Vol. 36, No. 4 (2026) | DOI: 10.37190/ord/231141

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Operations Research and Decisions

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OPERATIONS RESEARCH AND DECISIONS QUARTERLY

Cultural background and employees' presenteeism – European countries' perspective

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Abstract

The study aimed to examine the association between cultural background and the propensity of employees to stay at work despite illness or disability. The scope of the study includes 29 European countries from both the EU and non-EU representing significant differences in cultural parameters. The National Culture model by Hofstede was used for the analysis. It distinguishes 6 dimensions of national cultures: power distance, individualism, indulgence, uncertainty avoidance, motivation towards achievements and success, and long-term orientation. All these dimensions characterize social behavior, values, and attitudes across several important areas that – we believe – may be associated with the decision to stay at work despite the rationale for a layoff. Using classification trees and cluster analysis, the countries in question are analysed from the perspective of the relationship between their cultural background and the occurrence of presenteeism. The work results in the identification of groups of countries displaying similar characteristics of presenteeism in relation to cultural models.

Keywords: *presenteeism, national cultural models, Hofstede model, classification trees, cluster analysis, European countries*

JEL Classification: A12, A14, I12, O57, Z10

1. Introduction

National culture provides the normative framework within which individuals interpret workplace expectations, social obligations, and the legitimacy of taking time off work. It shapes how people relate to authority, the degree to which group interests are prioritized over individual needs, and the extent to which uncertainty or deviation from established routines is tolerated [22]. These culturally embedded norms extend to attitudes toward illness and work attendance – areas directly relevant to presenteeism.

Received 18 March 2026, accepted 15 August 2026, published online 16 August 2026
ISSN 2391-6060 (Online)/© 2026 Authors

In the organizational context, national culture affects leadership styles, the perceived acceptability of sick leave, and the social pressure to demonstrate commitment through physical presence. In societies where hierarchical relations are deeply respected, employees may feel less entitled to prioritize personal health over organizational expectations. Conversely, in cultures emphasizing individual autonomy and well-being, taking sick leave may be perceived as a responsible behavior rather than a sign of weakness [5].

These observations suggest that cross-country differences in presenteeism rates cannot be fully explained by individual, organizational, or economic factors alone. National culture constitutes a distinct, macro-level layer that may shape the normative environment within which attendance decisions are made. It is this perspective that motivates the present study.

Several frameworks for analyzing national culture have been developed in the literature, including the models of Hofstede [21], Trompenaars and Hampden-Turner [41], Hall [20], Lewis [30], and Gesteland [16]. While each offers valuable insights, they differ substantially in dimensionality, measurement approach, and empirical applicability. Trompenaars' model, for instance, emphasizes value dilemmas and relationship orientations, while Hall's framework focuses on communication context (high- vs. low-context cultures) and time perception. These models, however, typically rely on qualitative typologies that are difficult to operationalize in quantitative research.

Hofstede's model was selected for this study for three reasons. First, it offers a set of clearly defined, quantifiable dimensions scored on a 0–100 scale, making it compatible with statistical methods such as cluster analysis and classification trees. Second, it provides the broadest country coverage among available frameworks, enabling a systematic comparison of 29 European countries. Third, it remains the most widely used cultural model in cross-national organizational research [24], which facilitates comparability with existing studies on absenteeism and presenteeism. These advantages notwithstanding, the limitations of the Hofstede model – including its static nature and potential inability to capture within-country heterogeneity – are acknowledged in the Discussion section.

The above discussion suggests that national culture may shape the normative context in which employees decide on work attendance while ill. Rather than directly causing presenteeism, cultural dimensions are expected to operate through mechanisms such as perceived social pressure, attitudes toward authority, tolerance for uncertainty, and the legitimacy accorded to rest and personal well-being. These theoretical linkages are developed further below in the context of Hofstede's specific dimensions (see Table 1).

Presenteeism, in which people go to work while being ill, can substantially affect society, businesses, and workers by influencing labor costs, productivity, and employee health [23]. The costs connected to sickness presenteeism are significantly more substantial and challenging to appraise in comparison to sickness absenteeism [35]. Presenteeism is influenced by a complex interplay of three factors: health status, work capability, and behavioral factors rooted in work culture, social systems, and the labor market dynamics. Individuals with similar capacities might choose differently regarding taking sick leave based on various considerations. For some, the choice might be to continue working or to minimize absence periods, whereas others may opt to extend their time off work. These decisions are influenced by factors such as the policies on sick leave compensation, the risk of unemployment, flexible work models (e.g., remote work options), and employer incentives (e.g., bonuses for no absences). However, the propensity for presenteeism is rooted deeper. As Ferreira et al. [14] underline, it depends on broader beliefs and

values embedded in society.

