demographic variable; thus, we include it in Equations (2) and (3) below.

$$Factorburnout = \beta_0 + \beta_1 Rulesbefore + \beta_2 Experdiswork + \beta_3 Workprivbalance + \beta_4 Orgunifbefore + \beta_5 Enwork + \beta_6 Fulwork + \beta_7 Age + \varepsilon \quad (3)$$

with the description provided above but differing in the explained variable. Both variables are dependent on the same explanatory variables because of the robustness check for the main variable *Burnoutscore* (1).

In addition to the OLS, we use logistic regression for the occurrence of higher frequency of burnout indicators (symptoms)[2]. Thus, we follow the previous equations to explain the presence of at least 1, 2, 4, 6 and 8 burnout indicators (*Indoccur1*, *Indoccur2*, *Indoccur4*, *Indoccur6*, *Indoccur8*):

$$tleast\left(i_{i\in 1,2,4,6,8}\right) = \beta_0 + \beta_1 Rulesbefore + \beta_2 Experdiswork + \beta_3 Workprivbalance + \beta_4 Orgunifbefore + \beta_5 Enwork + \beta_6 Fulwork + \beta_7 Age + e \quad (4)$$

The description is provided at Equations (1) and (2), although the explained variable is the occurrence of at least *i* burnout indicators (Yes, No), where $i \in \langle 1,2,4,6,8 \rangle$. We consider it important to mention that the explained variable differs from the previous one. Despite the fact that we focused on scores and factors before, here we work with a variable that is based on occurrence rate. Therefore, potential results cannot be compared.

We can see that we proceed from higher occurrence to lower occurrence given by relatively higher occurrence of indicators (symptoms). The reason is that we do not assume that there is a single definitive occurrence in terms of frequency or a specific symptom. It is individual; thus, we set the starting point as "the middle point", considering occurrence of at least half of our indicators to be higher intensity. Then, we follow by difference by 2 and 1.

To make our models relevant, we perform statistical and econometric verification. For a more detailed description of these methods, we recommend Stata (2022) and Anderson *et al*. (2020).

Considering OLS regression, we test specification using the Ramsey reset test and the test of specification error; we test collinearity by measuring the variance inflation factor, then we control for heteroscedasticity using the Breusch-Pagan test and autocorrelation by the run test. Finally, we control for normality of residual graph in a normal residual distribution analysis.

In terms of logistic regression, we first apply the Akaike and Bayes information criteria. Based on the results, we specify the most relevant function form of the logistic regression (logit, probit). Following this, we perform a regression analysis and interpret our results in terms

2 We explain all the variables in more detail in Table 1.

of the odds ratio[3]. Then, we test stability, multicollinearity, specification and goodness of fit to check that the model is suitable for the data. We detect stability as a problematic element. We are aware of the lower stability presence. Thus, there may be a risk that the estimate is overestimated or underestimated within the monitored categories of observations. At the end, we use the ROC curve test to see which model is the most relevant to use in terms of prediction power as well as specificity (negative results for negative answers) and sensitivity (positive answers for positive results), which are needed to avoid statistical errors.

To compare effects of explanatory variables on burnout variables, we standardize our results at the given level of significance. Thus, we can see which variable has the highest influence among all the explanatory variables. We interpret our results in the next chapter.

To make sure that our estimations are strong, we include a robustness check by (1) adding and removing different variables in/from our models to see how regression coefficients and significance levels differ, together with the relative explanatory power of the models; and (2) performing different methods due to different explained variables.

4. Results

The general results for *Burnoutscore* are provided in Table 3 below. In the columns, we present variants of the model, while the rows show estimated parameters at a given level of significance with their *p*-values. Firstly, there are results for the main estimation of our model and robust variance estimation to be sure that the main results are not influenced by outliers. We also present other variants of the main model by adding other variables (see Annex 2) to see whether the estimated parameters are robust. The R-squared is adjusted in each model variant (Main, …, V6) to see how well our model explains the total variance. Based on the results, all the main parameters are significant regardless of which variable is added as the robustness check. Discussing the presence of remote work rules before the COVID-19 pandemic (*Rulesbefore*), if there were no rules for remote work before COVID-19, then it contributes to an increase in *Burnoutscore* compared to the situation where remote work rules were present by 0.286 ($\alpha = 0.1$). In the case of subjective evaluation of previous experience with distance work (*Experdiswork*), if distant work was not experienced before pandemic (0.0725) or the experience with remote work was negative (0.0859), the contribution to *Burnoutscore* is also positive compared to the presence of positive experience from previous times, both with significance ($\alpha = 0.01$). Similarly, considering balancing between private and work life (*Workprivbalance*), if working time was at the expense of private

3 Interpretation of results in logistic regression is complicated. We are aware that OR is simplifying and we cannot obtain more detailed information. We consider other forms of interpretation problematic; thus, we prefer OR as basic information about the results.

life compared to the situation where both are handled without problems, there is a positive impact on *Burnoutscore* with an increase of 0.0727 with significance ($\alpha = 0.01$).

Table 3: Results of estimation for model with *Burnoutscore* variable

Var/Mod (Adj. *R*-squared)	Main (0.1733)	Robust	V2 (0.1507)	V3 (0.1554)	V4 (0.1555)	V5 (0.1559)	V6 (0.1530)
(1) *Rulesbefore*	0.023** (0.044)	0.023* (0.060)	0.023** (0.041)	0.024** (0.033)	0.022* (0.054)	0.021* (0.059)	0.024** (0.035)
(2) *Experdiswork*	0.031*** (0.000)	0.031*** (0.000)	0.031*** (0.000)	0.030*** (0.000)	0.030*** (0.000)	0.032*** (0.000)	0.031*** (0.000)
(3) *Workprivbalance*	0.023** (0.023)	0.023** (0.038)	0.024** (0.021)	0.023** (0.024)	0.023** (0.027)	0.023** (0.027)	0.021** (0.040)
(4) *Orgunibefore*	−0.022** (0.029	−0.022** (0.029)	−0.022** (0.029)	−0.021** (0.041)	−0.020** (0.045)	−0.022** (0.030)	−0.021** (0.033)
(5) *Fulwork*	−0.019** (0.021)	−0.019** (0.027)	−0.019** (0.025)	−0.020** (0.015)	−0.020** (0.015)	−0.019** (0.022)	−0.019** (0.021)
(6) *Enwork*	−0.018** (0.029)	−0.018** (0.026)	−0.018** (0.029)	−0.019** (0.020)	−0.018** (0.026)	−0.018** (0.028)	−0.017** (0.041)
(7) *Age*	−0.027*** (0.008)	−0.027*** (0.008)	−0.027*** (0.008)	−0.027*** (0.010)	−0.027*** (0.009)	−0.025** (0.014)	−0.027*** (0.010)
(8) *Empmanagbefore*	–	–	0.004 (0.645)	–	–	–	–
(9) *Jobposition*	–	–	–	−0.024 (0.206)	–	–	–
(10) *Leadershipbefore*	–	–	–	–	0.01 (0.199)	–	–
(11) *Sex*	–	–	–	–	–	0.022 (0.187)	–
(12) *Education*	–	–	–	–	–	–	0.362 (0.343)

Notes: Variables are in rows, models in columns. V2, V3, V4, V5, V6 represent versions of models under the robustness check. Main symbolizes primarily estimation, Robust symbolizes primarily estimation under robust standard deviation; ***, ** and * indicate that statistical values are significant at the 1%, 5% and 10% significance level, respectively.

