Central European Journal of Economic Modelling and Econometrics

The Determinants of Presenteeism in Selected European Countries – Modelling from Geographical and Gender Perspectives

Elżbieta Antczak*, Katarzyna Miszczyńska†

Submitted: 17.01.2024, Accepted: 14.10.2024

Abstract

In this paper we analyze motives (person-, work-, and organizational-related) of presenteeism among employees in selected European countries. We applied questions on presenteeism from European Working Conditions Surveys (EWCS) for 2010-2021. Based on the preliminary outcomes we observe that presenteeism is gender and geographical-dependent. Therefore, we use geographically weighted regression (GWR) to model determinants of phenomena. We find that men are more motivated by economic issues (the level of earnings, type of work contract, household financial situation, gander pay gap) but women are guided by so-called emotional factors (having children at home or work requiring direct contact with customers). The type of employment contract and fact of having children at home also has an impact on presenteeism. The results of the GWR show that, regardless of gender, there are countries for which the influence of multiple factors was recorded simultaneously, e.g. Spain, Malta, Portugal. However, there are countries for which no influence of factors on presenteeism was identified, e.g. Germany, Slovakia, Sweden, Hungary, Luxemburg or Finland and therefore, the motives of presenteeism should be analysed separately. Finally, the country policy insurance arrangements contribute to the presenteeism.

Keywords: presenteeism, European countries, regional perspective, gender perspective, geographically weighted regression

JEL Classification: C01, I18, J16

*Department of Spatial Econometrics, Faculty of Economics and Sociology, University of Lodz, Poland; e-mail: elzbieta.antczak@uni.lodz.pl; ORCID:0000-0002-9695-6300

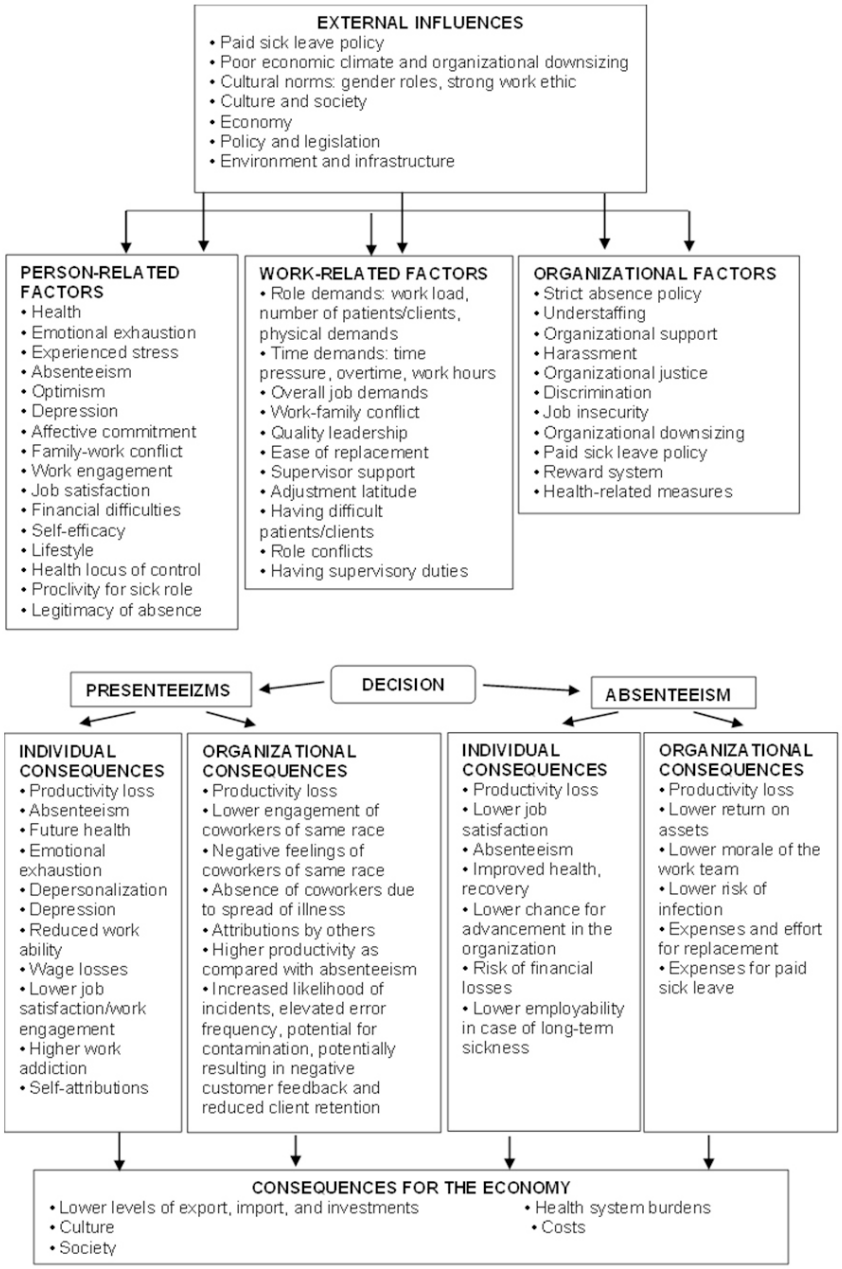
†Department of Banking, Faculty of Economics and Sociology, University of Lodz, Poland; e-mail: katarzyna.miszczynska@uni.lodz.pl; ORCID: 0000-0003-4924-7605

1 Introduction

Employees' illnesses have economic implications not only for themselves, but also for companies and other workers (Arnold 2016; Hirsch et al. 2017). The most commonly mentioned consequence of employee illness is sickness absence from work (known as sickness absenteeism). In addition to absenteeism sickness presenteeism can be distinguished. This phenomenon, while related to sickness absenteeism, is distinct and not its opposite. Presenteeism can be defined in a number of different ways, presented in Johns' study (Johns, 2010), however, the most common definition refers employees working while ill, physically present but with health issues that impede their full professional performance and productivity. The phenomenon of presenteeism was first used in the 1970s in the context of the antonym of attendance at work (Smith, 1970). While in the 1990s, the term was further developed in the literature by Cary Cooper when describing the propensity to spend long hours in the workplace of employees who feared for their jobs (Chapman, 2005). Presenteeism has been gaining on the popularity since the last two decades (Johns, 2010; Ruhle & Schmoll, 2021). Whether an employee should stay at home or go to work when sick is not entirely clear. Working while sick is undeniably associated with lower productivity (Henderson & Smith, 2022; Schultz & Edington, 2007). A separate concern, as indicated by Barmby and Larguem (Barmby & Larguem, 2009), is the possible spread of the disease to other colleagues. Research on presenteeism addresses both the issue of the definition itself and the impact on business operations, and is very often conducted parallelly with studies on employee sickness absence. However, it should be emphasized that research on absenteeism's determinants is predominant in the literature, compared to presenteeism. Moreover, as Kinman underlines an increasing number of studies indicate that both incidence and cost are significantly higher for presenteeism, compared to absenteeism (Kinman, 2019; Vänni et al., 2017). Moreover, investigating presenteeism is much more challenging than absenteeism. Nor has any so-called 'gold standard' for measuring presenteeism been developed so far (Kinman, 2019). This is probably due to the fact that it is very often "hard to spot" behavior. Measuring it would therefore require a considerable investment of both time and cost in a given company. However, an intermediate solution to support companies in recognizing and preventing widespread presenteeism would seem to be to isolate the factors influencing its occurrence. Thus, it is essential to better understand the different reasons employees give for going to work despite illness (see Figure 1).

The majority of empirical studies have focused on identifying correlates of the attendance phenomena (Johns, 2011; Miraglia & Johns, 2016), while little research has been conducted to understand the psychological processes of individuals that lead to the decision to attend work or not when sick (Gosselin et al., 2013). Interestingly, research on sickness absenteeism and sickness presenteeism has mainly developed along parallel paths, even though the phenomena are the result of a complex decision-

Figure 1: Decision-integrated model of employees presenteeism



Source: own elaboration based on Lohaus & Habermann (2019).

making process that excludes the other alternative (Halbesleben et al., 2014; Johns, 2011; Lohaus & Habermann, 2019).

Research into the determinants of presenteeism is sorely needed, as a prolonged period of presenteeism negatively affects the future health of the worker (Gustafsson et al., 2019; Gustafsson & Marklund, 2014). There is therefore a research gap concerning holistic approach to analyze motives of presenteeism among employees especially from gender and geographical-dependency perspectives. Moreover, as the phenomenon of presenteeism is intrinsically linked to illness and thus to sickness absence. In order to limit the negative effects of sickness absence activation policy in the form of graded (partial) sickness insurance arrangements have been created (Markussen et al., 2010). These arrangements were created as a countermeasure to the increasing sickness absence of employees and as a remedy for labor market exclusion related to temporary work incapacity. Markussen Mykletun, and Røed stress that most employee absenteeism is due to non-communicable diseases, which do not necessarily result in the need for full absence from work (Markussen et al., 2012). Countries have therefore decided to introduce graded (partial) sickness insurance to cover losses due to reduced productivity, but with an obligation on the employee to use his or her remaining capacity to work. To achieve this, doctors are obliged to determine the fraction of work capacity that has been lost due to illness (Markussen et al., 2012). Thus, the employee performs the work in the fraction indicated by the doctor and is paid according to this.

In this study we identify the determinants of health presenteeism in European countries from a country and gender perspective, assuming that there is a differentiation in the nature of the motives (person-, work-, and organizational-related) that drive women and men when choosing to work during illness. We identified the following research questions:

i) Are men motivated by economic issues and women guided by so-called emotional factors when choosing to work during illness?

ii) Does the presenteeism depend on the type of employment contract?

iii) Are family members with many children more likely to work during illness?

iv) Can an activation strategy aimed at exploiting the partial work capacity of people on sickness benefit contribute to increasing presenteeism?