While previous research has examined individual-level, organizational, and economic determinants of presenteeism, systematic cross-country analyses linking presenteeism rates to quantifiable dimensions of national culture remain scarce. Existing studies that incorporate cultural context tend to treat it as a moderating variable in micro-level analyses rather than as a primary explanatory framework at the country level. A detailed review of the literature on this subject is presented in Table I in the Appendix. This study addresses this gap by directly examining the association between Hofstede's cultural dimensions and national presenteeism rates across 29 European countries.

Therefore, the aim of the research is to examine the association between cultural factors, distinguished as dimensions of national culture in the model of G. Hofstede, and people's propensity to go to work despite illness (presenteeism), as well as to identify the direction of these associations. In light of the research objective thus set, we identified the following research questions:

- Is there a significant relationship between the cultural factors that define a country's national culture and its propensity for presenteeism?
- Which cultural dimensions are more important for presenteeism?
- What are the directions of the associations between cultural dimensions and the propensity to presenteeism?
- Are the observed associations between cultural factors and presenteeism stable over time?

The inclusion of the year 2021 in the study, strongly affected by the Covid-19 pandemic and related institutional changes, makes it possible to examine whether the associations between cultural factors and presenteeism changed under exceptional external conditions. We believe that understanding the relationship between the cultural profile of the countries analyzed and the propensity to presenteeism will help further fill the research gap related to the determinants of presenteeism.

The link between national culture and presenteeism can be theorized through the lens of institutional and behavioral mechanisms. Cultural dimensions, as conceptualized by Hofstede, shape the normative expectations that govern workplace behavior – including the perceived legitimacy of taking sick leave. In high power distance societies, employees may feel less entitled to question organizational expectations, making them more prone to attend work while ill. In collectivist cultures, absence may be perceived as burdening colleagues, creating social pressure to be present. High uncertainty avoidance may amplify the fear of negative career consequences associated with sick leave, while restrained societies may frame illness-related absence as a lack of discipline. These mechanisms suggest that cultural dimensions do not cause presenteeism directly but rather create a normative environment that shapes individuals' decisions about attending work while ill. The analysis is carried out based on Hofstede's cultural model, using a selected data mining method (classification trees) and cluster analysis.

2. Theoretical background and previous research

As outlined in the introduction, presenteeism – attending work while ill – is distinct from sickness absenteeism, though closely related. When combined with absenteeism, permanent or temporary work

incapacity, premature death, and informal caregiving, these phenomena contribute to the indirect costs associated with illnesses [33]. Research into employee sickness presenteeism encompasses a variety of perspectives. Previous studies have identified several key determinants:

- Job security and opportunities for development [34, 39],
- Earnings level [26, 37],
- Employment contract type [37],
- Health-related factors [45] and self-perceived health [8],
- Job satisfaction [7, 38],
- Psychosocial factors [18],
- Workplace conflicts and educational level [27],
- Stress [42],
- Workplace environment, organisational culture, and support [15],
- Family dynamics and household status [17, 43],
- Economic sector [1],
- Age [32, 37] and gender [6].

Existing research that incorporates cultural context into the analysis of presenteeism and absenteeism has done so primarily as a moderating variable in micro-level studies. Czakert et al. [11] examined how cultural dimensions moderate the relationship between leadership behavior, stress, and presenteeism, finding that the strength of these relationships varies across cultural contexts. Punnett et al. [36], while not addressing presenteeism directly, demonstrated that Hofstede's dimensions significantly shaped the relationship between illness absenteeism and job attitudes across countries. Both studies underscore the relevance of cultural context, yet neither treats cultural dimensions as the primary independent variable at the country level – the approach adopted in the present study. This distinction is important: rather than examining how culture moderates individual-level predictors, we investigate whether country-level cultural profiles are themselves associated with different levels of presenteeism.

Hofstede's model of national culture emerged from large-scale survey research conducted initially among employees of IBM across more than 70 countries [21], and was subsequently refined and expanded to encompass six dimensions [22]. Each dimension captures a distinct aspect of how societies organize relationships, handle uncertainty, and prioritize values. Country scores on each dimension, expressed on a 0–100 scale, are based on aggregated survey responses and represent the central tendency of a national population rather than individual-level traits. In the present study, these country-level scores serve as the independent variables characterizing each of the 29 European countries analyzed.

Table 1 summarizes the six dimensions together with their expected theoretical associations with presenteeism, drawing on the existing literature. These associations are not hypothesized as causal but rather as normative tendencies that may shape country-level presenteeism patterns.

Table 1. Hofstede's cultural dimensions and their expected associations with presenteeism.