Source: Authors' own calculations

The remaining variables have the opposite direction. Considering organizational values binding the organization together before COVID-19 pandemic, (*Orgunibefore*), loyalty and mutual trust decrease *Burnoutscore* by 0.0446 ($\alpha = 0.05$). Next, fulfilment from work before COVID-19 (employers like to work and feel satisfaction) (*Fulwork*) leads to a decrease in *Burnoutscore* by 0.0239 ($\alpha = 0.01$). The same interpretation is in the case of total work energy before COVID-19 included in *Enwork*, where the coefficients indicate a decrease of 0.0197 in *Burnoutscore* ($\alpha = 0.05$). Last, *Age* indicates a significant decrease in *Burnoutscore* by 0.0532 for the category 42–57 years ($\alpha = 0.05$), 0.0947 for the category 58–76 years ($\alpha = 0.01$) and 0.139 for the category +77 years ($\alpha = 0.05$), all compared to the youngest age category <25.

We can see a slight change in the significance level in the case of rules of distant work before COVID-19 (*Rulesbefore*) and age. The significance of the other parameters does not change, and their direction is stable. Another matter is that the estimated coefficients have small values. This is due to normalization. It does not imply automatically that our estimates are weak in terms of their size. The adjusted *R*-squared for our models is not high. We are aware that our explanatory variables can explain *Burnoutscore* as well as burnout partly, also because of relatively small correlation coefficients. However, this result is significant; thus, it cannot be ignored.

Table 4: Standardized coefficient estimation for *Burnoutscore* variable

Variable	***Burnoutscore***
(1) *Rulesbefore*	0.1185 (0.023)
(2) *Experdiswork*	0.2599 (0.031)
(3) *Workprivbalance*	0.1334 (0.023)
(4) *Orgunifbefore*	−0.1283 (−0.022)
(5) *Fulwork*	−0.1339 (−0.019)
(6) *Enwork*	−0.1269 (−0.018)
(7) *Age*	−0.1589 (−0.027)

Note: Standardized coefficient at a given level of significance, unstandardized regression coefficients from the Main model estimation in parentheses.

Source: Authors' own calculations

Table 4 shows above standardized coefficient estimations. We can compare the size of the change under the change in standard deviation. This allows us to see how big their power is to affect *Burnoutscore* on the same scale; thus, we can compare all the variables. Under standardized parameters, the original parameter from Table 3 is under the main estimation.

In a mutual comparison, the strongest effect per unit standard deviation change is achieved by *Experdiswork* (0.2599), followed by *Age* (−0.1589), *Fulwork* (−0.1339), *Workprivbalance* (0.1334), and slightly lower effects of *Orgunibefore* (−0.1283), *Enwork* (−0.1269) with the weakest *Rulesbefore* (0.1185). Detailed results of the regression analysis from Tables 3 and 4 are presented in Annex 7.

Next, we report results for the explained variable *Factorburnout* in Table 5 below. Same as before, all the estimated parameters are significant regardless of which variable is added. The level of significance changes in the case of the presence of remote work rules before COVID-19 and age. Within robustness checks, the direction and significance levels of other estimators remain the same. Similarly, the adjusted *R*-squared attains small values. This leads us to assume that the results are significant.

According to the details on OLS with *Factorburnout* as the explained variable, we found similar results as in the case of *Burnoutscore*, starting with *Rulesbefore* ($\beta = 0.286$) with significance ($\alpha = 0.1$). The same interpretation is in the case of *Experdiswork* ($\beta = 0.514$; $\alpha = 0.01$) in the case of no previous experience with remote work and ($\beta = 0.629$) with bad experience with remote work from previous time ($\alpha = 0.01$). Also, *Workprivbalance*, when work is at the expense of private life, there is an increase in *Factorburnout* by 0.512 ($\alpha = 0.01$). Also, same relationships are observed in the case of *Orgunibefore* ($\beta = -0.316$); thus, a decrease in *Factorburnout* by given units at a level of significance ($\alpha = 0.01$), *Fulwork* ($\beta = -0.166$; $\alpha = 0.01$), *Enwork* ($\beta = -0.139$; $\alpha = 0.05$) and *Age* without a significant influence by the age category 58–76.

Table 5: Results of estimation for model with *Factorburnout* variable

Var/Mod (Adj. *R*-squared)	Main (0.1532)	Robust	Check1 (0.1508)	Check2 (0.1555)	Chceck3 (0.1555)	Check4 (0.1560)	Check5 (0.1529)
(1) ***Rulesbefore***	0.155* (0.052)	0.154* (0.069)	0.159** (0.046)	0.165** (0.039)	0.148* (0.063)	0.145* (0.069)	0.163** (0.041)
(2) ***Experdiswork***	0.223*** (0.000)	0.223*** (0.000)	0.222*** (0.000)	0.215*** (0.000)	0.220*** (0.000)	0.232*** (0.000)	0.227*** (0.000)
(3) ***Workprivbalance***	0.166** (0.023)	0.166** (0.040)	0.170** (0.021)	0.164** (0.024)	0.161** (0.027)	0.162** (0.027)	0.152** (0.041)
(4) ***Orgunifbefore***	−0.152** (0.032)	−0.152** (0.032)	−0.152** (0.032)	−0.143** (0.044)	−0.141** (0.048)	−0.151** (0.033)	−0.149** (0.036)
(5) ***Fulwork***	−0.131** (0.024)	−0.131** (0.031)	−0.127** (0.029)	−0.139** (0.017)	−0.138** (0.017)	−0.129** (0.025)	−0.131** (0.024)
(6) ***Enwork***	−0.126** (0.031)	−0.126** (0.028)	−0.127** (0.030)	−0.136** (0.021)	−0.128** (0.028)	−0.127** (0.029)	−0.119** (0.043)
(7) ***Age***	−0.193*** (0.008)	−0.193*** (0.008)	−0.193*** (0.008)	−0.188*** (0.010)	−0.189*** (0.010)	−0.179** (0.015)	−0.188*** (0.010)
(8) ***Empmanagbefore***	–	–	0.031 (0.581)	–	–	–	–
(9) ***Jobposition***	–	–	–	−0.177 (0.195)	–	–	–
(10) ***Leadershipbefore***	–	–	–	–	0.071 (0.193)	–	–
(11) ***Sex***	–	–	–	–	–	0.159 (0.176)	–
(12) ***Education***	–	–	–	–	–	–	0.119 (0.337)

Notes: Variables are in rows, models in columns. V2, V3, V4, V5, V6 represent versions of models under the robustness check. Main symbolizes primarily estimation, Robust symbolizes primarily estimation under robust standard deviation; ***, ** and * indicate that statistical values are significant at the 1%, 5% and 10% significance level, respectively.

Source: Authors' own calculations

Standardized regression coefficients are shown in Table 6 below. The highest effect is in the case of evaluated experience with remote work before COVID-19, followed by age, balance between working and free time, fulfilment from the work before COVID-19, *etc*.