Our paper proceeds as follows. In the next section, we review the existing literature and identify factors influencing women's and men's propensity to work during illness. In the next section, we select questions on presenteeism from the European Working Conditions Surveys between 2010 and 2021, followed by an empirical analysis on the basis of statistical data obtained from Eurofound for available years: 2010, 2015 and 2021. In the first part, we base the empirical analysis on a statistical exploration of the data from a gender and geographic perspective. In the second part of the

Table 1: Factors determining health-related presenteeism in literature studies

Category	Subcategory	Variables	Examples of references
Socio-economic security and health	Job/career security and development	Tend to agree and strongly agree that job offers good prospects for career advancement Tend to agree and strongly agree with statements on losing job in 6 months Type of employment (indefinite employment contract, a temporary employment agency contract, an apprenticeship or other training scheme, no contract) Job position Job tenure	(Aronsson et al. 2000; Elstad and Vabø 2008; Luksyte et al. 2022; Miraglia and Johns 2016; Reuter et al. 2019; Ruhle and Süß 2020; Sendén et al. 2016)
	Career opportunities	Opportunities to move ahead in my job or career	(Caplan et al., 1975; Caverley et al., 2007)
	Adequate earnings/ financial security	Tend to agree and strongly agree to be well paid for the work Household is very easily and easily able to make ends meet	(Aronsson & Gustaffon, 2005; Kwon, 2020; Reuter et al., 2019)
	Self-perceived health	General health (How is your general health (physical and mental) in comparison to other people of your age?)	(Bergström et al. 2009; Biron et al. 2006; Sendén et al. 2016)
Work conditions and organization	Health and safety at work	Very satisfied and satisfied with working conditions Health or safety is at risk because of work	(Biron et al. 2022; Kwon 2020; Schnabel 2022)
	Job stress	Number of times that a relatively high level of job stress was reported on the four items	(Elstad & Vabø, 2008)
	Work intensity	Workload, Length of working hours (per week, day, month) Time pressure (Do you skip lunch because of time pressure? Does your job involve working at very high speed?)	(Aronsson & Gustaffon, 2005; Biron et al., 2006; Caverley et al., 2007; Elstad & Vabø, 2008; Eurofound, 2023; Sendén et al., 2016)
	Autonomy	Pace of work is dependent, or not, on the direct control of boss	(Arnold, 2016; Miraglia & Johns, 2016)
	Collective interest representation and type of working sector	Existence at company trade union, works council or committee representing employees, working in: private/public sector, joint private-public organization or company, non-for-profit sector	(Aronsson et al. 2000; Baker-McClearn et al. 2010b; Bergström et al. 2009)
	Size of company	Number of people in total work at the workplace	(Knani, 2021; Reuter et al., 2019)

Table 1: Factors determining health-related presenteeism in literature studies, cont.

Category	Subcategory	Variables	Examples of references
Gender balance and job satisfaction	Gender balance	A man being an immediate boss Gender pay gap	(Azmat et al., 2022; Kwon, 2020)
	Job satisfaction	The feeling of often and always doing useful work Being often and always involved in improving the work organization or work processes of the department or organization	(Caverley et al., 2007; Rodríguez-Cifuentes et al., 2020; Vera-Calzaretta et al., 2014)
Household status	Size of household, marital status	Number of children at home, married/not married	(Gosselin et al., 2013; Hansen & Andersen, 2008; Sendén et al., 2016; Vera-Calzaretta et al., 2014)
Corporate culture	Supervisor	The help and support of the manager: always and often Tend to agree and strongly agree that employees trust management	(Caverley et al., 2007; Garrow, 2016)
	Workplace conflicts	Tend to agree and strongly agree that conflicts are resolved in a fair way	(Biron et al., 2006; Lakiša et al., 2022)
	Peer support	Colleagues or peers always and often help and support	(Caverley et al., 2007; Garrow, 2016; Kwon, 2020)
	Job control	The ability to influence what happens on the job	(Arnold, 2016; Miraglia & Johns, 2016)

Table 1: Factors determining health-related presenteeism in literature studies, cont.

Category	Subcategory	Variables	Examples of references
Skills and working section	Education	The level of education	(Bergström et al., 2009; Elstad & Vabø, 2008; Gustafsson & Marklund, 2011; Kwon, 2020; Lakiša et al., 2022; Luksyte et al., 2023)
	Sector of economy (NACE)	Employment in: agriculture, commerce and hospitality, construction, education, financial services, health, industry, other services, public administration, transportation and storage	(Abdi et al., 2021; Rodríguez-Cifuentes et al., 2020; Strömberg et al., 2017)
Age	Age group	Age-group classification	(Aronsson et al., 2000; Aronsson & Gustaffon, 2005; Elstad & Vabø, 2008; Gustafsson & Marklund, 2011; Lakiša et al., 2022; Reuter et al., 2019; Sendén et al., 2016)
Gender	Gender differentiation	Men/women classification	(Aronsson & Gustaffon, 2005; Bergström et al., 2009; Kwon, 2020; Luksyte et al., 2023; Sendén et al., 2016)
Work-life balance	Work-family conflict	Feeling that work commitments limit family contacts	(Arslaner & Boylu, 2017; Gillet et al., 2021; Sendén et al., 2016)
Personal motivations	Health-related, work psychological, related factors	Belief that no one else can do the job, loyalty to own professional image, commitment to colleagues, clients and organization, Fear of passing on illness, guilt, overcommitment	(Baker-McClearn et al. 2010a; Biron et al. 2006; Yildirim et al. 2013; Rodríguez-Cifuentes et al. 2020)
Workplace pressure	Workplace environment	Belief that attending work sets a good example, provides strong social network, loss of performance-related incentives	(Baker-McClearn et al. 2010a; Yildirim et al. 2013)

empirical analysis, we use econometric modelling of the determinants of presenteeism in selected European countries. Conducted in this way, it allows for comprehensive inference. Next, we make a presentation of the results in order to seamlessly move on to discussing them and relating them to the current state of research in Europe.
Work-attendance behavior studies have attracted scientific interest recently more then ever. Some researchers trace the causes of this situation to the covid-19 pandemic, which changed perceptions of the workforce's morbidity (Ferreira et al., 2022). The situation of attendance (presenteeism) or non-attendance (absenteeism) despite illness is analysed by researchers separately (Casini et al., 2013; Hesselius, 2007; Kigozi et al., 2017; Marklund et al., 2021) or in combination (Caverley et al., 2007; Gosselin et al., 2013; Reuter et al., 2021). Research on the prevalence of presenteeism has been conducted from the perspective of individual countries (Guay et al., 2022; Lohaus et al., 2022; Sander et al., 2023), the Nordic countries (Marklund et al., 2021) and the European Union (Arnold, 2016). Information on presenteeism can also be found in regular surveys carried out by Eurofound (Eurofound, 2023).
The factors underlying health presentism are increasingly being investigated by researchers around the world (Chimed-Ochir et al., 2019; Ruhle & Süß, 2020). As Nowak et al. underline sickness of employees leads to important individual and organizational consequences (Nowak et al., 2023). The motives for health-related presenteeism have different origins and are gender specific (Sendén et al., 2016). The results of the literature analysis indicate that these can be divided into several or even a dozen distinct groups, collecting factors of a similar nature (Eurofound, 2023). The study in this article is based on the groups whose division is used in Eurofound research. The factors that may influence the development of health-related presenteeism are summarised in Table 1, and we have chosen to allocate them to the categories and subcategories most commonly found in the literature in conjunction with the methodology used by Eurofound. The literature references presented are a guide for further research, not a closed catalogue.

2 Data and methods

2.1 Data analysis

The analysis of presenteeism in Europe was carried out on the basis of statistical data obtained from Eurofound (Eurofound, 2023). We included over 25,000 individuals who responded to the each of 5th, 6th and 7th waves of the European Working Conditions (EWCS 2010 and 2015) and European Working Conditions Telephone Survey (EWCTS 2021). We analyzed the share of people (women and men) who over the past 12 months worked when they were sick in total working population. The research was conducted for 31 European countries (the data concern the countries, as these are the geographical units for which the presenteeism indicators are available). We analyzed: Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus

(CY), the Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), the Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TU), and the Great Britain (GB).

Presenteeism status is strongly related to gender. On average, in years 2010-2021, more European female tended to work when they were sick than men (37.9% of female, 33.8% of male). Moreover, the analyzed phenomena had large relative variation (CV greater than 10%) (Kelley, 2007). Distribution of variable for women's presenteeism in the analysed countries was moderately left-skewed (in the majority of countries, the values of women's presenteeism were significantly higher than the average), while for men's it was positive. However, for both gender groups, fewer values were close to the mean (platykurtic distribution) (Hair et al., 2022). In general, the share of population who over the past 12 months worked when they were sick in the analyzed countries was characterized by a steady decrease over the study period (an average annual drop of about 25% women and 23% men). The fast dynamics of decrease in the variation of presenteeism was also noticed (a decrease of about 21 p.p. for females and 36 p.p. for males). Table 2 displays the summary statistics of the data.

From a regional perspective, European countries were characterized by large distortions in the presenteeism. We also investigated and revealed the statistically significant differences between the presenteeism for men and women in European countries (Mann-Whitney $U = 355.5$, $p = 0.05$), Figure 2.

In 2010-2021, noticeably the highest proportion both for women and men who over the past 12 months worked when they were sick in Denmark, Malta, Sweden, and Great Britain, while the lowest in Bulgaria and Romania. However, it can be clearly seen on the maps in Figure 2 that the presenteeism of females was less spatially diversified than for males in Europe. Over the analyzed period, regardless of gender, a clear division of continental Europe into the "greater tendency towards presenteeism" western part and the less willing-to-presenteeism eastern part can easily be seen.

Data presented on maps in Figure 2 show that neighbouring European countries are grouped into homogeneous areas of females' and males' willingness to presenteeism (presented a spatial tendency). Reuter et al. (Reuter et al., 2021) concluded that choosing the presenteeism may be associated with a unobserved (hidden) compositional tendency toward regional concentration of the process determinants, i.e. socio-demographic, occupational covariates, the informal work, European labor law, or the spread of diseases in the surrounding areas. Moreover, Steidelmüller et al. (Steidelmüller et al., 2020) indicated a strong relationship between telework and sickness presenteeism that is robust and similar across neighboring countries (with respect to differences in occupations). On the other hand, Peter et al. (Peter et al., 2023) found cross-country differences in regard to the presenteeism