Cultural dimension (Hofstede's model)	**Characteristics**	**Expected association with presenteeism**
Power Distance Index – PDI	Defines the relationships between superiors and subordinates, as well as between power and the citizen. Indicates the level of acceptance for social inequalities, the tendency of superiors to consult with subordinates, and the degree of authoritarianism in power, as well as the expected level of obedience towards parents, superiors, and those with a higher value index, with greater acceptance for a rigid social hierarchy.	Employees in high power distance cultures may experience greater pressure to attend work regardless of health, as hierarchical norms discourage questioning organizational expectations or asserting individual needs such as sick leave. In contrast, flatter hierarchies may create a more permissive environment for health-related absence [5].
Individualism – IDV	The proportions established between the weight assigned to individual and group determine the manner of self-identification of the individual and the hierarchy of values. In individualistic societies, the interest and well-being of the individual are perceived as more important than the good of the group, while in collectivist societies the reverse is true.	Employees in collectivist cultures may face stronger social pressure to attend work while ill, as absence can be perceived as burdening the group. In individualist societies, by contrast, the decision to take sick leave is more likely framed as a personal right, reducing normative pressure toward presenteeism [5].
Motivation towards achievements and success – MAS	Highlights the differences in the values traditionally attributed to male and female roles. Female cultures place a heavy emphasis on caring for emotions, quality of life, empathy, compromise, and care for others, while male cultures place greater emphasis on assertiveness, competitive spirit, goal-setting, and financial success.	Employees in achievement-oriented (high MAS) cultures may exhibit greater presenteeism, as dedication to career and heavy workload are socially valued and illness-related absence may be perceived as a lack of commitment. In cultures scoring lower on this dimension, greater social acceptance of work–life balance and empathetic behaviors may reduce the normative pressure to attend work while ill [11].
Uncertainty Avoidance Index – UAI	The level of perceived threat experienced by members of a given culture in the face of new, surprising, different, unknown, or uncertain situations. It indicates the degree to which members of the culture are willing to accept the unpredictability of relationships, events, and social relations, as well as uncertainty about the future. It is worth emphasizing that avoiding uncertainty is not equivalent to avoiding risk.	Employees in high uncertainty avoidance cultures may be more prone to presenteeism because taking sick leave introduces unpredictability – regarding workload coverage, career progression, and employer perception. The fear of disrupting established routines and the anxiety associated with absence may outweigh health considerations. In lower-uncertainty-avoidance cultures, employees are expected to tolerate ambiguity more readily, reducing the perceived risk of taking time off [11, 40].
Long Term Orientation – LTO	The primary focus is on distinguishing between long- and short-term mindsets in life (and business). A long-term orientation is centered on the future, achieving long-term benefits, perseverance in pursuing goals even at the cost of sacrifices, prevention, relationships and trust, while a short-term orientation is focused on the present, quick success, current achievements and satisfaction, but also values tradition, stability, and balance.	Employees in long-term oriented cultures may exhibit higher presenteeism, as the emphasis on perseverance, future rewards, and sustained commitment encourages working through illness to demonstrate dedication. In short-term oriented cultures, where immediate results and personal satisfaction are valued, employees may be more inclined to prioritize their current health over long-term career signaling [22].
Indulgence Index – IND	The extent to which attitudes of tolerance towards natural human behaviors, such as demonstrating joy and having fun, are accepted in a given society. Moderate societies limit and regulate such behaviors by formulating and enforcing strict social norms, while lenient societies prefer "affirmation of life" and are more likely to accept individu-	Employees in restrained (low IND) cultures may exhibit higher presenteeism, as dominant norms emphasize duty and self-discipline, while rest and attention to personal comfort may be viewed as weakness. Conversely, in indulgent cultures, where the fulfillment of personal needs is socially sanctioned, employees are more likely to view

3. Data and methods

3.1. Preliminary data analysis

Our research is grounded in the European Working Conditions Telephone Survey (EWCTS) 2021, which surveyed individuals in 29 European countries, including EU Member States, the United Kingdom, Norway, Switzerland, Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia. For the purpose of generating nationally representative samples, random probability sampling was employed in each country. The minimum sample size anticipated was 1,000, applicable to potential and candidate countries as well as Switzerland, while the maximum size was 4,100 for Germany. In the majority of countries, it was expected that a sample size of 1,800 would be obtained. The variations in sample sizes were attributable to factors such as budget availability, the size of the workforce, or contributions from individual Member States [13].

It should be noted that the EWCS 2015 and EWCTS 2021 are independent cross-sectional surveys and do not constitute a panel dataset. Therefore, comparisons between the two periods are made at the aggregate country level, examining shifts in national presenteeism rates rather than tracking individual respondents over time.

As far as presenteeism is concerned, we examine the proportion of individuals (both men and women) who worked while ill over the past 12 months, as a percentage of the total surveyed working population in each country (the presenteeism rate). Separate rates are calculated for each of the 29 European countries analysed in 2021, namely Austria, Belgium, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom. The final selection of countries was dictated by the availability of data on the dimensions of culture according to Hofstede.

The statistical data analysis was conducted with the help of the Statistica 13.3 program. The countries in the study are analysed from the following Hofstede dimension perspective: Power Distance (PDI), Individualism (IDV), Motivation Towards Achievement and Success (MAS), Uncertainty Avoidance (UAI), Long Term Orientation (LTO), and Indulgence (IND).