Table 6: Standardized coefficient estimation for *Factorburnout* variable

Variable	*Factorburnout*
(1) *Rulesbefore*	0.1145 (0.155)
(2) *Experdiswork*	0.2657 (0.223)
(3) *Workprivbalance*	0.1333 (0.166)
(4) *Orgunifbefore*	−0.1263 (−0.152)
(5) *Fulwork*	−0.1309 (−0.131)
(6) *Enwork*	−0.1256 (−0.126)
(7) *Age*	−0.1582 (−0.193)

Notes: Standardized coefficients at a given level of significance in cells, unstandardized regression coefficients from Main model estimation in parentheses. We can see that both models with different explained variable forms show the same relationships as well as relative power in terms of per unit standard deviation change under standardization. Again, within mutual comparison, the strongest effect is caused by *Experdiswork* (0.2657) followed by *Age* (−0.1582), *Workprivbalance* (0.1333), *Fulwork* (−0.1309), slightly lower effects caused by *Orgunibefore* (−0.1263), *Enwork* (−0.1256), with the weakest *Rulesbefore* (0.1145). There is a change of position in the case of *Workprivbalance* and *Fulwork*. Total fulfilment from work before COVID-19 has a slightly higher change effect than balancing private and work life. Due to the negligible difference, we do not consider it important. We include detailed results of the regression analysis from Tables 5 and 6 in Annex 7.

Source: Authors' own calculations

Finally, we report results for the logistic regression. We briefly mention results of the probit models in Table 7 below. The reason for choosing the probit form in explained in the Methodology section. However, we perform logit models to avoid subjectivity. Nevertheless, we do not report the results of the logit function form because we do not assume it as important for our research outputs.

Table 7: Results of estimation by logistic regression for *Indoccur* variable

Var/Mod	*Indoccur atleast1*	*Indoccur atleast2*	*Indoccur atleast4*	*Indoccur atleast 6*	*Indoccur atleast 8*
(1) *Rulesbefore*	0.105 (0.417)	0.249** (0.033)	0.163 (0.155)	0.202 (0.143)	−0.0546 (0.761)
(2) *Experdiswork*	0.153* (0.071)	0.160** (0.034)	0.226*** (0.001)	0.317*** (0.000)	0.071 (0.523)
(3) *Workprivbalance*	0.260* (0.060)	0.335*** (0.007)	0.200** (0.049)	0.048 (0.698)	−0.0714 (0.681)
(4) *Orgunifbefore*	−0.285** (0.018)	−0.143 (0.177)	0.017 (0.867)	−0.014 (0.906)	−0.061 (0.701)
(5) *Fulwork*	−0.0535 (0.568)	−0.113 (0.186)	−0.159* (0.058)	−0.208** (0.034)	−0.151 (0.232)
(5) *Enwork*	−0.204** (0.040)	−0.179** (0.043)	−0.138 (0.102)	−0.150 (0.134)	−0.090 (0.489)
(7) *Age*	−0.181 (0.112)	−0.336*** (0.002)	−0.232** (0.033)	−0.274** (0.045)	−0.166 (0.362)

Note: Frequency of burnout indicators are presented in columns (*atleast1* … 1 burnout indicator occurrence, *atleast2* … 2 burnout indicator occurrences, *atleast4* … 4 burnout indicator occurrences, *atleast6* … 6 burnout indicator occurrences, *atleast8* … 8 burnout indicator occurrences). We individually examine whether explanatory variables influence the *Indoccur* variable (indicator of occurrence of relatively higher frequency of burnout indicators, symptoms); ***, ** and * indicate that statistical values are significant at the 1%, 5% and 10% significance level, respectively.

Source: Authors' own calculations

We work with at least 1 higher occurrence of frequency of burnout indicators, at least 2, at least 4, at least 6 and finally at least 8. By doing this, we can see whether our variables influence the probability of occurrence of more burnout symptoms from lower to higher occurrence rate. We are aware that the explanatory power of the explained variable is not so evident, and we know that the simplicity of getting the form goes at the expense of information that we lost.

In Table 7 above, we report the results of the logistic regression. We mention models according to the explained variable in columns and estimators obtained in rows. We can see that the significance level varies with the different rate of occurrence. The evaluation of previous experience with distant work before COVID-19 is she most stable, but if we detect the occurrence probability of all the indicators at the same time, the variable is not significant. The same goes for each variable included. It is interesting that the direction of the coefficients is not the same all the time. The cause can be the lack of data in our dataset, which makes the estimation unstable.

Here, some additional findings are observed. When paying attention to the relatively high frequency of occurrence of burnout indicators (symptoms) during COVID-19, *Experdiswork* is the most stable among all forms of frequency. In other words, if distant work was not experienced before the pandemic or the experience was negative, then a higher frequency of burnout indicators is more possible across all the variants. The other variables differ; for example, *Workprivbalance* is significant in the lower frequency variants (*atleast1*, *atleast2*, *atleast4*). In other words, if working time was at the expense of private life, then it has a positive effect on the probability of presence of given frequencies of burnout indicators. Age is significant in the extreme frequency variants (*atleast2*, *atleast4* and *atleast6*); thus, a lower age category increases the probability of higher frequencies under the given variants. *Rulesbefore* is significant only in one case of the frequency variants, as is *Orgunibefore*, which means that loyalty and mutual trust decrease the probability of higher occurrence – in this case, occurrence in general since there is significance only under the extreme forms. Fulfilment from work (*Fulwork*) is significant basically in the medium frequencies of occurrence (*atleast4*, *atleast6*). When considering the number of significant estimators, the forms *atleast2* and *atleast4* are higher than in different forms. To sum up, we found that our variables have different forms of frequencies in the variants as follows: *Rulesbefore* (1/4), *Experdiswork* (4/4), *Workprivbalance* (3/4), *Orgunibefore* (1/4), *Fulwork* (2/4), *Enwork* (2/4) and *Age* (3/4). The reason why we excluded the extreme variant *atleast8* is that the model did not fit the verification criteria; thus, it cannot be considered relevant.

Comparing all the results, under the OLS estimations we found significant relationships between explained and explanatory variables. The results are basically the same, the only difference is in interpretation. We found the strongest relationship in terms of evaluation of previous experience with distant work before COVID-19 (*Experdiswork*) and age. Including both models, we got a robustness check for burnout represented by both *Burnoutscore* and *Factorburnout*, making all the models more relevant. In both cases, verification of our estimates was performed. The estimated parameters within the OLS models as well as the models can be considered significant, even though their explanatory power is not as high.

In addition to the logistic regression results, we estimated this model to extend our study with different information. We found this method weaker in terms of explanation; nevertheless, the results can be understood as a different role of explanatory variables in terms occurrence of relatively higher frequency of burnout indicators.

5. Discussion

Our results correspond to some extent with previous findings. For example, loyalty and mutual trust characterizing organizations can reduce the burnout indicators. This corresponds to the works

of Matziari *et al*. (2017) or Janz *et al*. (1986), which concluded that values or practices can affect burnout negatively. Next, we found that work energy and work satisfaction before COVID-19 also contributed to a decrease in the burnout indicators. This corresponds to findings that aversion to the job and lower job satisfaction contributes to higher tendency to burnout (Takeda *et al*., 2005). The authors also found that an increase in home visits among social workers contributes to burnout. Additionally, it was found that high job demands and long working hours can significantly increase the risk of burnout (Hu *et al*., 2016; Russell, 2020). This may partly correspond with another of our findings, namely that if work was at the expense of private life, the burnout indicators are higher.