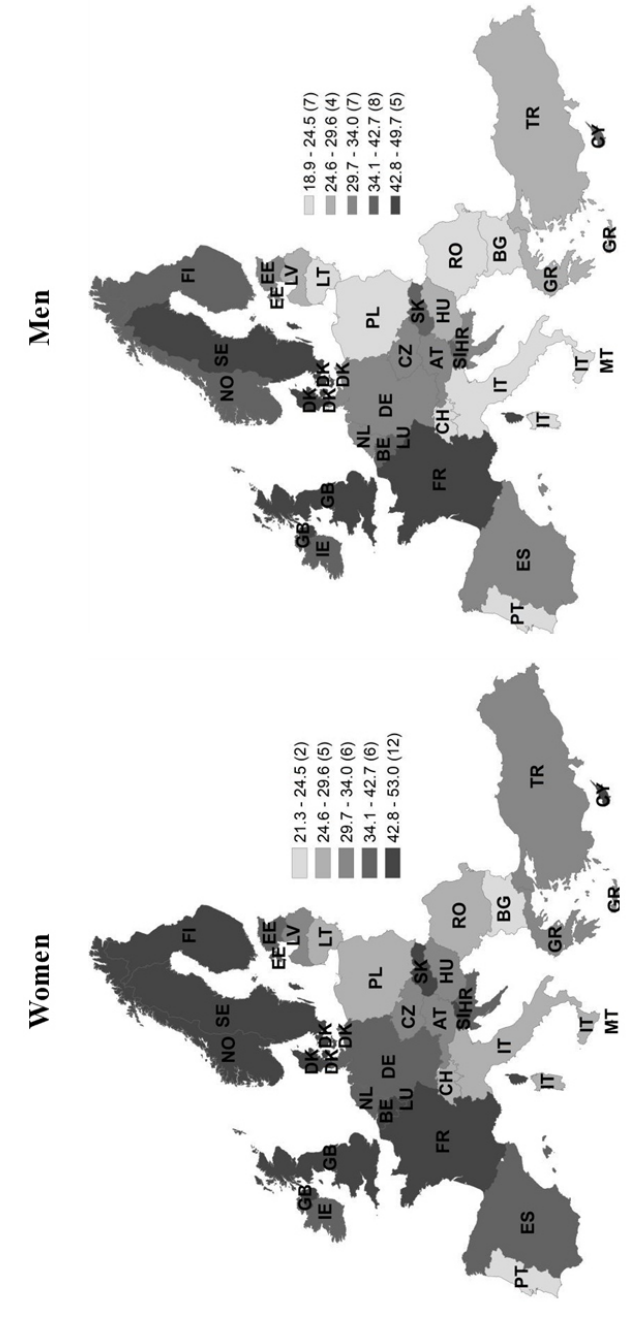


Figure 2: Presenteeism of females and males in European countries in selected years (averaged over years 2010, 2015, 2021) [in %]

Table 2: Summary statistics (averaged over years: 2010, 2015, 2021) of share of people with declaration of being sick in work [as % of working population]

	Women	Men
Mean	37.9	33.8
	(−24.6)	(−23.2)
Median	37.4	32.2
	(−28.3)	(−22.9)
Minimum	21.3	18.9
	(18.8)	(23.8)
Maximum	53.0	49.7
	(−32.4)	(−34.9)
Standard Deviation, SD	9.2	1.6
	(−40.1)	(−50.7)
Coefficient of Variation, CV	24	27
	(−20.6)	(−35.8)
Skewness	-0.003	0.1
	(−55.1)	(8.6)
Kurtosis	-1.2	-1.0
	(199.0)	(81.2)

Note: in parentheses, we computed the changes between 2010 and 2021 to show diversity over time in percentage points, p.p.

which could be of particular relevance since the labor market is becoming increasingly globalized, and companies have to establish occupational health management across countries with differing culture-related work attitudes.

In our study we applied the global spatial autocorrelation measure (Moran's I) to explore of spatial tendency in presenteeism of Europeans (Anselin & Florax, 1995). We used the distance-based (DB) option to construct spatial weights matrix **W**. The spatial weights matrix constructed from a distance measure was obtained when i and j were considered neighbors whenever j falls within a critical distance band from i. In order to avoid isolates (islands) the distance was chosen such that each location had at least one neighbor. The function identified neighbours of area points by Euclidean distance with a distance range. In the case of our analysis of polygons, calculations were based on centroids (Antczak, 2018).

The results presented in Table 3 highlight how sick presenteeism is inextricably linked to geography and demonstrate that it varies spatially. The adjacent countries tended to cluster according to the share of people who over the past 12 months worked when they were sick, but the unclear fluctuations occurred in 2021. The changes had no

clear pattern but the further analysis of GWR explores and explains why this spatial structuring is observed.

Table 3: Spatial autocorrelation of presenteeism measured by Moran's I statistics, in years 2010, 2015 and 2021

	2010	2015	2021	Mean values (2010-2021)
Women	0.09*	0.18**	0.06*	0.13*
Man	0.10*	0.24**	0.08*	0.19**

Note: significance levels: $\alpha = 0.10^{*}, 0.05^{**}, 0.01^{***}$.

2.2 Potential determinants of europeans' presenteeism

The presenteeism is a complex problem. The drivers of presenteeism are diverse and vary between individuals, organisations, and regions (Baker-McClearn et al., 2010a; Nordenmark et al., 2019). Many variables are possible predictors of presenteeism in Europe. Taking into account the availability of data and those variables defined in the literature, we suggest a wide range of gender- and country-specific determinants of the phenomena (see Table 4). The data were collected from the Eurofound or Eurostat and grouped into 8 categories and 17 subcategories.

2.3 Methodology

The Ordinary Least Square (OLS) approach to the empirical analysis of spatial data is to build a global model that assumes stationary – in all parts of the studied geographical area relationships between dependent and independent variables (1):

$$y_i = \beta_0 + \sum_{k=1}^{m} \beta_k x_{ik} + \varepsilon_i \tag{1}$$

where y_i is the dependent variable at location i, x_{ik} $(k = 1, \ldots, m)$ is the k-th independent variable at location i, β_0 is the intercept for location i, β_k is the local regression coefficient for the k-th independent variable at location i and ε_i is the random error at location i, which is assumed to be independent and identically distributed normal random variable with mean zero and constant variance σ^2 (Antczak, 2019).

The GWR is a technique that models geographically non-stationary relationship. Compared with the basic regression (1), the coefficients in GWR are functions of spatially varying location (Matthews & Yang, 2016). Thus, the coefficient β_k takes different values for each region (here for each European country). This method generates a separate regression equation for each location (Fotheringham et al., 2002):

Table 4: Potential determinants of gender presenteeism in Europe

Category	Subcategory	Abbr.	Description of the variable	Available time span
Socio-economic security and health	Job/career security and development	PCAR	Tend to agree and strongly agree that job offers good prospects for career advancement [in %]	2015, 2021
		MLJ	Tend to agree and strongly agree with statements on losing job in 6 months [in %]	2010, 2015, 2021
		IC	Indefinite employment contract [in %]	2010, 2015, 2021
		FTC	A fixed term contract [in %]	2010, 2015, 2021
		TE	A temporary employment agency contract [in %]	2010, 2015, 2021
		ATS	An apprenticeship or other training scheme [in %]	2010, 2015, 2021
		NC	No contract [in %]	2010, 2015, 2021
	Adequate earnings/ financial security	LP	Tend to agree and strongly agree to be well paid for the work [in %]	2010, 2015, 2021
		EE	Household is very easily and easily able to make ends meet [in %]	2010, 2015, 2021
	Self-perceived health	SPH	Self-perceived health: very good and good [in %]	2010, 2015, 2020
Work conditions	Health and safety at work	SWC	Very satisfied and satisfied with working conditions [in %]	2010, 2015, 2021
		RW	Health or safety is at risk because of work [in %]	2010, 2015, 2021
	Work intensity	HWPW	Hours worked per week of full-time employment [in hours per employee]	2010, 2015, 2021
	Autonomy	BC	Pace of work is dependent, or not, on the direct control of boss [in %]	2010, 2015

Table 4: Potential determinants of gender presenteeism in Europe, cont.

Category	Subcategory	Abbr.	Description of the variable	Available time span
Work conditions	Collective interest representation	TU	Existence at company trade union, works council or committee representing employees [in %]	2010, 2015, 2021
		JPRS	Working in private sector [in %]	2010, 2015, 2021
		JPUS	Working in public sector [in %]	2010, 2015, 2021
		JPPOC	Working in joint private-public organization or company [in %]	2010, 2015, 2021
		NGO	Working in non-for-profit sector [in %]	2010, 2015, 2021
	Size of company	SCT49	Number of people in total work at the workplace - below 49 [in %]	2010, 2015, 2021
		SCA49	Number of people in total work at the workplace – above 49 [in %]	2010, 2015, 2021
Gender balance and job satisfaction	Gender balance	GIB	A man being an immediate boss [in %]	2010, 2015, 2021
		GPG	Gender pay gap in unadjusted form [in %]	2010, 2015, 2021
	Job satisfaction	DUW	The feeling of often and always doing useful work [in %]	2010, 2015, 2021
		WO	Being often and always involved in improving the work organization or work processes of the department or organization [in %]	2010, 2015, 2021
Household status	Size of household	OCH	Distribution of households with children by number of children - one child [in %]	2010, 2015, 2020
		FCH	Distribution of households with children by number of children – four children [in %]	2010, 2015, 2020

Table 4: Potential determinants of gender presenteeism in Europe, cont.

Category	Subcategory	Abbr.	Description of the variable	Available time span
Corporate culture	Supervisor	BSUP	The help and support of the manager: always and often [in %]	2010, 2015
		TR	Tend to agree and strongly agree that employees trust management [in %]	2010, 2015
	Workplace conflicts	CRES	Tend to agree and strongly agree that conflicts are resolved in a fair way [in %]	2010, 2015
	Peer support	CSUP	Colleagues or peers always and often help and support [in %]	2010, 2015, 2021
Skills and working section	Education	TEA	The highest successfully completed level of education or training: tertiary educational attainment [in %]	2010, 2015, 2020
		EPE	The highest successfully completed level of education or training: early childhood education and Primary education [in %]	2010, 2015, 2020
	Sector of economy (NACE)	N_A	Employment in agriculture [in %]	2010, 2015, 2021
		N_CH	Employment in commerce and hospitality [in %]	2010, 2015, 2021
		N_C	Employment in construction [in %]	2010, 2015, 2021
		N_E	Employment in education [in %]	2010, 2015, 2021
		N_FS	Employment in financial services [in %]	2010, 2015, 2021
		N_H	Employment in health [in %]	2010, 2015, 2021
		N_I	Employment in industry [in %]	2010, 2015, 2021
		N_OS	Employment in other services [in %]	2010, 2015, 2021
		N_PA	Employment in public administration [in %]	2010, 2015, 2021

$$y_i = \beta_0 (u_i, v_i) + \sum_{k=1}^{m} \beta_k (u_i, v_i) x_{ik} + \varepsilon_i \tag{2}$$

where (u_i, v_i) are the location coordinates.
The parameter estimation obtained for each location describes the equation (3):

$$\widehat{\boldsymbol{\beta}} = \left(\mathbf{X}^T \mathbf{W} (u_i, v_i) \mathbf{X}\right)^{-1} \mathbf{X}^T \mathbf{W} (u_i, v_i) \mathbf{Y} \tag{3}$$

where $\widehat{\boldsymbol{\beta}}$ is the vector of elements $k, \mathbf{X}^T \mathbf{W} (u_i, v_i) \mathbf{X}$ is the geographically weighted variance-covariance matrix, $\mathbf{W} (u_i, v_i)$ is the diagonal matrix $(n \times n)$ of spatial weights with non-zero diagonal elements and w_{ij} is the geographical weight, referring to the surroundings of location idefined by coordinates (u_i, v_i). Most commonly, the coordinates (u_i, v_i) indicate location i's geographic centre and the location of each point where an observation was made, so that $\mathbf{W} (u_i, v_i)$ = diag elements $(w_{i1}, w_{i2}, \ldots, w_{in})$. The model parameter estimation (3) is achieved by using the weighted least square method and assigning different weights to each unit.
To explore local relations, we applied the weighting scheme $\mathbf{W}$ calculated with a fixed Gaussian kernel function based on the proximities between regression point i and the N data points around it (4). This weighting function was employed because it best fits the model, but several options are possible for estimation of the bandwidth in GWR models (Charlton et al., 2009).