The analysis was carried out in the perspective of two years – two waves of the EWCS survey – the years 2015 and 2021. This was done not only to compare the results in the years studied, but also to see if and how the Covid-19 pandemic changed the propensity to presenteeism from the perspective of Hofstede's cultural models. As the first step of our analysis, we conduct the preliminary data analysis. We examine descriptive statistics (Hofstede dimensions and presenteeism rate) and we check spatial variation and statistical correlations. In the next phase, we conduct cluster analysis and incorporate the classification trees method.

In 2021, the group of countries where a relatively high proportion of workers went to work when they were sick compared to other countries included France, Belgium, Luxembourg, and Great Britain (see Figure 1). In these countries, the share of employees who reported going to work when sick in the past 12 months exceeded 36%, with the highest value recorded in France. On the other hand, the group of countries where workers were more likely to stay at home during illness than go to work included Lithuania, Italy, Greece, and Estonia.

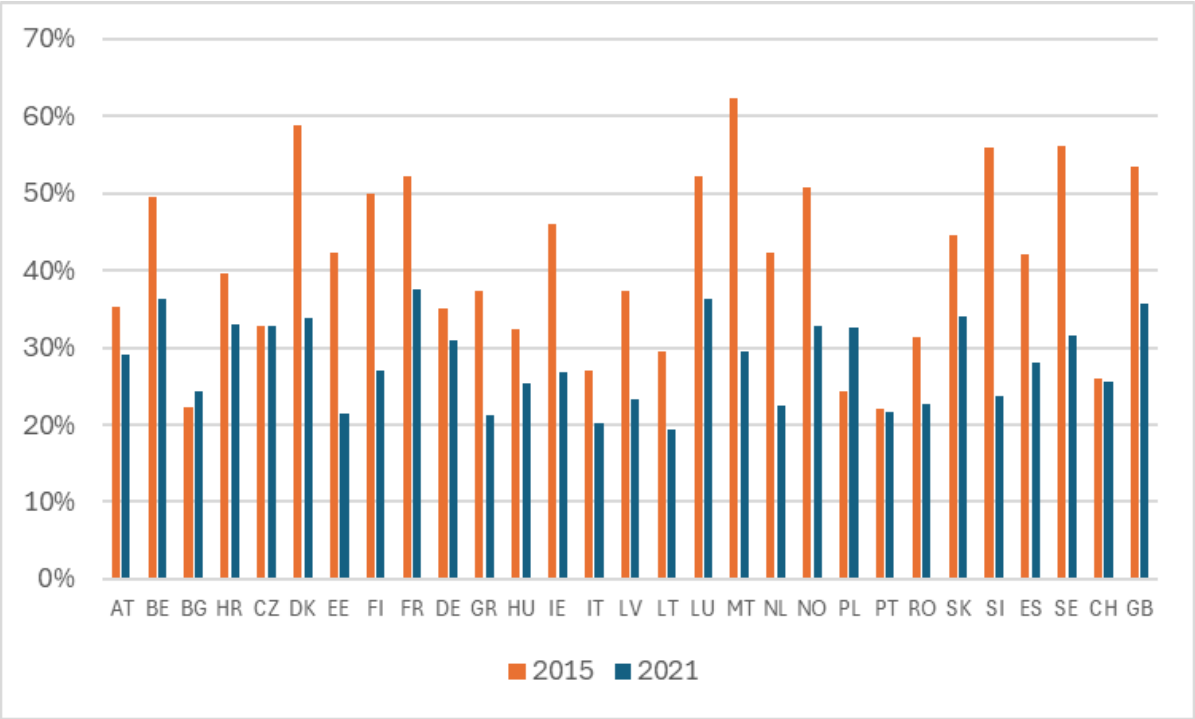


Figure 1. Presenteeism rate in selected European countries.

Source: own elaboration based on EWCTS 2021 data.

On average, in 2015, 41% of Europeans worked while sick. However, in 2021, a significant decline was observed, down to 28%. This was due to the occurrence of the Covid-19 pandemic, frequent illnesses and the associated use of sick leave. The distribution of the presenteeism rate in the analysed countries was moderately right-skewed. This indicates that in the majority of countries the values of the presenteeism rate were significantly lower than the average. Moreover, there is also a wide dispersion of results around the average (platykurtic distribution) [19]. Table 2 displays the summary statistics of the data.

Table 2. Summary statistics of the share of people with a declaration of being sick at work [as % of working population].

	2015	**2021**
N	29	29
Range	0.402	0.182
Min	0.220	0.194
Max	0.620	0.376
Mean	0.410	0.283
Standard deviation	0.110	0.055
Variance	0.014	0.003
Skewness	0.005	0.052
Kurtosis	−1.075	−1.347

Source: own elaboration.