Our next finding that higher age leads to lower burnout indicators corresponds to the results of Kowalska *et al*. (2010). According to the authors, younger age can increase depersonalization as part of the MBI. Nevertheless, the relationship between burnout and age is not coherent with Hayes *et al*. (2021), who found a relationship between various age categories with sex and burnout. Also, we did not find a relationship between sex at birth and burnout indicators as in the case of Kowalska *et al*. (2010).

Our last findings correspond with Kotowski *et al*. (2022), who found that remote work among teachers contributed to stress and burnout during COVID-19. Also, Hayes *et al*. (2021) found that burnout increased among well-educated professionals who worked remotely before the COVID-19 pandemic. Here, we contribute two more findings: Firstly, burnout indicators can be positively related to non-existing rules of remote work before the pandemic. Secondly, ff previous remote work experience was negative or absent, the burnout indicators are higher. Nevertheless, according to Hoffman *et al*. (2020), radiation oncologists working from home did not lead to higher burnout than in previous situations. Thus, there can be some differences among different job specializations and positions.

We did not find a positive relationship between burnout and some characteristics of organizational culture. For example, employees' teamwork support, participation, individual risk-taking, innovation, fierce competition, job security or stability of relationships at the workplace before COVID-19, represented by the employee management factor, did not affect the burnout indicators. Similarly, the factor of leadership, consisting of mentoring, education, entrepreneurship, innovation, task performance and activity efficiency before the pandemic, did not influence the burnout indicators. This contradicts the findings of Jourdain and Chênevert (2014) or Matziari *et al*. (2017). Moreover, we did not find a relationship between burnout indicators and whether respondents have subordinates in their job position. The level of education did not influence the burnout indicators either. This contradicts the findings of Kretová-Lisá and Budaiová (2007) that lower education affects burnout positively. However, for example, Hayes *et al*. (2021) indicated higher

stress and burnout among well-educated professionals. There will probably be other factors that can influence burnout among people with different education levels.

Since the effect of the pandemic is not explicitly involved, it is difficult to conclude to what extent the pandemic contributed to the burnout syndrome. Nevertheless, our results can provide important information about the situation before COVID-19 and how it could affect the burnout indicators during remote working during the pandemic. Moreover, we can see that those factors representing work satisfaction and conditions are significant, also across a wide range of literature. It is possible that if a job position did not include predisposition for remote work, it could bring additional stress to employees during the pandemic. Similarly, organizational values and work satisfaction reflecting the situation before COVID-19 can reduce burnout risk if employees trust each other and have a positive relationship to their work. However, we assume that without inclusion of variables reflecting pandemic-related variables (for example, taking care of a family member, *etc*.), the generalizability of our results can be limited.

Here, we would like to discuss limitations of our approach along with recommendations for future research. Firstly, our sample included university employees. Based on current research, different results among different professions are evident. This can be due to different demands and aspects of the given job and environment. Furthermore, as we are inspired by workplace burnout from the MBI, more complex aspects of burnout can be included. On the other hand, different indicators can be used to prove external validity of the present research.

Additionally, we do not include situations at home and personal life satisfaction. Both can be important aspects of burnout. Thus, additional information about sources of burnout indicators can be examined, for example, to explain why some people spend more time working at the expense of their personal life.

Moreover, we are aware that different personal and psychic hygiene characteristics can be associated with burnout, as those characteristics can be responsible for clustering of workers in their professions. Also, we use a bottom-up approach, which complies with the perspective of employees. Here, the perspective of leadership can be examined to see whether there is a gap between employees and managers.

Another limitation is related to different time frames. It is debatable whether and to what extent the perception of the past can be distorted through the present. This may appear to be a shortcoming when multiple time frames are examined in the questionnaire. Therefore, it will be more appropriate to place future research in a relevant time frame context. On the other hand, to frame the research in current time can be limiting as well. Repeated polling in time and examining the occurrence of burnout indicators may be more suitable.

Based on the above limitations and present results, we emphasize the necessity of further research that will be more complex, involving enough observations with respect to different jobs and interpersonal factors. To follow on this, we are going to conduct a questionnaire to examine more extensive burnout indicators in relation to various factors within public universities. We are going to survey not only organizational environment or work-related factors, but also other interpersonal and socio-demographic characteristics.

6. Conclusion

In this paper, we examined whether organizational culture leads to higher presence of burnout symptoms and what factors alongside organizational culture can contribute to burnout during remote work. After a literature review mapping the current burnout syndrome research, we presented the results of a standard regression and logistic regression analysis, followed by a robust analysis of three variations of burnout indicators. Where possible, we employed factor analysis to reduce the number of explanatory variables. We found that non-existing rules of remote work before the COVID-19 pandemic increased the burnout indicators. Also, the burnout indicators are positively related to no previous remote working experience or with presence of negative experience with remote work. Next, we identified a positive relationship to burnout indicators if work is at the expense of private life. The factors that reduce burnout indicators include loyalty and mutual trust in an organization, work energy before the pandemic and satisfaction with the work before the pandemic. Also, we found that higher age can be related to a lower effect on burnout indicators. We included an econometric verification process to reduce estimation bias that can be given by a lower number of observations or asymmetric character of the sample. After standardization, we found that the demonstrated variables have different powers in relation to burnout indicators. Next, we examined the relationship of the given variables with burnout indicators in terms of frequency of occurrence. We found that experience with distant work, balance between working and private time and age have the highest amount of occurrence. The frequency analysis is, nevertheless, slightly different from the results given by the conventional regression. It seems that there can be a stronger relationship given by analysis of intensity compared to frequency analysis in terms of the burnout syndrome.

There are some limitations of this study due to the lower number of observations; nevertheless, they do not differentiate from other studies. Furthermore, we are aware that the burnout indicators used are not complex; thus, there can be a little bias due to the lower number of items used. Also, retrospective bias can be present on the part of respondents.

On the other hand, we contribute to current research by the following items. Firstly, this paper can inspire managers, leaders and supervisors employed in the public sector to build better

working environments preventing burnout. Secondly, we checked external validity against current burnout studies, which are coherent. Thirdly, this can be found as inspiration for emergency situations similar to the COVID-19 pandemic that can occur in the future.

Finally, the summarized results indicate that organizational culture could have an impact on the burnout syndrome during COVID-19, when remote work was present, and that organizational culture together with remote work aspects can influence burnout indicator intensity and frequency.

For future research, we are going to examine burnout while involving more complex forms of organizational culture as well as other social, psychological, performance-oriented and economic characteristics of the respondents. To measure burnout, we have got new inspiration from official burnout measurements and are going to extend them with more items. We are also going to include controls for private life. The research will be made on a sample of university employees (academics).

Acknowledgement

Funding: Authors Vojtech Konarik and Katerina Kashi acknowledge the support of the student project no. SP2023/079 "Analysis of Structural Imbalances in the Labour Market in the Czech Republic" at VSB – Technical University of Ostrava.