$$w_{ij} = \exp\left[-\frac{1}{2}\left(\frac{d_{ij}}{b}\right)^2\right] \tag{4}$$

where d_{ij} is the Euclidean distance between locations i and j in geographical space and b is the bandwidth; that is, the radius of the circle containing points that are considered still influential in the formation of the model parameters.
An optimum bandwidth can be found by minimising a model goodness-of-fit diagnostic (Loader, 1999) such as the cross-validation (CV) score (Fingleton, 1999), which accounts for model prediction accuracy only, or the Akaike information criterion (AIC) (Akaike, 1973). Thus, for a GWR model with a bandwidth b, its CV of bandwidth can be found by minimising the following expression (Brunsdon et al., 2000):

$$CV = \sum_{i=1}^{n} \sum_{j=1}^{n} \left[y_i - \hat{y}_{j \neq i}(b)\right]^2 \tag{5}$$

where $\hat{y}_{j \neq i}$ is a theoretical (estimated) value of the observation y_i.
The selection of the best GWR and robustness check analysis included: 1) estimation of the OLS parameters using a pseudo-stepwise regression and Akaike information criterion (AIC). OLS is a benchmark model to be compared to its GWR counterpart (Fotheringham et al., 2002), 2) identifying the spatial heterogeneity and non-stationarity in OLS using Koenker's studentized Breusch-Pagan test (Andy, 2005),

3) testing for multicollinearity and spatial dependency on the residuals. We therefore employed the measure of variance inflation factor (VIF) (Gollini et al., 2015) and Moran's I test (Leung et al., 2000) respectively.

3 Results and findings

3.1 Modelling outcomes

We conducted several stepwise regressions to identify predictive variables of the females' and males' presenteeism over the years: 2010, 2015, 2021. Moreover, it can be clearly seen, that the panel data set (Table 4) is not complete because of gaps with some variables for the period under study and the panel estimates are not possible to our dataset. Finally, to overcome the problems (regional variability, spatial non-stationarity and dependency), we estimated each GWR function – for women and men – to model the phenomena properly. We averaged the values for the aforementioned period of all variables and expressed them in natural logarithms as the log-log model better describes the relationship than other types of functions do (we checked for linearity with the RESET test, Table 6), (Reda et al., 2023). We used ArcGIS software v.10.6. Regression results (6)-(7) indicated the statistically significant relationship between the presenteeism in European countries and selected factors – gender-depended:

$$\begin{aligned} \mathrm{PR}_{\mathrm{women,i}} &= \gamma_0(\mathrm{u_i},\mathrm{v_i}) + \gamma_1(\mathrm{u_i},\mathrm{v_i})\,\mathrm{JPRS}_i + \gamma_2(\mathrm{u_i},\mathrm{v_i})\,\mathrm{CRES}_i + \\ &+ \gamma_3(\mathrm{u_i},\mathrm{v_i})\,\mathrm{A\_16\_24}_i + \gamma_4(\mathrm{u_i},\mathrm{v_i})\,\mathrm{N\_A}_i + \gamma_5(\mathrm{u_i},\mathrm{v_i})\,\mathrm{N\_CH}_i + \\ &+ \gamma_6(\mathrm{u_i},\mathrm{v_i})\,\mathrm{N\_E}_i + \gamma_7(\mathrm{u_i},\mathrm{v_i})\,\mathrm{FCH}_i \qquad (6) \\ \mathrm{PR}_{\mathrm{men,i}} &= \alpha_0(\mathrm{u_i},\mathrm{v_i}) + \alpha_1(\mathrm{u_i},\mathrm{v_i})\,\mathrm{JPUS}_i + \alpha_2(\mathrm{u_i},\mathrm{v_i})\,\mathrm{TR}_i + \\ &+ \alpha_3(\mathrm{u_i},\mathrm{v_i})\,\mathrm{GPG}_i + \alpha_4(\mathrm{u_i},\mathrm{v_i})\,\mathrm{EE}_i + \alpha_5(\mathrm{u_i},\mathrm{v_i})\,IC_i + \\ &+ \alpha_6(\mathrm{u_i},\mathrm{v_i})\,\mathrm{N\_C}_i + \varepsilon_i, \qquad (7) \end{aligned}$$

where: PR – the share of people (women and men) who over the past 12 months worked when they were sick in total working population, $(\mathrm{u_i},\mathrm{v_i})$ denotes the coordinates (longitude, latitude) of the destination location i, for $\mathrm{i} = 1, 2, \ldots, 31$ countries, $\gamma_k(\mathrm{u_i},\mathrm{v_i})$ are structural parameters of the weighted regression model and ε_i is the random error at location i.

Table 5 contains the local results of GWR modelling of the women's and men's presenteeism in European countries and Table 6 presents diagnostic statistics of the models. The results of the modeling significantly improved employing the GWR function (6) and (7).

Firstly, results of the spatial non-stationarity diagnostics (Koenker-Bassett) were found to be statistically significant ($\mathrm{p} < 0.05$), indicating that associations between presenteeism of men and women with at least one or more independent variables were

Table 5: Local results of GWR modelling of the men's and women's presenteeism in European countries

	Women						Men						
	JPRS	CRES	A16_24	N_A	N_CH	N_E	FCH	JPUS	TR	GPG	EE	IC	N_C
AT		−3.41**	0.62	-0.06	0.72*	0.14	0.03	0.47	−1.12	0.05	0.39	0.55	−0.37
BE		−2.37**	0.19	−0.16	0.29	0.84	0.19	−0.28	−1.72	−0.13	0.39	1.29	−0.28
BG	−0.75*	−2.94**	0.37	−0.25**	0.69**	0.09	0.06	0.73**	−0.94	0.22*	0.27	−0.97***	−0.51*
CH		−2.81***	0.41	−0.13	0.62*	0.44	0.08	0.3	−1.35	0.02	0.41	0.43	−0.39
CY		−2.56**	0.25	−0.35***	0.64**	0.17	0.15	0.66*	−1.29*	0.27**	0.24	−0.82**	−0.29
CZ		−3.97*	0.62	−0.04	0.72	0.08	0.04	0.31	−1.16	0.02	0.38	1.19	−0.27
DE	0.19	−3.42	0.32	−0.11	0.61	0.30	0.14	−0.15	−1.54	−0.08	0.36	1.91	−0.24
DK	−0.17	−1.8***	0.25*	−0.19	0.38	0.49	0.14	0.5	−0.76	0.12	0.29	0.24	−0.22
EE	−0.68	−0.59	0.08	−0.34	0.52	0.60	0.26	0.85*	−0.32	0.32*	0.31	−1.29	−0.03
ES	−0.13	−2.24***	0.29*	−0.23**	0.59***	0.48*	0.17*	0.83***	−0.82*	0.17*	0.29**	−0.82	−0.47*
FI	−0.69	−0.51	0.16	−0.35	0.54	0.86	0.25	0.73	−0.43	0.34	0.37	−1.54	0.09
FR	−0.07	−2.43**	0.36	−0.23**	0.65**	0.69*	0.12	0.27	−1.34	−0.01	0.40*	−0.12	−0.39
GB	0.041	−2.19***	0.27	−0.20	0.45	0.76	0.16	0.35	−0.99	0.07	0.34	0.09	−0.42
GR	−0.64*	−2.71***	0.32	−0.27***	0.68***	0.15	0.09	0.83**	−0.89	0.25**	0.25*	−1.06***	−0.49*
HR	−0.69	−3.58**	0.80	−0.06	0.77*	0.03	0.03	1.15**	−0.51	0.2	0.34*	−1.23	−0.64
HU	−0.63	−3.92	0.82	-0.08	0.77	0.05	0.01	0.96	−1.19	0.17	0.44	0.08	−0.55
IE	−0.04	−2.09***	0.27*	−0.21*	0.48*	0.66*	0.16	0.52	−0.99*	0.11	0.33**	−0.15	−0.38
IT	−0.57	−2.92***	0.54*	−0.11	0.71**	0.13	0.07	0.96***	−0.62	0.20*	0.33**	−1.43**	−0.58*
LV	−0.55	−1.07	0.11	−0.28	0.48	0.49	0.23	0.89**	−0.31	0.28**	0.27*	−0.94	−0.12
LT	−0.53	−0.85	−0.05	−0.34	0.48	0.46	0.31	1.02**	−0.15	0.33**	0.25	−1.13	−0.19
LU	−0.27	−2.49	0.15	0.01	−0.02	0.39	0.13	−0.43	−1.71	−0.21	0.29	1.23	−0.23
MT	−0.54*	−2.63***	0.35**	−0.22**	0.67***	0.22	0.09	0.95***	−0.66	0.23**	0.27**	−1.24***	−0.56**
NL	0.03	−2.43*	0.19	−0.14	0.15	0.84	0.23	−0.54	−2.05	−0.15	0.61	2.00	−0.36
NO	−0.52	−0.92	0.22	−0.19	0.26	0.35	0.13	0.59	−0.54	0.19*	0.32*	−0.50	−0.02
PL	−0.23	−2.63**	0.18	−0.17	0.54*	0.31	0.19	0.93**	−0.36	0.22*	0.28*	−0.38	−0.26
PT	−0.20	−2.13***	0.26**	−0.23**	0.53***	0.47*	0.16*	0.83***	−0.81*	0.18**	0.28**	−0.82**	−0.43**
RO	−0.77	−3.19**	0.47	−0.18	0.70**	0.06	0.03	0.74	−0.93	0.21*	0.31	−0.89*	−0.49*
SE	−0.6	−0.65	0.21	−0.22	0.30	0.49	0.17	0.59	−0.33	0.25	0.41	−0.99	0.11
SI	−0.63	−3.55*	0.82	−0.06	0.77	0.09	0.02	0.93	−0.84	0.14	0.41	−0.21	−0.51
SK	−0.57	−3.92	0.71	−0.06	0.75	0.06	0.02	0.84	−1.33	0.16	0.48	0.34	−0.39
TR	−0.62	−2.56**	0.24	−0.37**	0.64**	0.19	0.16	0.53	−1.36**	0.26**	0.24	−0.71*	−0.22

Note: significance levels: $\alpha = 0.10^{*}, 0.05^{**}, 0.01^{***}$. In the modeling we selected the statistically significant determinants with VIF values that did not exceed 2.0 and for which local multicollinearity problem was subsequently solved with principal components method (PCA) (HervÃ© & Williams, 2010); the correlation matrix, all results of VIF and principal components analysis are available by Author's e-mail.

spatially heterogeneous. Secondly, GWR models had a markedly better fit to the empirical data. The value of the adjusted R-squared for women increased to 0.84 in the GWR; for men, it rose to 0.81. The AIC's value for women declined from 345.9 in the OLS to 215.7 in the GWR; for men, it ranged from 218.1 in OLS to 104.3 in GWR. The Moreover, the Jarque-Bera statistic indicated that the residuals were normally distributed. The Moran's I was not statistically significant, so any spatial dependencies which might have been present in the residuals for the global model have been removed with the geographical weighting in the local modelling. We also found that the rate of men's and women's presenteeism is spatially dependent and strongly diversified across Europe (Figure 2, Table 3). Thus, the assumption of stationarity or structural stability over space is generally unrealistic, since the parameters tend to vary over the study area and determine the territorially varying relationships between presenteeism and selected factors. All these results highlight that the OLS techniques were not the best approach for modeling the presenteeism in Europe. Therefore, we needed to change the modeling approach. Under the circumstances, the local spatial regression modeling approach performed better than the OLS, since the GWR can explore the local relationships and account for spatial non-stationarity characteristics. As a conclusion, the local parameter estimates of GWR-based technique that denote local relationships are "groupable", thus we can capture some major trends and spatial variation patterns of presenteeism among European countries.