In addition, the strength and significance of the correlation between the presenteeism rate variable in 2015 and 2021 and the cultural dimensions of the Hofstede model was checked. Correlation inference was based on Pearson's coefficients. In none of the analyzed years did all of the Hofstede dimensions confirm a significant relationship. In the year 2015, IDV, UAI, LTO and IND turned out to be significantly correlated. However, in the year 2021, only IND was significantly correlated. Some of the analysed

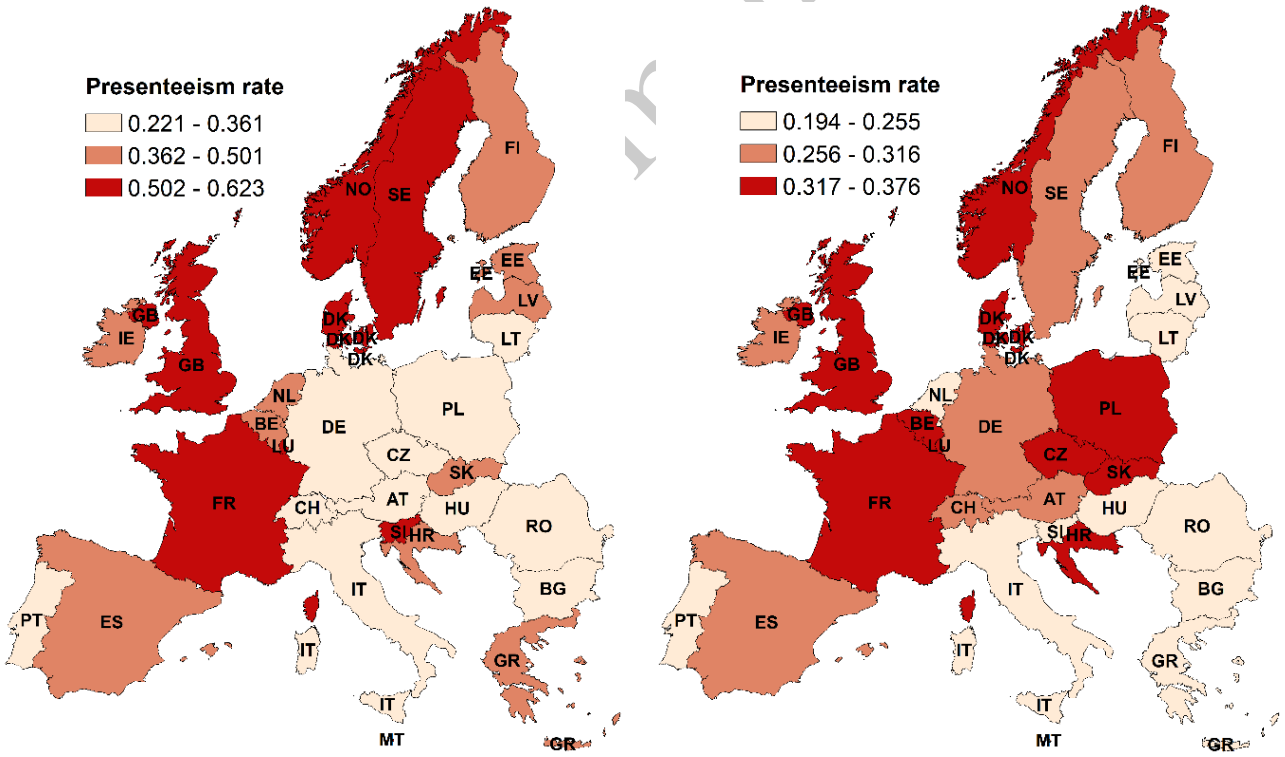
dimensions turned out to be significantly correlated within the Hofstede dimensions' group of variables. The results are presented in Table 3.

Table 3. Correlation coefficients – summary results.

	PDI	IDV	MAS	UAI	LTO	IND	PRES_15	PRES_21
PDI	–							
IDV	-0.557^{**}	–						
MAS	0.199	-0.306	–					
UAI	0.603^{**}	-0.471^{**}	0.173	–				
LTO	-0.349	0.496^{**}	-0.330	-0.385^{*}	–			
IND	-0.531^{**}	0.637^{**}	-0.057	-0.427^{*}	0.158	–		
PRES_15	-0.203	0.463^{*}	-0.293	-0.381^{*}	0.451^{*}	0.634^{**}	–	
PRES_21	0.005	0.210	0.191	-0.212	0.242	0.415^{*}	0.526^{**}	–

Source: own elaboration. $N = 29$. Significance levels: ** $p < 0.01$, * $p < 0.05$ (two-sided).

To classify countries and identify cultural similarities in terms of employee presenteeism, the countries were divided into three groups reflecting the prevalence of presenteeism. Consequently, we decided to allocate countries to one of three categories: low, medium, or high presenteeism. To this end, we utilized the classical measure of divergence and allocated countries based on this measure. The results are presented in Figure 2.



a) 2015 b) 2021

Figure 2. Countries according to the level of presenteeism.