Conflicts of interest: The authors hereby declare that this article was not submitted or published elsewhere.

References

Anderson, D. R., Sweeney, D. J., Williams, T. A., et al. (2020). *Statistics for Business and Economics: Metric Version.* 14th ed. Boston: Cengage Learning. ISBN 978-0-357-11448-3.

Azevedo, J. P. (2003). FACTORTEST: Stata module to perform tests for appropriateness of factor analysis. *Statistical Software Components*, S436001.

Bercea, O.-B., Lakatos, E.-S., Bacali, L. (2019). Comparative Study Regarding Organizational Culture: Nonprofit Organization and Profit-Oriented Organization. In: Văduva, S. A., Wilt, R., Fotea, I., et al. *Civil Society: The Engine for Economic and Social Well-Being.* Cham: Springer International Publishing, pp. 41–52. ISBN 978-3-319-89872-8.

Brassey, J., Coe, E., Dewhurst, M., et al. (2022). Addressing employee burnout: Are you solving the right problem? [Retrieved 2023-12-10] Available at: https://www.mckinsey.com/mhi/our-insights/addressing-employee-burnout-are-you-solving-the-right-problem

De Simone, S., Vargas, M., Servillo, G. (2021). Organizational strategies to reduce physician burnout: a systematic review and meta-analysis. *Aging Clinical and Experimental Research,* 33, 883–894. https://doi.org/10.1007/s40520-019-01368-3

Edú-Valsania, S., Laguía, A., Moriano, J. A. (2022). Burnout: A Review of Theory and Measurement. *International Journal of Environmental Research and Public Health*, 19(3), 1780. *SAGE Open*, 11(4). https://doi.org/10.1177/21582440211058193

Hoffman, R. E., Garner, D., Koong, A. C., et al. (2020). Understanding the Intersection of Working from Home and Burnout to Optimize Post-COVID-19 Work Arrangements in Radiation Oncology. *International Journal of Radiation Oncology Biology Physics*, 108(2), 370–373. https://doi.org/10.1016/j.ijrobp.2020.06.062

Hu, N. C., Chen, J. D., Cheng, T. J. (2016). The Associations Between Long Working Hours, Physical Inactivity, and Burnout. *Journal of Occupational and Environmental Medicine*, 58(5), 514–518. https://doi.org/10.1097/JOM.0000000000000715

Huhtala, M., Tolvanen, A., Mauno, S., et al. (2015). The Associations between Ethical Organizational Culture, Burnout, and Engagement: A Multilevel Study. *Journal of Business and Psychology*, 30, 399–414. https://doi.org/10.1007/s10869-014-9369-2

Janz, T., Dugan, S., Ross, M. S. (1986). Organizational Culture and Burnout: Empirical Findings at the Individual and Department Levels. *Journal of Health and Human Resources Administration*, 9(1), 78–92.

Jin, J. C., Jin, L. (2013). Research publications and economic growth: evidence from cross-country regressions. *Applied Economics*, 45(8), 983–990. https://doi.org/10.1080/00036846.2011.613785

Jourdain, G., Chênevert, D. (2015). The Moderating Influence of Perceived Organizational Values on the Burnout-Absenteeism Relationship. *Journal of Business and Psychology*, 30, 177–191. https://doi.org/10.1007/s10869-014-9346-9

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31–36. https://doi.org/10.1007/BF02291575

Kalinienė, G., Lukšienė, D., Ustinavičienė, R., et al. (2021). The Burnout Syndrome among Women Working in the Retail Network in Associations with Psychosocial Work Environment Factors. *International Journal of Environmental Research and Public Health*, 18(11), 5603. https://doi.org/10.3390/ijerph18115603

Kotowski, S. E., Davis, K. G., Barratt, C. L. (2022). Teachers feeling the burden of COVID-19: Impact on well-being, stress, and burnout. *IOS Press*, 71(2), 407–415. https://doi.org/10.3233/WOR-210994

Kowalska, M., Bugajska, J., Żołnierczyk-Zreda, D. (2010). Frequency of burnout syndrome in office worker. *Medycyna Pracy*, 61(6), 615–623.

Kretová-Lisá, E., Budaiová, V. (2007). Burnout syndrome in social workers and their notions about prevention and intervention. *Studia Psychologica*, 49(3), 233–249.

Marquez-Ramos, L., Mourelle, E. (2019). Education and economic growth: an empirical analysis of nonlinearities. *Applied Economic Analysis*, 27(79), 21–45. https://doi.org/10.1108/AEA-06-2019-0005

Matziari, A., Montgomery, A. J., Georganta, K., et al. (2017). The Relationship Between Organizational Practices and Values with Burnout and Engagement. *Current Psychology*, 36, 276–285. https://doi.org/10.1007/s12144-016-9413-7

Mikolajczak, M., Gross, J. J., Stinglhamber, F., et al. (2020). Is Parental Burnout Distinct From Job Burnout and Depressive Symptoms? *Clinical Psychological Science*, 8(4), 673–689. https://doi.org/10.1177/2167702620917447

Norling, L. R., Chopik, W. J. (2020). The Association Between Coworker Support and Work-Family Interference: A Test of Work Environment and Burnout as Mediators. *Frontiers in Psychology*, 11. https://doi.org/10.3389/fpsyg.2020.00819

Russell, M. B., Attoh, P. A., Chase, T., et al. (2020). Examining Burnout and the Relationships Between Job Characteristics, Engagement, and Turnover Intention Among U.S. Educators. *Sage Open*, 10(4). https://doi.org/10.1177/2158244020972361

Shanafelt, T. D., Noseworthy, J. H. (2017). Executive Leadership and Physician Well-being: Nine Organizational Strategies to Promote Engagement and Reduce Burnout. *Mayo Clinic Proceedings*, 92(1), 129–146. https://doi.org/10.1016/j.mayocp.2016.10.004

Stasiła-Sieradzka, M., Sanecka, E., Turska, E. (2023). Not So Good Hybrid Work Model? Resource Losses And Gains Since The Outbreak Of The COVID-19 Pandemic And Job Burnout Among Non-Remote, Hybrid, And Remote Employees. *International Journal of Occupational Medicine and Environmental Health,* 36(2), 229–249. https://doi.org/10.13075/ijomeh.1896.02026

StataCorp (2022). *Stata 17 Base Reference Manual*. College Station: Stata Press. ISBN 978-1-59718-395-6.