Table 6: Diagnostics for models of men's and women's presenteeism

Diagnostics	Women		Men	
	OLS	GWR	OLS	GWR
R-Squared	0.77	0.96	0.73	0.93
Adjusted R-Squared	0.71	0.84	0.68	0.81
AICc	345.9	215.7	218.1	104.3
Moran's I	0.09^{*}	-0.01	0.12^{**}	-0.03
Koenker-Bassett (BP)	9.9^{*}	-	9.62^{**}	-
Jarque-Bera	4.1	2.4	4.7	1.1
Ramsey's RESET	11.4^{**}	-	14.2^{**}	-

Note: significance levels: $\alpha = 0.10^{*}, 0.05^{**}, 0.01^{***}$.

3.2 Interpretation

The first empirical finding suggests that the working in private sector ($JPRS_i$), having the trust to management (TR_i) and conviction that the conflicts are resolved in a fair way ($CRES_i$), owing an indefinite employment contract (IC_i), employment in the agriculture (N_A_i) and construction (N_C_i) sectors decrease the presenteeism.

In turn, working in public sector ($JPUS_i$), in education (N_E_i), commerce and hospitality (N_CH_i), the distribution of households with four children (FCH_i), gender pay gap (GPG_i), and employees aged 16-24 ($A16\_24_i$) and household status that very easily and easily is able to make ends meet (EE_i) are positively correlated with the share of people who over the past 12 months worked when they were sick in total working population. However, the results of the conducted analysis are gender-dependent and indicate the spatial polarization of the impact of these factors on the Europeans tendency to presenteeism.

In years 2010-2021, a positive correlation between the share of women aged 16-24 in the total population ($A16\_24_i$) and presenteeism was observed in 6 of the analyzed countries: Denmark, Spain, Ireland, Italy, Malta and Portugal. The strongest relationship occurred for women in Malta and Italy (a rise in presenteeism from 0.35% to 0.54%, ceteris paribus). In the other countries, a 1% increase in the share of young women in the total population led to an increase in the presenteeism by 0.25% to 0.29%. A positive relationship between working population who over the past 12 months worked when they were sick and working in commerce and hospitality sector of economy (N_CH_i) was noticed in 15 countries located in the western and central-southern and eastern Europe. This factor has the highest impact on the absence rate in Croatia, Austria, Italy and Romania. An increase of 1% in the share of women working in commerce and hospitality sector generated an average increase in the presenteeism from around 0.70% in Romania to as much as 0.77% in Croatia (ceteris paribus). The share of women employed in the education sector factor (N_E_i) had a statistically significant and positive impact on women's presenteeism only in 4 of analyzed countries: Spain, France, Portugal and Ireland. A 1% increase in women's employment in the education sector generated an average rise in the sick presenteeism from 0.49% in Portugal to 0.69% in France, ceteris paribus. In turn, the employment in agriculture sector (N_A_i), working in the private sector ($JPRS_i$) and conviction that the conflicts are resolved in a fair way ($CRES_i$) occurred to have a statistically significant and negative impact on the women's presenteeism. Moreover, in terms of its value and regional range, the $CRES_i$ was the factor that most considerably affected the analyzed phenomena and spread over 68% of countries. It was the highest for Czech Republic (−3.97%), Croatia (−3.58%) and Slovenia (−3.55%). The lowest influence noted Denmark (1.8%). There was also a negative and statistically significant correlation between the women's employment in the private sector and the presenteeism but only in 3 of the analyzed countries located in south-eastern part of Europe: Bulgaria (−0.75%), Greece (0.64%) and Malta (−0.54%). The last important factor affecting the women's presenteeism was the share of women employed in the agriculture sector. This factor decreases the presenteeism in 9 countries (in the south-eastern and south-western of Europe). The highest negative and statistically significant relationship between these two variables was noticed in: Cyprus (−0.35%) and Turkey (−0.37%).

For men, there were three considerable variables that increased the presenteeism:

employment in public sector ($JPUS_i$), gender pay gap (GPG_i) and having household that very easily and easily is able to make ends meet (EE_i). As for the value of the coefficient, a notable factor is the $JPUS_i$. An 1% increase of employment in public sector led to increase of the presenteeism from 0.66% in Cyprus to 1.15% in Croatia. There was a positive and statistically significant correlation between the men's presenteeism and the employment in public sector in approximately 40% of the analyzed countries located in the south and east of Europe. In terms of its regional range, the gender pay gap was the factor that most considerably affected the men's presenteeism in Europe (this impact was noted in 50% of countries). An increase of 1% in GPG_i generated an average increase in presenteeism from around 0.17% in Spain to as much as 0.33% in Lithuania (ceteris paribus). A statistically significant relationship was observed for men in Norway and countries located in southern and eastern parts of Europe. Regarding the economic status of individual (having household that very easily and easily is able to make ends meet), the relationship with the dependent variable spread over the analyzed countries located in eastern and western Europe. Nonetheless, the highest parameter values (a rise in EE_i from 0.32% to 0.40%) were recorded in Norway, Italy, Ireland, Croatia, and France. The lowest values were noted in Greece (0.25%), Latvia (0.27%) and Malta (0.27%). There was a negative correlation between men's presenteeism and having the trust to management (TR_i), owing an indefinite employment contract (IC_i), or working in construction economy sector (N_C_i). An increase of 1% of TR_i resulted in the decline (from −0.81% to 1.36%) of men's presenteeism only in 5 countries: Cyprus, Spain, Ireland, Portugal and Turkey (ceteris paribus). Moreover, the increase in IC_i has a statistically significant impact on the quality of health in 8 of the analyzed countries. The highest decrease was recorded in Italy (by −1.43% on average) and Malta (by −1.24% on average), ceteris paribus. Finally, in the years 2010-2021, a statistically significant and negative impact of N_C_i was recorded in 7 of analyzed countries. Italy and Malta noted the highest drop of men's presenteeism within (−0.56%) and the Portugal the lowest (−0.43%) as the consequence of a 1% increase in share of employment in construction.

4 Discussion

Based on the survey, we can easily conclude that the phenomenon of presenteeism appears to be much more complex than employee sickness absence (Antczak & Miszczyńska, 2021). It has been repeatedly found in the literature that sick workers causes, in aggregate, much greater productivity losses than employee sickness absence (Miraglia & Johns, 2016; Yoshimoto et al., 2020).

The results of our study clearly demonstrate the validity of adopting a gender perspective in the analysis of presenteeism. Thus, the existence of different factors for women and for men was confirmed. The individual factors do not overlap, but their categories do. This is consistent with the findings presented by Kwon (2020),

Luksyte et al. (2022), and Sendén et al. (2016). Turning to the details, one factor definitely stands out in the case of women – conflicts are resolved in a fair manner (abbr. CRES), both from a spatial perspective and from the strength of its impact (Lakiša et al., 2022). In the case of men, there is no factor that stands out significantly, however, there are definitely more 'economic' factors than 'emotional' factors, as in case of women. Men working in the public sector were more likely than women to be willing to work during illness, which was also confirmed in the study by Bockerman and Laukkanen (2010), and Johansen, Aronsson, and Marklund (2014). Moreover, for Sweden, the study by Johansen et al. indicates a positive statistically significant relationship between presenteeism and working in the public sector. For men, the financial situation was also an important aspect (variable EE). Men having a good financial situation chose to work during their illness. The reason for this can be seen in the fact that if they had taken sick leave, it would have had a significant impact on household finances. Assuming they were in a relationship, an additional aspect becomes apparent here – the lower average earnings of women. Going on sick leave for a man would be more economically felt in the household than for a woman (Azmat et al., 2021). This also is connected with the gender pay gap, which also occurred to be statistically significant in some countries for men in our models (Azmat et al., 2020). Another factor influencing the occurrence of presenteeism among men is the type of employment contract. Our results indicate that men who are on an indefinite contract or even work without a contract are more likely to work while sick. These results are also confirmed by Johns study (2010) in terms of Scandinavian countries. Our study, however, did not confirm such a situation in the Scandinavian countries, which, though, is consistent with Virtanen et al. (2003). So the results are not always consistent with this factor and may be more dependent on organizational culture, as Garrow (2016) underlines. Management trust is also analyzed differently in the context of presenteeism. Lakiša et al. (2022) and Mori et al. (2023) pointed out that in situations when employees feel managers' support presenteeism is reduced. However, this was not confirmed in our study. This may be due to the fact that employees, knowing that they have good relation with the manager and feeling their trust, do not want to disappoint them by showing sickness absence.

In case of women, the phenomenon of presenteeism was more often noted in jobs where attendance has a great influence on other people's health and well-being (Lakiša et al., 2022). These professions include working in education, commerce and hospitality sectors (Aronsson et al., 2000). This may be due to the fact that the absence in these professions has a direct impact on customers (e.g. school children) and is associated with the sick person's sense of guilt (Biron et al., 2006). Moreover, women working in private sector were more prone to work while sick than men. Our results were consistent with Mandiracioglu et al. (2015). Our results also showed that women with children at home show presenteeism's' tendency, which coincides with Aronsson and Gustaffon (2005) and Aronsson et al. (2000) studies.