Source: own elaboration.

In our research, we utilised Moran's I, a global spatial autocorrelation measure, to investigate the spatial tendency of presenteeism among Europeans [2]. We employed the distance-based (DB) option to create a spatial weights matrix W. The spatial weights matrix was constructed from a distance measure,

with i and j considered neighbors whenever j fell within a critical distance band of i [4]. To prevent isolates (islands), the distance was carefully selected so that each location had at least one neighbor. The function identified neighbors of area points through Euclidean distance, with a specific range of distances. For our analysis of polygons, calculations were conducted based on centroids, as stated by Antczak [3].

The results of the Moran I statistic showed a positive and statistically significant relationship at the $\alpha = 0.10$ level (0.16 with p-value 0.06^*). Thus, the clustering of countries in space was confirmed. These results indicate some spatial similarities, patterns of countries side by side. However, in the year 2021, the Moran I statistic showed no relationship between the presenteeism rate and geographical location (-0.0863 with p-value 0.396). This indicated a lack of statistical significance – no spatial dependence. Thus, neighboring countries do not cluster based on the percentage of people who worked while sick in the past 12 months.

The distribution of 3 out of 5 Hofstede's dimensions was moderately right-skewed. This indicates that in the majority of countries the values of power distance, individualism, motivation towards achievement and success, and long-term orientation were significantly lower than the average. In terms of uncertainty avoidance and indulgence, the results were opposite. Moreover, there is also a wide dispersion of results around the average (platykurtic distribution) [19]. Only Power Distance had a leptokurtic distribution. Table 4 displays the summary statistics of the data.

Table 4. Summary statistics of Hofstede's model dimensions.

	PDI	**IDV**	**MAS**	**UAI**	**LTO**	**IND**
N	29	29	29	29	29	29
Range	89	58	95	77	39	65
Min	11	42	5	23	32	13
Max	100	100	100	100	71	78
Mean	50.14	67.72	45.52	69.45	52.55	44.62
Standard deviation	20.66	14.27	25.15	21.64	9.42	19.53
Variance	426.84	203.71	632.69	468.33	88.83	381.46
Skewness	0.42	0.14	0.16	-0.52	0.07	-0.08
Kurtosis	0.01	-0.54	-0.67	-0.55	-0.30	-1.29

Source: own elaboration.

3.2. Methodology

In order to achieve the goal set in the study, several data mining techniques can be applied. Among them, we initially conducted a cluster analysis and then a classification tree procedure. The methods used in that phase of the study were chosen to complement each other. Cluster analysis classified countries according to the dimensions of culture, and this grouping was compared with the values of presenteeism. In the classification trees, on the other hand, the presenteeism indicators were taken as a starting point and became the basis for classification and the search for cultural characteristics. This led us to use a bottom-up approach in our analysis.

3.2.1. Cluster analysis

Many tools for exploration seek to categorize data vectors into groups based on similarities when the true group membership is unknown [44]. Among them we distinguish: classification (Bayesian classifica-

tion, decision trees, artificial neural networks, etc.); cluster analysis (graphical cluster analysis, k-means method, etc.); regression (linear and non-linear regression methods, etc.); and association rules (one- and multi-dimensional methods, one- and multilevel methods, methods of temporal exploration and methods of frequent data mining, etc.).

In light of the fact that there is no rule governing the grouping of countries according to presenteeism, cluster analysis appears to be ideal for seeking similarities between countries. Cluster analysis is a multivariable technique that aims to categorize a sample of subjects or objects on the basis of a set of measured variables into several distinct groups, wherein similar subjects are grouped together [9]. There are various methods that can be employed for carrying out cluster analysis, and they can be broadly classified into hierarchical and non-hierarchical methods. Hierarchical methods include agglomerative and divisive methods, while non-hierarchical methods include k-means clustering [9]. When conducting cluster analysis, a distance measure must be selected. Among these, the Euclidean distance, Manhattan distance, city block distance, and squared Euclidean distance are commonly used. In our case, the Euclidean distance is used, which is defined as the square root of the sum of the squared differences between the corresponding elements of two vectors: if you have p variables $X_1, X_2, \ldots, X_p$ measured on a sample of n subjects, the observed data for subject i can be denoted by $x_{i1}, x_{i2}, \ldots, x_{ip}$ and the observed data for subject j by $x_{j1}, x_{j2}, \ldots, x_{jp}$ [9]. The Euclidean distance between these two subjects is given by:

$$d_{ij} = \sqrt{(x_{i1} - x_{j1})^2 + (x_{i2} - x_{j2})^2 + \cdots + (x_{ip} - x_{jp})^2}. \tag{1}$$

The application of the Euclidean distance adheres to its principles. All variables are expressed on the same scale, and there are no outlying values among the analyzed variables.