World Health Organization: International Classification of Diseases (2019). *QD85 Burnout*. [Retrieved 2023-12-10] Available at: https://icd.who.int/browse11/l-m/en#/http://id.who.int/icd/entity/129180281

Takeda, F., Ibaraki, N., Yokoyama, E., et al. (2005). The Relationship of Job Type to Burnout in Social Workers at Social Welfare Offices. *Journal of Occupational Health*, 47(2), 119–125. https://doi.org/10.1539/joh.47.119

Appendix

Annex 1

Authors	Topic	Data and methodology	Variables	Main results
Janz *et al.* (1986)	Organizational culture and burnout: Empirical findings at the individual and the department level	Corporate culture survey (CCS), Maslach Burnout Inventory (MBI), factor analysis, correlation analysis	Culture indicators (CCS), burnout indicators (MBI)	At the level of individual workers, higher power and lower values are associated with a higher level of overall reported burnout. At the department level, there is a negative correlation between shared values on the one hand and the percentage of workers in the advanced stages of burnout on the other.
Takeda *et al.* (2005)	The Relationship of Job Type to Burnout in Social Workers at Social Welfare Offices	Factor analysis, regression analysis, questionnaire	Burnout (dependent), job variables, basic demographic variables	There are differences between social service job types and burnout syndrome. The greatest tendency to burnout exists in the job type of public assistance. Also, a greater aversion to the job and overall lower job satisfaction were found among these workers.
Kretová-Lisá and Budaiová (2007)	Burnout Syndrome in Social Workers and Their Notions about Prevention and Intervention	Maslach Burnout Inventory (MBI), Coping Strategy Indicator (CSI), *t*-test, correlation analysis, ANOVA, regression analysis	Burnout indicators (MBI), stress coping strategies (CSI), demographic indicators	There is no statistically significant relationship between burnout and span of practice. A lower level of education is associated with a higher level of emotional exhaustion. It was not confirmed that burnout was related to family type or family status. Social workers with higher levels of emotional exhaustion showed a statistically higher need to change their jobs more frequently.
Kowalska *et al.* (2010)	Frequency of Burnout Syndrome in Office Workers	The Polish version of the Maslach Burnout Inventory (MBI), statistical/ correlation analysis, *t*-test	Burnout indicators (MBI), demographic indicators	Burnout syndrome concerned 4.15% of workers. Differences were found within both gender and age.
Huhtala *et al.* (2015)	The Associations between Ethical Organizational Culture, Burnout, and Engagement: A Multilevel Study	58-item Corporate Ethical Virtues questionnaire (CEV), 9-item Bergen Burnout Inventory (BBI-9), Utrecht Work Engagement Scale (UWES-9), regression analysis, correlation analysis	Burnout indicators (BBI-9), organizational indicators (CEV), engagement indicators (UWES-9), control variables	Higher level of ethical organizational culture is associated with lower burnout and higher employee engagement (both at the individual level and at the level of organizational units/ departments).
Jourdain and Chênevert (2014)	The Moderating Influence of Perceived Organizational Values on the Burnout-Absenteeism Relationship	Factor analysis, regression analysis, Maslach Burnout Inventory (MBI), questionnaire	Absenteeism (dependent), exhaustion, cynicism (MBI), organizational values, control variables	The values "humanity" and "innovation" have a positive (directly proportional) relationship between voluntary sickness absenteeism and burnout.

Matziari *et al.* (2017)	The Relationship Between Organizational Practices and Values with Burnout and Engagement	Regression analysis, *t*-test, ANOVA, Maslach Burnout Inventory (MBI), The FOCUS questionnaire, The Utrecht Work Engagement Scale, questionnaire	Burnout indicators (MBI), organizational practices and values, work engagement, demographic indicators	Organizational values and practices are negatively connected with burnout and positively with engagement.
Hoffman *et al.* (2020)	Understanding the Intersection of Working from Home and Burnout to Optimize Post-COVID19 Work Arrangements in Radiation Oncology	The American Medical Association MiniZ burnout survey, $\chi 2$ test	Burnout variables, job characteristics, demographic indicators	The change to working from home was not accompanied by an increased incidence of burnout syndrome, on the contrary, this transition was evaluated positively by majority of the employees.
Norling and Chopik (2020)	The Associations Between Coworker Support and Work-Family Interference: A Test of Work Environment and Burnout as Mediators	Regression analysis, Health and Retirement Study, Shirom-Melamed Burnout Measure, questionnaire	Coworker support, work environment, work family interference and enhancement, job satisfaction, burnout	Coworker support is associated with better work-life outcomes. A positive work environment and lower burnout positively influence work-family outcomes.
Hayes *et al.* (2021)	Perceived Stress, Work-Related Burnout and Working From Home Before and During COVID-19: An Examination of Workers in the United States	Perceived Stress Scale, Copenhagen Burnout Inventory (CBI), questionnaire, regression analysis, correlation analysis, paired *t*-test	Burnout subscales (CBI), work-related indicators, demographic indicators	A remote job can be associated with higher stress and burnout. Burnout is mainly associated with those workers who worked remotely even before the pandemic. There are differences within gender and age groups.
Kalinienė *et al.* (2021)	The Burnout Syndrome among Women Working in the Retail Network in Associations with Psychosocial Work Environment Factors	Regression analysis, correlation analysis, HSE management standards work-related stress indicator tool, Copenhagen burnout inventory (CBI)	Burnout subscales (CBI – dependent variables), psychosocial stressors (HSE), demographic indicators	Personal, work-related and client-related burnout is associated with psychosocial work environment factors. A higher level of managers' support is associated with lower burnout.
Kotowski *et al.* (2022)	Teachers feeling the burden of COVID-19: Impact on well--being, stress and burnout	On-line survey, ANOVA	Demographic indicators, work-related indicators, stress and burnout indicators, work-family balance indicators	Level of stress and burnout had increased during COVID-19 pandemic and had not decreased even a year after COVID-19 pandemic.
Stasiła--Sieradzka *et al.* (2023)	Not so good hybrid work model? Resource losses and gains since the outbreak of the covid-19 pandemic and job burnout among non-remote, hybrid and remote employees	Conservation of Resources – Evaluation (COR-E), the Oldenburg Burnout Inventory (OLBI), regression analysis, correlation analysis, ANOVA	Burnout (OLBI - dependent variable), gains and losses, work-related variables, sociodemographic (control) variables	That gains and losses are associated with burnout (gains negatively, losses positively). It was found that hybrid workers experienced the highest gains and losses compared to non-remote and remote workers.

Source: Authors' own elaboration

Annex 2

Explained variable

Question: *Try to complete the questionnaire according to how you felt during the pandemic. Please use this grading:*

1 never, 2 almost never, 3 sometimes, 4 often, 5 always.

Items (indicators, symptoms):

I felt physically or emotionally drained.

I had negative thoughts about my work.

I was easily upset by minor issues or my co-workers and team.

I felt under an uncomfortable pressure to succeed.

I felt that I was in the wrong organization or in the wrong profession.

I felt that organizational policy or bureaucracy was hindering my ability to do a good job.

I felt like I didn't have time to do many of the things that are important to doing quality work.

I find that I don't have time to plan as much as I would like.

Explanatory variable

Question: *The following 9 statements are about how you felt at work before the pandemic.*

never, almost never, once a month, several times a month, once a week, several times a week, always.