Our results show that there are countries for which the influence of multiple factors

was recorded simultaneously – regardless of gender – Spain, Malta, Portugal. On the other hand, however, there are countries for which no influence of factors on presenteeism was identified. Thus, countries such as Germany, Slovakia, Sweden, Hungary, Luxemburg and Finland should be analysed separately. In 2010-2021, the highest proportion for both sexes (more than 60 % – (Schnabel, 2022)) were noticed among others in Norway, Finland, Ireland, Denmark, Malta, Germany and Sweden, and the lowest in Bulgaria (exhibiting presenteeism below 25% (Schnabel, 2022)), which was also confirmed by Garrow (2016). The significant presenteeism in countries mentioned above can be explained by the introduction of graded sickness insurance arrangements. Countries that used such an arrangement with some variations included Germany, Sweden, Norway, Finland, GB and Denmark (Markussen et al., 2012; Schneider et al., 2016). Thus, our results are consistent with these studies.
Regardless of gender, we found some patterns in the regional variability of the coefficients of presenteeism rates across Europe. Similar spatial trends in changes in presenteeism can be seen in the Scandinavian countries and in the countries of Southeastern and Southwestern Europe – especially in Spain and Portugal. According to conviction that the conflicts are resolved in a fair way, central European countries show a similar regional trend in the reduction of presenteeism. On the other hand, the countries of Southern Europe, especially in the central part, stand out in terms of the growing sick-presence of people working in commerce and hospitality. For the gender pay gap in unadjusted form draws a cluster of countries, increasing the scale of presenteeism located in parts of northern and southeastern Europe (specifically Spain and Italy, Turkey, Finland). As the share of employees in the construction sector and with permanent contracts increased, presenteeism similarly decreased in the east, north-east and Spain and in southern Europe. However, for determinants such as age, the share of people working in agriculture and education, the distribution of households with four children, workers' trust in management, and the belief that the household is very easy and simple to manage, there is no clear spatial trend in Europe. We can distinguish certain individual countries that stand out in Europe (e.g. Malta, Bulgaria or Cyprus). This leads us to the conclusion that presenteeism should be analyzed separately in selected countries. Those spatial patterns detected in the spatial variability of the coefficients could be partly attributable to social security systems, political regimes, sick-pay policies, and sick-leave legislation systems (e.g., sickness insurance processes, sickness certification rule, the minimum contribution or employment period required to receive sickness benefits), which vary substantially across Europe (McCrudden, 2019). Our modelling outcomes indicated that the presenteeism is significantly higher in countries where employees are not entitled to full salary during sickness, hence, work absences due to long-standing sickness generate substantial costs for social protection systems (Antczak & Miszczyńska, 2021). For example, in Malta, Austria, and Italy, employers are required to continue paying full wages when employees fall sick, whereas in Greece, Ireland, Turkey, and Great Britain, these benefits take the form of a lump-sum allowance. In Denmark, the level

of benefit received depends on the individual's rate of pay and the number of hours worked (McCrudden, 2019). In turn, in Sweden, women took twice as many sickness absence days as men. Paid sick leave, therefore, is primarily focused on women. Given that employees' propensity to stay away from work is expected to be higher in countries with the least restrictive access to sickness benefits and the most generous entitlements (Chaupain-Guillot & Guillot, 2018), it is important to consider national labor market structures and employment rates by gender and age when analyzing these figures. International data on male and female sickness absence and labor force participation indicate that the gender disparity in sickness absence is correlated with the increased participation of women in the labor force, such as in Sweden and Norway compared to France (European Agency for Safety and Health at Work et al., 2014). The Czech Republic, Italy, Switzerland, Germany and Iceland are the examples of countries in which women are less likely to be a part of the labor force than men (Camilleri-Cassar, 2017; Lalive & Lehmann, 2020; Thorsteinsson et al., 2021).

Finally, it was also shown that whether people continue to work during illness depends on a number of factors, which can be categorized into numerous categories and subcategories. Research based on Eurofound surveys categorises factors into the following groups: job context, social environment, prospects and financial security, work organization, work intensity, working time, physical environment, health and well-being, skills, engagement and job fulfilment, work-life balance (Eurofound, 2023). As we believe that the approach used in Eurofound's research allows the broadest possible coverage of the factors influencing presenteeism, we decided to base our study on this classification. However, we also selected the factors potentially influencing presenteeism based on the analysis of other studies. Of particular relevance in this respect is the classification presented in Gosselin et al. (2013) study, that divided the factors into the following groups: health disorders, demographic factors and corporate culture factors. Miraglia et al., on the other hand, presented the following division: job and personal resources, job attitude and justice, other variables (like gender, age, education etc.), health and performance and constraints on absenteeism (Miraglia & Johns, 2016). It should be noted, that not all studies were based on such a wide range of factors. Retuer analysed demographic, socio-economic and health-related factors (Reuter et al., 2019), while there are a number of studies analysing presenteeism on the basis of only a few isolated factors, i.e. work-related factors (Rodríguez-Cifuentes et al., 2020), health-related factors (Biron et al., 2022; Yoshimoto et al., 2020), psychological environment (Biron et al., 2006) or the type of employment contract (Reuter et al., 2019).

A factor that undoubtedly also affects the incidence of presenteeism is remote working. It was not included in our study due to the lack of data in the database on which our study was based. However, it is worth mentioning that, the remote work is an increasingly common situation addressed by researchers. Can such behavior be classified as presenteeism? Opinions are divided on this matter. Remote work presenteeism is a phenomenon that emerged on a larger scale during the COVID-

19 pandemic. It is undoubtedly a more challenging phenomenon to detect than presenteeism itself, which also poses difficulties in quantification. As Ferreira et al. (2022) underlines working from home, despite the positive benefits brought also negative impacts for employees. According to Sachdeva et al. (2021) and Wang et al. (2021) while working remotely due to a health issue, the lack of peer and leader support, combined with high job demands, may result in physical inactivity, social isolation, poor work-life balance, procrastination, and loneliness. All this ensures that remote work presenteeism requires separate treatment and thus separate analysis.

5 Conclusions

The study aimed to identify the determinants of health presenteeism in European countries from a regional and gender perspective. We have presented the author's categorization of factors into categories and subcategories, which we believe holistically captures the determinants of presenteeism.

Our results indicate that the presenteeism in Europe is strongly related to gender and had large relative country-level variability. Men's presenteeism provided more significant territorial variation than women. However, men are more motivated by economic issues (e.g. earnings, etc.) when choosing to work during illness than women, who are guided by so-called emotional factors when choosing to work during illness.

It is also worth emphasizing that in some countries, the interaction of multiple factors on presenteeism has been noted. In Spain and Portugal, for example, we have observed that the share of women who over the past 12 months worked when they were sick in total working population is influenced by the conviction that the conflicts are resolved in a fair way, age of employees, employment in agriculture, commerce and hospitality and education sectors as well as by number of children in the household. In contrast, the tendency to presentism among men in Italy and Malta is determined by work in the public sector, on an indefinite employment contract, gender pay gap and household status that very easily and easily is able to make ends meet. On the one hand, the results of our study showed geographical dependencies between countries in the perspective of presenteeism, which justifies the use of GWR analysis, but on the other, it should be borne in mind that the results of such an analysis should not be generalised.

Finally, the outcomes of our analysis confirms that presenteeism not only challenges companies by creating a requirement to develop new organisational practices, but also highlights the need to design appropriate pay policies that would lead to an optimal amount of attendance at work. However, presenteeism cannot be analyzed only from the perspective of negative consequences – loss of productivity – as it can be assessed from two sides. That is why, in future research, we will try to focus on isolating the positive and negative effects of presenteeism in European countries. It would also be interesting to look at the direction of the research in terms of identifying

common behavior's regarding these effects of presenteeism in European countries. The results of our study and the need to select a GWR model also indicated that countries that have implemented the activation strategy should be analysed as an individual group. This will also be the focus of our future research. Moreover, our findings could be valuable for policy-makers and public health administration in the context of exploring the current policy landscape shaping approaches to the provision of work during illness, discussing policy gaps and opportunities for action in individual countries.

References

[1] Abdi F., Jahangiri M., Kamalinia M., Cousins R., Mokarami H., (2021), Presenteeism and work ability: development of the Persian version of the Stanford Presenteeism Scale (P-SPS-6) and measurement of its psychometric properties, *BMC Psychology* 9(1), available at: https://doi.org/10.1186/s40359-021-00617-3.

[2] Akaike H., (1973), Information theory and the maximum likelihood principle, [in:] *Selected Papers of Hirotugu Akaike*, [eds.:] B. N. Petrov & F. Csaki, Springer Series in Statistics (Per-spectives in Statistics), 199–213.

[3] Andy M., (2005), The ESRI Guide to GIS Analysis, Spatial Measurements and Statistics and Zeroing, Geographic Information Systems at Work in the Community, Esri Press.

[4] Anselin L., Florax R., (1995), Small Sample Properties of Tests for Spatial Dependence in Regression Models: Some Further Results, [in:] New Directions in Spatial Econometrics, [eds.:] L. Anselin, R. Florax, Springer, 21–74, available at: https://doi.org/https://doi.org/10.1007/978-3-642-79877-1_2.

[5] Antczak E., (2018), Building W Matrices Using Selected Geostatistical Tools: Empirical Examination and Application, *Stats* 1(1), 112–133, available at: https://doi.org/10.3390/stats1010009.

[6] Antczak E., (2019), Municipal Waste in Poland: Analysis of the Spatial Dimensions of Determinants Using Geographically Weighted Regression, *European Spatial Research and Policy* 26(2), 177–197, available at: https://doi.org/10.18778/1231-1952.26.2.09.

[7] Antczak E., Miszczyńska K. M., (2021), Causes of sickness absenteeism in europeanalysis from an intercountry and gender perspective, *International Journal of Environmental Research and Public Health* 18(22), 11823, available at: https://doi.org/10.3390/ijerph182211823.

[8] Arnold D., (2016), Determinants of the Annual Duration of Sickness Presenteeism: Empirical Evidence from European Data, *Labour* 30(2), 198–212, available at: https://doi.org/10.1111/labr.

[9] Aronsson G., Gustaffon K., (2005), Sickness presenteeism: prevalence, attendancepressure factors, and an outline of a model for research, *J Occup Environ Med.* 47(9), 958–966, available at: https://doi.org/10.1097/01.jom.0000177219.75677.17.

[10] Aronsson G., Gustafsson K., Dallner M., (2000), Sick but yet at work. An empirical study of sickness presenteeism, *Journal of Epidemiology and Community Health* 54(7), 502–509, available at: https://doi.org/10.1136/jech.54.7.502.

[11] Arslaner E., Boylu Y., (2017), Perceived organizational support, work-family/familywork conflict and presenteeism in hotel industry, *Tourism Review* 72(2), 171–183, available at: https://doi.org/https://doi.org/10.1108/TR-09-2016-0031.

[12] Azmat G., Hensvik L., Rosenqvist O., (2021), Workplace Presenteeism, Job Substitutability and Gender Inequality, Sciences Po Economics Discussion Paper, No. 2021–11, available at: https://doi.org/10.3368/jhr.1121-12014r2.

[13] Azmat G., Hensvik L., Rosenqvist O., (2022), Workplace Presenteeism, Job Substitutability and Gender Inequality, *The Journal of Human Resources* 1121–12014R2, available at: https://doi.org/10.3368/jhr.1121-12014r2.