Next, the hierarchical clustering method was applied using the Ward method, which is one of the hierarchical clustering techniques. Among these methods we also distinguish the single linkage method, complete linkage, UPGMA (unweighted pair-group method using arithmetic averages), WPGMA (weighted pair-group method using arithmetic averages), UPGMC (unweighted pair-group method using centroid averages), WPGMC (weighted pair-group method using centroid averages), and the Ward method. The Ward method differs from the others as it uses variance analysis to estimate the distance between clusters. This method aims to minimize the sum of squared differences within clusters. Among all possible cluster pairs, the one that results in the smallest total difference is selected, which is described by the formula:

$$ESS = \sum_{i=1}^{k} \left(x_i - \overline{x}\right)^2, \tag{2}$$

where ESS – Error Sum of Squares; k – the number of objects in the cluster; x_i – the value of the variable serving as the criterion for segmentation for the i-th object; and $\overline{x}$ – the mean value of that variable within the cluster.

This method was chosen because the selected variables have a quantitative nature, and above all, it is effective in its results by seeking to create small clusters. This corresponds to the size of our research group (29 countries).

3.2.2. Classification trees

Classification and regression trees are data mining tools used for building predictive and descriptive models [29]. Classification trees are one of the most effective methods in data mining, enabling the discovery of hidden patterns and relationships in the data [12]. Classification trees are widely used across fields such as economics, medicine [31], computer science, and psychology [10]. We use classification trees when the dependent variable is expressed on a nominal or ordinal scale, while we use regression trees when the level of measurement of that variable is at least interval-level [28]. The purpose of building a predictive model is to predict the quality or quantity of a phenomenon, while the purpose of building a descriptive model is to describe and present patterns in the studied population [28].

A decision tree is a graphical model that is created through a recursive division of the set K into n non-overlapping subsets $K_1, K_2, K_3, \ldots, K_n$. The purpose of building a model is to obtain subsets that are as homogeneous as possible with respect to the dependent variable value. This is a multistep process that can use a different independent variable in each subsequent step. In each step, all predictors are analyzed, and the one that provides the best split of the node – that is, that isolates the most homogeneous subsets – is chosen.

The majority of classification and regression tree algorithms are derived from three classical methods: Concept Learning System (CLS); Automatic Interaction Detection (AID) [10]; and Classification and Regression Trees (CART). The CART method was proposed by Leo Breiman and his team over two decades ago. CART is the most advanced method for building trees [12]. In the CART method, the predictor variables are partitioned into subsets with homogeneous values of the dependent variable, and this process is represented by a decision tree that can be used to make predictions on new data [25].

The rules for dividing the tree used in the CART method include the Gini index, the entropy measure, and the two-way rule for dividing the tree into two parts. The characteristic feature of this method is excessive tree growth and pruning of individual branches to reduce the description length of the leaves (while slightly increasing the classification error rate) [28]. This allows for the comparison of an expanded model and a model with a reduced number of nodes, as the quality of the tree does not depend on the accuracy of the predictions, but rather on the usefulness of the generated rules [28].

4. Results

The preliminary analysis of the data did not reveal a consistent pattern in the geographic connections between the countries studied across the years under review, nor did it uncover any substantial correlations between the presenteeism index and the various cultural dimensions. In 2015, a correlation existed between these factors, but this connection cannot be confirmed in 2021. Even though the analysis showed a significant correlation between the examined Hofstede cultural dimensions, the strength of these correlations was not particularly strong. Therefore, the use of the decision tree method to classify countries based on cultural models is entirely reasonable.

The outcomes of the conducted analysis, which focused on Euclidean distance and hierarchical clustering using the Ward method, are illustrated in Table 5. All variables pertaining to Hofstede's dimensions have been analyzed, including PDI, IDV, LTO, UAI, IND, and MAS. Based on the conducted analysis and the selection of the cutting point at 100, five clusters were formed. The values of presenteeism,

expressed in terms of low, average, and high, were color-coded and included in the figures showing the results of the analysis of the clusters (see Table 5).

Cluster analysis based on the dimensions of national cultures indicated by G. Hofstede's model identified five groups of countries with relatively similar cultural profiles.

The first group of countries, comprising Central and Eastern European countries, the Balkan countries, and Italy, is characterized by high (and quite high) power distance, a very high degree of uncertainty avoidance, and high restrictiveness. In these countries, in 2015, low presenteeism values were observed, and the group was relatively homogeneous in this regard. In contrast, in 2021, which should be considered exceptional due to the Covid-19 pandemic, this group exhibited the greatest variability – in half of the countries presenteeism remained low, while in the other half it increased to high levels.

The second group, including southern countries but also Belgium, France, and Slovenia, is distinguished by a very high degree of uncertainty avoidance, fairly high individualism, higher indulgence than in the first group, but lower power distance. In this group, which is quite diverse in terms of presenteeism, medium and high values of this indicator were observed in 2015, and low, medium, and high values in similar proportions in 2021. Interestingly, this group included 2 out of 6 countries where the level of presenteeism decreased during the studied period.