Items:

When I was at work, I felt that I was bursting with energy. (*Enwork*)*

When I was at work, I felt full of strength and energy. (*Enwork*)*

I was excited about my work. (*Enwork*)*

My work inspired me. (*Enwork*)*

When I woke up in the morning, I wanted to go to work. (*Enwork*)*

When I worked intensively, I felt happy. (*Fulwork*)*

I was proud of the work I did. (*Fulwork*)*

I was immersed in my work. (*Fulwork*)*

I got carried away with my work. (*Fulwork*)*

* (abbreviations of factors created by items listed in parentheses)

Annex 3

Variable	Description
Additional variables	*In your opinion, employee management is supporting: teamwork, participation, individual risk-taking, innovation, fierce competition, job security, stability of relationships*
***Empmanagbefore* (F)**	***a) Before COVID-19*** *b) During COVID-19* *c) After COVID-19*
Jobposition	*Characteristics of job position.* *a) I have subordinates* *b) I have no subordinates*
Leadershipbefore (F)	*Leadership (non-violent management of people, where one person sets the direction and the others follow him) support factor by respondent mentoring, education, entrepreneurship, innovation, task performance, activity, efficiency* ***d) Before COVID-19*** *e) During COVID-19* *f) After COVID-19*
Sex at birth	*Gender of respondents* *a) Man* *b) Woman*
Education	*Highest achieved education attained by respondents.* *a) Primary level* *b) Secondary level* *c) Upper secondary level* *d) University level*

Note: (F) symbolises factor. This is the list of variables used as a robustness check in the regression analysis.

Source: Authors' own elaboration

Annex 4

Model *Scoreburnout*	**Hypothesis**	**Model *Factorburnout***
P (0.53)	Autocorrelation (runtest) H_0: No autocorrelation H_1: Autocorrelation under given level of significance.	*P* (0.53)
P (0.428)	Heteroscedasticity (Breuch–Pagen Test) H_0: Homoscedasticity H_1: Heteroscedasticity under given level of significance.	*P* (0.421)
VIF = 1.05	Collinearity (VIF) *VIF* < 10	VIF = 1.05
_hatsq = 0.393	Specification (linktest) _hatsq not significant	*_hatsq* = 0.419
P (0.520)	Omitted variables (Ramsey test) H_0: No omitted variables H_1: Omitted variables	*P* (0.527)

Model *atleast4* (example)	**Hypothesis**
NO	Stability Number of observations in crosstabs between explanation and explained variable At least more than 30 or 50
VIF = 1.07	Collinearity (VIF) *VIF* < 10
_hatsq = 0.683	Specification (linktest) *_hatsq* not significant
P (0.533)	Goodness of fit H_0: Good fit detected H_1: Model performs not good fit

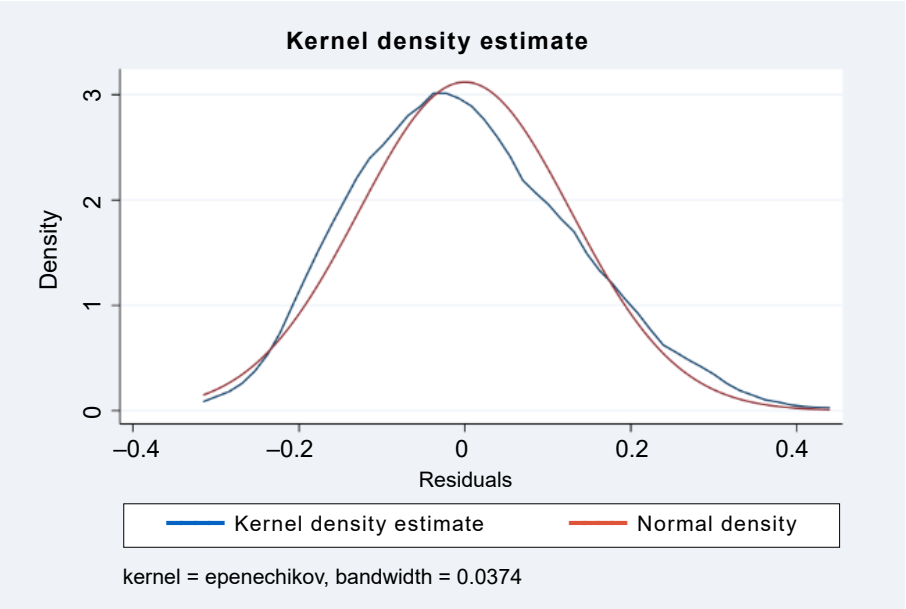
Note: The results are just demonstrative. Significantly similar results obtained via testing all forms of models, except atleast8.

Source: Authors' own elaboration

Annex 5

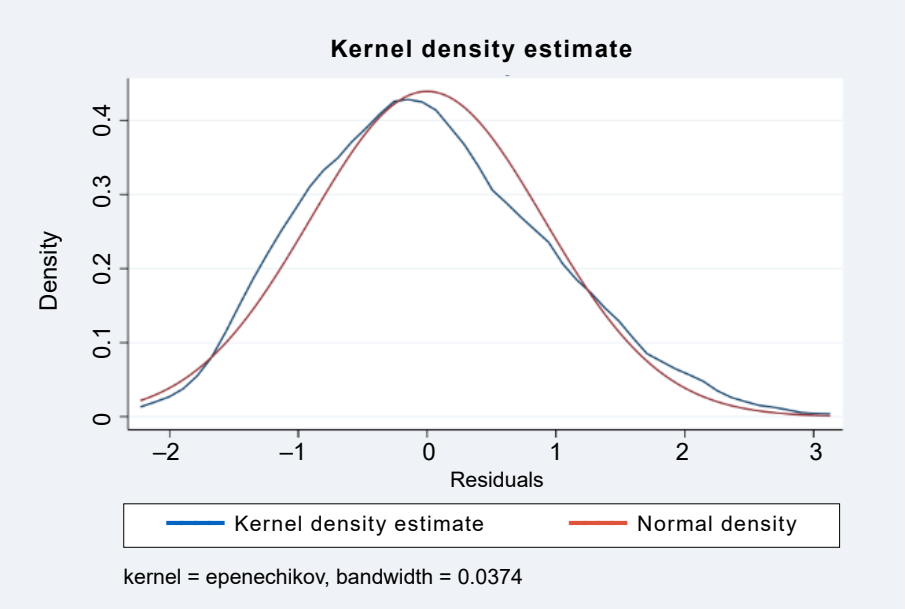
Below we attach a test of normality of the residual. In both cases, the residual distribution is close to normal.