[14] Baker-McClearn D., Greasley K., Dale J., Griffith F., (2010a), Absence management and presenteeism: the pressures on employees to attend work and the impact of attendance on performance, *Human Resource Management Journal* 20(3), 311–328, available at: https://doi.org/10.1111/j.1748-8583.2009.00118.x.

[15] Baker-McClearn D., Greasley K., Dale J., Griffith F., (2010b), Absence management and presenteeism: The pressures on employees to attend work and the impact of attendance on performance, *Human Resource Management Journal* 20(3), 311–328, available at: https://doi.org/10.1111/j.1748-8583.2009.00118.x.

[16] Barmby T., Larguem M., (2009), Coughs and Sneezes Spread Diseases: An Empirical Study of Absenteeism and Infectious Disease, *Journal of Health Economics* 28, 1012–1017, available at: https://doi.org/10.1016/j.jhealeco.2009.06.006.

[17] Bergström G., Bodin L., Hagberg J., Lindh T., Aronsson G., Josephson M., (2009), Does sickness presenteeism have an impact on future general health? *International Archives of Occupational and Environmental Health* 82(10), 1179–1190, available at: https://doi.org/10.1007/s00420-009-0433-6.

[18] Biron C., Brun J., Ivers H., Cooper C., (2006), At work but ill: psychosocial work environment and well-being determinants of presenteeism propensity, *Journal of Public Mental Health* 5(4), 26–37, DOI:10.1108/17465729200600029.

[19] Biron C., Karanika-Murray M., Ivers H., (2022), The health-performance framework of presenteeism: A proof-of-concept study, *Frontiers in Psychology* 13, 1029434, available at: https://doi.org/10.3389/fpsyg.2022.1029434.

[20] Bockerman P., Laukkanen E., (2010), What makes you work while you are sick? Evidence from a survey of union members, *European Journal of Public Health* 20(1), 43–46, available at: https://doi.org/10.1093/eurpub/ckp076.

[21] Brunsdon C., Fotheringham S., Charlton M., (2000), *Geographically Weighted Regressionas a Statistical Model*, University of Newcastle-upon-Tyne.

[22] Camilleri-Cassar F., (2017), About time: Gender equality in Malta's working-time regime? *Social Policy and Society* 16, 561–575, available at: DOI: https://doi.org/10.1017/S1474746416000294.

[23] Caplan R. D., Cobb S., French J. R. P., Van Harrison R., Jr P. S. R., (1975), Job demands and worker health: main effects and occupational differences, Research Report Series, National Institute for Occupational Safety and Health.

[24] Casini A., Godin I., Clays E., Kittel F., (2013), Gender difference in sickness absence from work: A multiple mediation analysis of psychosocial factors, *European Journal of Public Health* 23(4), 635–642, available at: https://doi.org/10.1093/eurpub/cks183.

[25] Caverley N., Cunningham J. B., MacGregor J. N., (2007), Sickness presenteeism, sickness absenteeism, and health following restructuring in a public service organization, *Journal of Management Studies* 44(2), 304–319, available at: https://doi.org/10.1111/j.14676486.2007.00690.x.

[26] Chapman L. S., (2005), Presenteeism and its role in worksite health promotion, *American Journal of Health Promotion* 19(14), 1–8.

[27] Charlton M., Fotheringham S., Brunsdon C., (2009), *Geographically Weighted Regression*, available at: http://gwr.nuim.ie/downloads/GWR_WhitePaper.pdf.

[28] Chaupain-Guillot S., Guillot O., (2018), Sickness benefit rules and work absence: An empirical study based on European data, *Revue d'Economie Politique*, 127(6), 1109–1137, available at: https://doi.org/10.3917/redp.276.1109.

[29] Chimed-Ochir O., Nagata T., Nagata M., Kajiki S., Mori K., Fujino Y., (2019), Potential Work Time Lost Due to Sickness Absence and Presence among

Japanese Workers, *Journal of Occupational and Environmental Medicine* 61(8), 682–688, available at: https://doi.org/10.1097/JOM.0000000000001646.

[30] Elstad J., Vabo M., (2008), Job stress, sickness absence and sickness presenteeism in Nordic elderly care, *Scandinavian Journal of Public Health* 36(5), 467–474, available at: https://doi.org/10.1177/1403494808089557.

[31] Eurofound, (2023), European Working Conditions Telephone Survey 2021 dataset, Eurofound, available at: https://eurofound.link/ewcts2021data https://www.eurofound.europa.eu/surveys/european-working-conditions-surveys-ewcs.

[32] European Agency for Safety and Health at Work, Hassard J., Teoh K., Cox T., Dewe P., Cosmar M., Gründler R., Flemming D., Cosemans B., Van den Broek K., (2014), Calculating the Cost of Work-Related Stress and Psychosocial Risks: European Risk Observity: Literature Review, Publications Office of the European Union, Luxembourg, avaliable at: Www.Healthy-Workplaces.Eu, https://doi.org/10.2802/20493.

[33] Ferreira A., Mach M., Martinez L., Miraglia M., (2022), Sickness Presenteeism in the Aftermath of COVID-19: Is Presenteeism Remote-Work Behavior the New (Ab)normal? *Frontiers in Psychology* 12(January), 1–13, available at: https://doi.org/10.3389/fpsyg.2021.748053.

[34] Fingleton B., (1999), Spurious Spatial Regression: Some Monte Carlo Results with a Spatial Unit Root and Spatial Cointegration, *Journal of Regional Science* 39(1), 1–19, available at: https://doi.org/10.1111/1467-9787.00121.

[35] Fotheringham A. S., Brunsdon C., Charlton M. E., (2002), *Geographically Weighted Regression: The Analysis of Spatially Varying Relationships*, Wiley.

[36] Garrow V., (2016), Presenteeism: A review of current thinking, Institute for Employment Studies (Issue February 2016), available at: https://www.employmentstudies.co.uk/system/files/resources/files/507_0.pdf.

[37] Gillet N., Austin S., Fernet C., Becker M., (2021), Workaholism, Presenteeism, Work-Family Conflicts, and Personal and Work Outcomes: Testing a Moderated Mediation Model, *Journal of Clinical Nursing* 30(19-20), 2842–2853, available at: https://doi.org/10.1111/jocn.15791.

[38] Gollini I., Lu B., Charlton M., Brunsdon C., Harris P., (2015), GWmodel: an R package for exploring spatial heterogeneity, *Journal of Statistical Software* 63(17), 1–50, DOI:10.18637/jss.v063.i17.

[39] Gosselin E., Lemyre L., Corneil W., (2013), Presenteeism and absenteeism: Differentiated understanding of related phenomena, *Journal of Occupational Health Psychology* 18(1), 75–86, available at: https://doi.org/10.1037/a0030932.

[40] Guay S., Lemyre A., Geoffrion S., (2022), Work-related predictors of mental health, presenteeism, and professional quality of life following exposure to a potentially traumatic event in child protection workers, *European Journal of Psychotraumatology* 13(1), available at: https://doi.org/10.1080/20008198.2022.2037904.

[41] Gustafsson K., Bergström G., Marklund S., Aboagye E., Leineweber C., (2019), Presenteeism as a predictor of disability pension: A prospective study among nursing professionals and care assistants in Sweden, *Journal of Occupational Health*, 61(6), 453–463, available at: https://doi.org/10.1002/1348-9585.12070.

[42] Gustafsson K., Marklund S., (2011), Consequences of sickness presence and sickness absence on health and work ability: A Swedish prospective cohort study, *International Journal of Occupational Medicine and Environmental Health* 24(2), 153–165, available at: https://doi.org/10.2478/s13382-011-0013-3.

[43] Gustafsson K., Marklund S., (2014), Associations between health and combinations of sickness presence and absence, *Occupational Medicine* 64(1), 49–55, available at: https://doi.org/10.1093/occmed/kqt141.

[44] Hair J. F., Hult G. T. M., Ringle C. M., Sarstedt M., (2022), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, SAGE Publications, Inc.

[45] Halbesleben J. R. B., Whitman M. V., Crawford W. S., (2014), A dialectical theory of the decision to go to work: bringing together absenteeism and presenteeism, *The Human Resource Management Review* 24, 177–192, available at: https://doi.org/10.1016/j.hrmr.2013.09.001.

[46] Hansen C., Andersen J., (2008), Going ill to work – What personal circumstances, attitudes and work-related factors are associated with sickness presenteeism? *Social Science and Medicine* 67(6), 956–964, available at: https://doi.org/10.1016/j.socscimed.2008.05.022.

[47] Henderson A. A., Smith C. E., (2022), When does presenteeism harm productivity the most? Employee motives as a key moderator of the presenteeism-productivity relationship, *Journal of Managerial Psychology* 37(6), 513–526, available at: https://doi.org/https://doi.org/10.1108/JMP-08-2020-0446.

[48] Hervé A. L., Williams J. L., (2010), Principal Component Analysis, *WIREs Computational Statistics* 2, 433–459, available at: https://doi.org/10.1002/wics.101.

[49] Hesselius P., (2007), Does sick absence increase the risk of unemployment? *Journal of Socio-Economics* 36, 288–310, available at:https://doi.org/10.1016/j.socec.2005.11.037.

[50] Johansen V., Aronsson G., Marklund S., (2014), Positive and negative reasons for sickness presenteeism in Norway and Sweden: A cross-sectional survey, *BMJ Open* 4(2), 1–6, available at:https://doi.org/10.1136/bmjopen-2013-004123.

[51] Johns G., (2010), Presenteeism in the workplace: A review and research agenda, *Journal of Organizational Behavior* 31(4), 519–42, available at: https://doi.org/10.1002/job.

[52] Johns G., (2011), Attendance dynamics at work: the antecedents and correlates of presenteeism, absenteeism, and productivity loss, *J. Occup. Health Psychol.* 16, 483–500, available at: https://doi.org/10.1037/a0025153.

[53] Kelley K., (2007), Sample size planning for the coefficient of variation from the accuracy, *Behavior Research Methods* 39(4), 755–766.

[54] Kigozi J., Jowett S., Lewis M., Barton P., Coast J., (2017), The Estimation and Inclusion of Presenteeism Costs in Applied Economic Evaluation: A Systematic Review, *Value in Health* 20(3), 496–506, available at: https://doi.org/10.1016/j.jval.2016.12.006.

[55] Kinman G., (2019), Sickness presenteeism at work: prevalence, costs and manamgement, *British Medical Bulletin Advanced Materials* 129, 69–78, available at: https://doi.org/10.1093/bmc/ldy043.

[56] Knani M., (2021), Presenteeism in small and medium-sized enterprises, *Determinants and impacts on health* 68, 733–747, available at: https://doi.org/10.3233/WOR-203407.