Figure A.1: Residual distribution for model estimation for *Burnoutscore*



Source: Authors' own elaboration

Figure A.2: Residual distribution for model estimation for *Factorburnout*

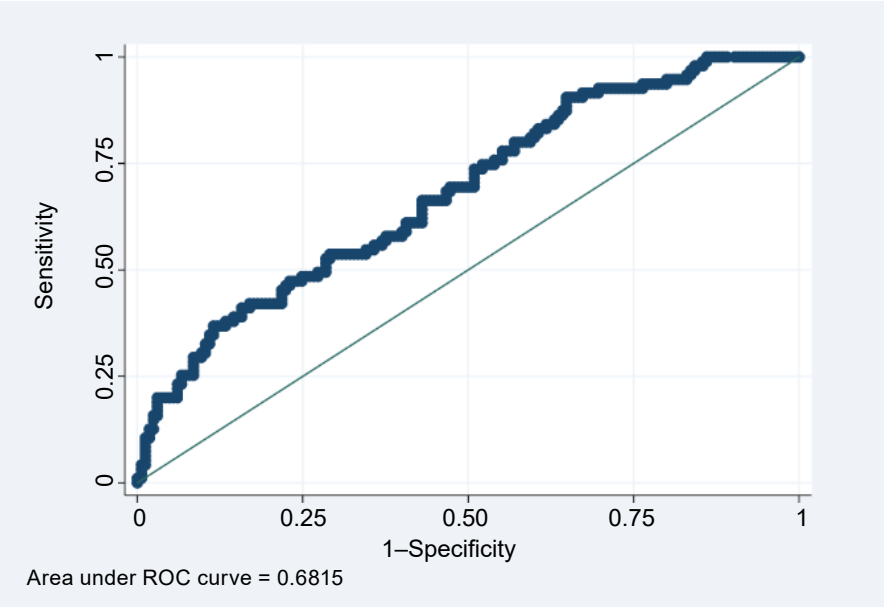


Source: Authors' own elaboration

Annex 6

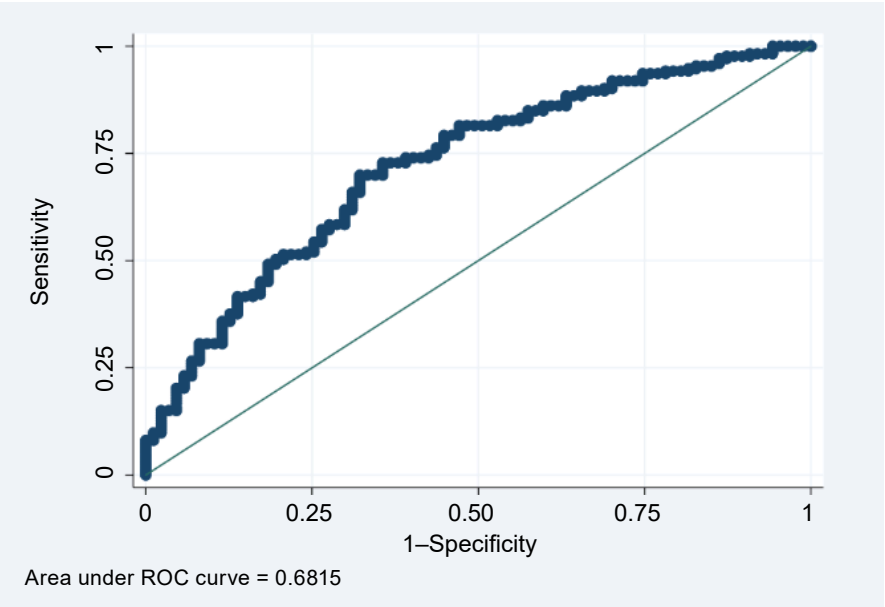
Here we can see the ROC analysis for the chosen probit models. The highest area under the ROC curve is detected in the case of Figure A.4 for the model with *atleast2* indicators of burnout detection with higher frequency.

Figure A.3: ROC analysis for probit model with *Indoccur atleast4* variable



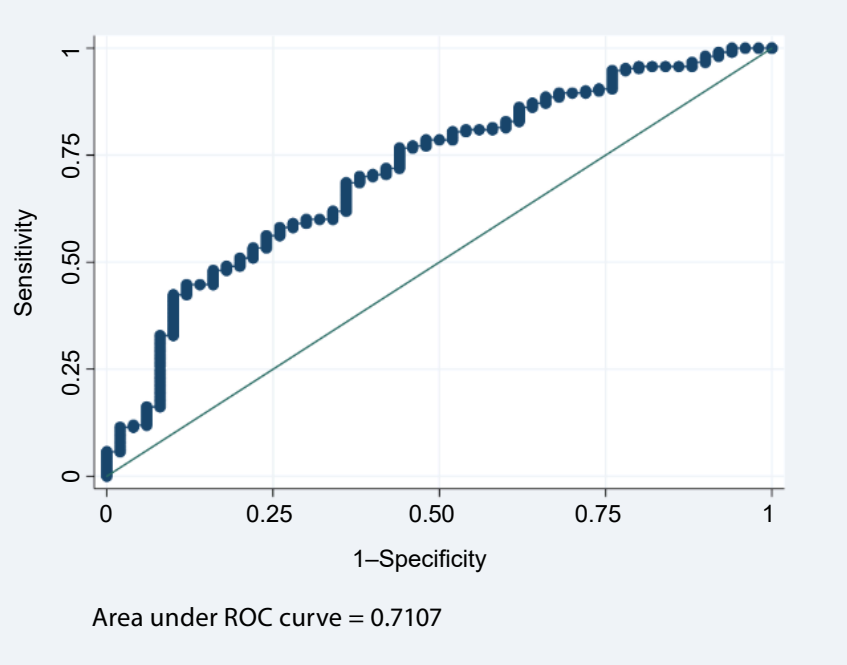
Source: Authors' own elaboration

Figure A.4: ROC analysis for probit model with *Indoccur atleast2* variable



Source: Authors' own elaboration

Figure A.5: ROC analysis for probit model with *Indoccur atleast1* variable



Source: Authors' own elaboration

Annex 7

Table 8: Detailed results of regression analysis for normalized score and burnout factor

	Variables	(2) Normalized score	(3) Factor burnout
(1)	**Remote work rarely (before COVID-19)**	0.0168 (0.0212)	0.116 (0.146)
(1)	**No rules exist (before COVID-19)**	0.0417* (0.0243)	0.286* (0.160)
(2)	No positive, nor negative experience	0.00638 (0.0301)	0.0475 (0.203)
(2)	No remote work experience	0.0725*** (0.0239)	0.514*** (0.158)
(2)	Negative experience prevails	0.0859*** (0.0229)	0.629*** (0.166)
(3)	**Work at expense of private life**	0.0727*** (0.0193)	0.512*** (0.134)
(3)	**Private life at expense of work**	0.0717 (0.0810)	0.500 (0.548)
(3)	**Cannot manage both**	0.0277 (0.0374)	0.199 (0.248)
(4)	Emphasis on formal rules and policies	0.00447 (0.0254)	0.0271 (0.188)
(4)	Loyalty and mutual trust	−0.0446** (0.0225)	−0.316* (0.180)
(4)	Innovation and development	−0.0169 (0.0385)	−0.114 (0.257)
(5)	**F1 satisfaction**	−0.0197** (0.00808)	−0.139** (0.0590)
(6)	**F1 work energy**	−0.0239*** (0.00841)	−0.166*** (0.0591)
(7)	26–41 years	−0.0161 (0.0202)	−0.111 (0.137)
(7)	42–57 years	−0.0532** (0.0264)	−0.377** (0.188)
(7)	58–76 years	−0.0947*** (0.0274)	−0.661 (0.926)
(7)	+77 years	−0.139** (0.0571)	−0.979** (0.409)
Constant		0.399*** (0.0278)	−0.232 (0.206)
Observations		260	260
***R*-squared**		0.228	0.226

Notes: Numbers (1)–(7) symbolize variables from Tables 3, 4, 5 and 6. Abbreviations: (1) *Rulesbefore*; (2) *Experdiswork*; (3) *Workprivbalance*; (4) *Orgunibefore*; (5) *Fulwork*; (6) *Enwork*; (7) *Age*. Detailed description in Table 1. Standard errors in parentheses; ***, ** and * indicate that statistical values are significant at the 1%, 5% and 10% significance level, respectively.

Source: Authors' own calculations