[57] Kwon M., (2020), Occupational Health Inequalities by Issues on Gender and Social Class in Labor Market: Absenteeism and Presenteeism Across 26 OECD Countries, *Frontiers in Public Health* 8(84), available at: https://doi.org/10.3389/fpubh.2020.00084.

[58] Lakiša S., Matisane L., Gobiņa I., Orru H., Vanadziņš I., (2022), Sickness Presenteeism among Employees Having Workplace Conflicts-Results from Pooled Analyses in Latvia, *International Journal of Environmental Research and Public Health* 19(17), 10525, available at:https://doi.org/10.3390/ijerph191710525.

[59] Lalive R., Lehmann T., (2020), *The Labor Market in Switzerland 2000–2018*, 402-402, IZA World of Labor, Institute of Labor Economics (IZA), Bonn.

[60] Leung Y., Mei C., Zhang W., (2000), Testing for spatial autocorrelation among the residuals of the geographically weighted regression, *Environment and Planning A* 32(5), 871–890, available at: https://doi.org/10.1068/a32117.

[61] Loader C., (1999), Bandwidth selection: classical or plug-in? By clive R Loader, *The Annals of Statistics* 27(2), 415–438, DOI: 10.1214/aos/1018031201.

[62] Lohaus D., Habermann W., (2019), Presenteeism: a review and research directions, *The Human Resource Management Review*, 43–58, available at: https://doi.org/10.1016/j.hrmr.2018.02.010

[63] Lohaus D., Habermann W., Nachreiner M., (2022), Sickness presenteeism explained by balancing perceived positive and negative effects, *Frontiers in Psychology* 13, 963560, available at: https://doi.org/10.3389/fpsyg.2022.963560.

[64] Luksyte A., Unsworth K. L., Avery D. R., Cordery J. L., Seah J., (2023), Gender differences in the relationship between presenteeism and extra-role behaviors, *Journal of Organizational Behavior* 44(6), 957–972, available at: https://doi.org/10.1002/job.2651.

[65] McCrudden C., (2019), Gender-Based Positive Action in Employment in Europe: A Comparative Analysis of Legal and Policy Approaches in the EU and EEA, *SSRN Electronic Journal*, Preprint, available at: https://doi.org/10.2139/ssrn.3524238.

[66] Mandiracioglu A., Bolukbas O., Demirel M., Gumeli F., (2015), Factors related to presenteeism among employees of the private sector, *International Journal of Occupational Safety and Ergonomics* 21(1), 80–85, available at: https://doi.org/10.1080/10803548.2015.1017967.

[67] Marklund S., Gustafsson K., Bergström G., Leineweber C., (2021), Reasons for presenteeism in different occupational branches in Sweden: a population based cross-sectional study, *International Archives of Occupational and Environmental Health* 94(6), 1385–1395, https://doi.org/10.1007/s00420-021-01701-2.

[68] Markussen S., Mykletun A., Røed K., (2010), The Case for Presenteeism, *SSRN Electronic Journal*, Preprint, available at: https://doi.org/10.2139/ssrn.1720325.

[69] Markussen S., Mykletun A., Røed K., (2012), The case for presenteeism – Evidence from Norway's sickness insurance program, *Journal of Public Economics* 96(11–12), 959–972, https://doi.org/10.1016/j.jpubeco.2012.08.008.

[70] Matthews S., Yang T. C., (2016), Mapping the results of local statistics: Using geographically weighted regression, *Demographic Research* 26, 151–166, https://doi.org/10.4054/DemRes.2012.26.6.Mapping.

[71] Miraglia M., Johns G., (2016), Going to Work Ill: A Meta-analysis of the Correlates of Presenteeism and a Dual-path Model, *Journal of Occupational Health Psychology* 21(3), 261–283, DOI: 10.1037/ocp0000015.

[72] Mori T., Nagata T., Nagata M., Odagami K., Mori K., (2023), Perceived Supervisor Support for Health Affects Presenteeism: A Prospective Cohort Study, *Journal of Occupational and Environmental Medicine* 65(1), 16–21, available at: https://doi.org/10.1097/JOM.0000000000002691.

[73] Nordenmark M., Hagqvist E., Vinberg S., (2019), Sickness Presenteeism among the Self-employed and Employed in Northwestern Europe – The Importance of Time Demands, *Safety and Health at Work* 10(2), 224–228, available at: https://doi.org/10.1016/j.shaw.2019.01.003.

[74] Nowak J., Emmermacher A., Wendsche J., Döbler A.-S., Wegge J., (2023), Presenteeism and absenteeism in the manufacturing sector: A multilevel approach identifying underlying factors and relations to health, *Current Psychology* 42(22), 18641–18659, available at: https://doi.org/10.1007/s12144-022-03013-1.

[75] Reda A. K., Tavasszy L., Gebresenbet G., Ljungberg D., (2023), Modelling the effect of spatial determinants on freight (trip) attraction: A spatially autoregressive geographically weighted regression approach, *Research in Transportation Economics* 99, 101296, available at: https://doi.org/10.1016/j.retrec.2023.101296.

[76] Reuter M., Dragano N., Wahrendorf M., (2021), Working while sick in context of regional unemployment: A Europe-wide cross-sectional study, *Journal of Epidemiology and Community Health* 75(6), 574–580, available at: https://doi.org/10.1136/jech-2020-214888.

[77] Reuter M., Wahrendorf M., Di Tecco C., Probst T., Ruhle S., Ghezzi V., Barbaranelli C., Iavicoli S., Dragano N., (2019), Do temporary workers more often decide to work while sick? Evidence for the link between employment contract and presenteeism in Europe, *International Journal of Environmental Research and Public Health* 16(10), 1868, available at: https://doi.org/10.3390/ijerph16101868.

[78] Rodríguez-Cifuentes F., Topa G., Fernández-Salinero S., Moriano J. A., (2020), Presenteeism, overcommitment, workplace bullying, and job satisfaction: A moderated mediation relationship, *International Journal of Environmental Research and Public Health* 17(22), 1–13, available at: https://doi.org/10.3390/ijerph17228616.

[79] Ruhle S., Schmoll R., (2021), COVID-19, Telecommuting, and (Virtual) Sickness Presenteeism: Working From Home While Ill During a Pandemic, *Frontiers in Psychology* 12(October), 1–13, available at: https://doi.org/10.3389/fpsyg.2021.734106.

[80] Ruhle S., Süß S., (2020), Presenteeism and Absenteeism at Work-an Analysis of Archetypes of Sickness Attendance Cultures, *Journal of Business and Psychology* 35(2), 241–255, available at: https://doi.org/10.1007/s10869-019-09615-0.

[81] Sachdeva S., Desai R., Singh S., Kumar G., Sachdeva R., (2021), Work from home culture and acute cardiovascular events: a bidirectional conundrum yet

to be resolved! *International Journal of Cardiology* 333(250), available at: https://doi.org/10.1016/j.ijcard.2021.02.051.

[82] Sander C., Dogan-Sander E., Fischer J. E., Schomerus G., (2023), Mental health shame and presenteeism: Results from a German online survey, *Psychiatry Research Communications* 3(1), 100102, available at: https://doi.org/10.1016/j.psycom.2023.100102.

[83] Schnabel C., (2022), Presenteeism at the workplace, No. 495, Discussion Paper, available at: https://doi.org/10.15185/izawol.495.

[84] Schneider U., Linder R., Verheyen F., (2016), Long-term sick leave and the impact of a graded return-to-work program: evidence from Germany, *The European Journal of Health Economics* 17, 629–643, DOI: 10.1007/s10198-015-0707-8.

[85] Schultz A. B., Edington D. W., (2007), Employee Health and Presenteeism: A Systematic Review, *Journal of Occupational Rehabilitation* 17, 547–579, DOI: 10.1007/s10926-007-9096-x.

[86] Sendén M., Schenck-Gustafsson K., Fridner A., (2016), Gender differences in Reasons for Sickness Presenteeism – a study among GPs in a Swedish health care organization, *Annals of Occupational and Environmental Medicine* 28(1), 1–7, available at: https://doi.org/10.1186/s40557-016-0136-x.

[87] Smith D., (1970), Absenteeism and presenteeism in industry, *Archives of environmental health* 21(5), 670–677, available at: https://doi.org/10.1080/00039896.1970.10667313.

[88] Steidelmuller C., Meyer S. C., Muller G., (2020), Home-based telework and presenteeism across europe, *Journal of Occupational and Environmental Medicine* 62(12), 998–1005, available at: https://doi.org/10.1097/JOM.0000000000001992.

[89] Strömberg C., Aboagye E., Hagberg J., Bergström G., Lohela-Karlsson M., (2017), Estimating the Effect and Economic Impact of Absenteeism, Presenteeism, and Work Environment-Related Problems on Reductions in Productivity from a Managerial Perspective, *Value in Health* 20(8), 1058–1064, available at: https://doi.org/10.1016/j.jval.2017.05.008.

[90] Thorsteinsson E. B., Hjálmsdóttir A. S., Bjarnason T., (2021), Perceptions of Gender Equality among Icelandic Year 10 Adolescents: Population Studies 1992, 2006, and 2014, *Adolescents* 1(3), 294–305, available at: https://doi.org/10.3390/adolescents1030022.

[91] Vänni K., Neupane S., Nygard C.-H., (2017), An effort to assess the relation between productivity loss costs and presenteeism at work, *International Journal of Occupational Safety and Ergonomics* 23(1), 33–43, DOI: 10.1080/10803548.2016.1197578.

[92] Vera-Calzaretta A., Carrasco-Dajer C., da Costa S., Paez-Rovira D., (2014), Factores psicosociales del presentismo en trabajadores del Sistema de Salud chileno, *Journal of Work and Organizational Psychology* 30(2), 75–81, available at: https://dx.doi.org/10.1016/j.rpto.2015.03.004.

[93] Virtanen M., Kivimäki M., Elovainio J., Vahtera J., Ferrie J., (2003), From insecure to secure employment: changes in work, health, health related behaviours, and sickness absence, *Occupational and Environmental Medicine* 60, 948–953, DOI: 10.1136/oem.60.12.948.

[94] Wang B., Liu Y., Qian J., Parker S. K., (2021), Achieving effective remote working during the COVID-19 pandemic: a work design perspective, *Applied Psychology: An International Review* 70(16–59), available at: https://doi.org/10.1111/apps.12290.

[95] Yildirim M., Saygin M., Yildirim S., (2013), A Research About Employees' Work-Life Balance and Presenteeism Tendency, *International Journal of Social Sciences and Humanity Studies* 5(2), 1309–8063.

[96] Yoshimoto T., Oka H., Fujii T., Nagata T., Matsudaira K., (2020), The Economic Burden of Lost Productivity due to Presenteeism Caused by Health Conditions Among Workers in Japan, *Journal of Occupational and Environmental Medicine* 62(10), 883–888, available at: https://doi.org/10.1097/JOM.0000000000002001.