The third group, the most geographically homogeneous, consists of the Baltic countries, where power distance is relatively low, the level of motivation towards achievement and success is also low, but restrictiveness is high. This is accompanied by fairly high individualism and a moderately high uncertainty avoidance index. These countries showed medium and low presenteeism values in 2015, but uniformly low values in 2021.

The fourth group includes the Scandinavian countries and the Netherlands, characterized by very low power distance, very low motivation towards achievement and success, very high individualism, and rather high indulgence. These countries demonstrated relatively stable medium and high presenteeism in both periods, and in two of them the change was towards a decrease in its level.

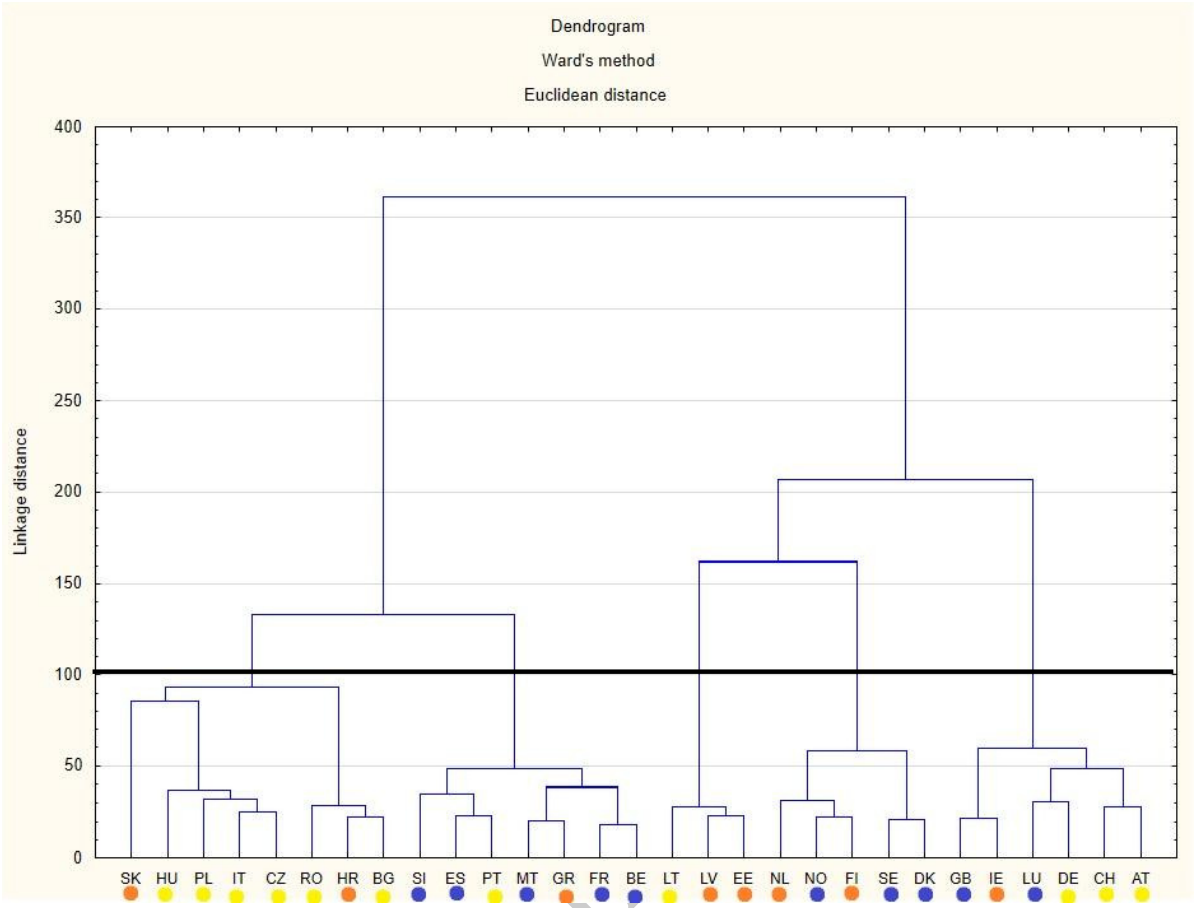
The last group includes countries of the British and Germanic cultural circle. They are characterized by relatively low power distance, high individualism, fairly high values of the motivation towards achievement and success index, and values close to average in other dimensions (i.e., without clear indications in one direction or another). Attitudes towards presenteeism are also varied – although much more so in 2015 than in 2021.

Moving on to the classification tree's results, we used the C&RT binary classification tree method using the Statistica 13.3 package. The method uses the principle of recursive division of a set of observations into subsets [12]. Its goal is to obtain the maximum homogeneity of subsets due to the membership of objects to classes [28]. The classification tree diagram is used to analyze presenteeism based on Hofstede's cultural dimensions. The trees were divided into nodes and branches representing cultural factors associated with different presenteeism levels.

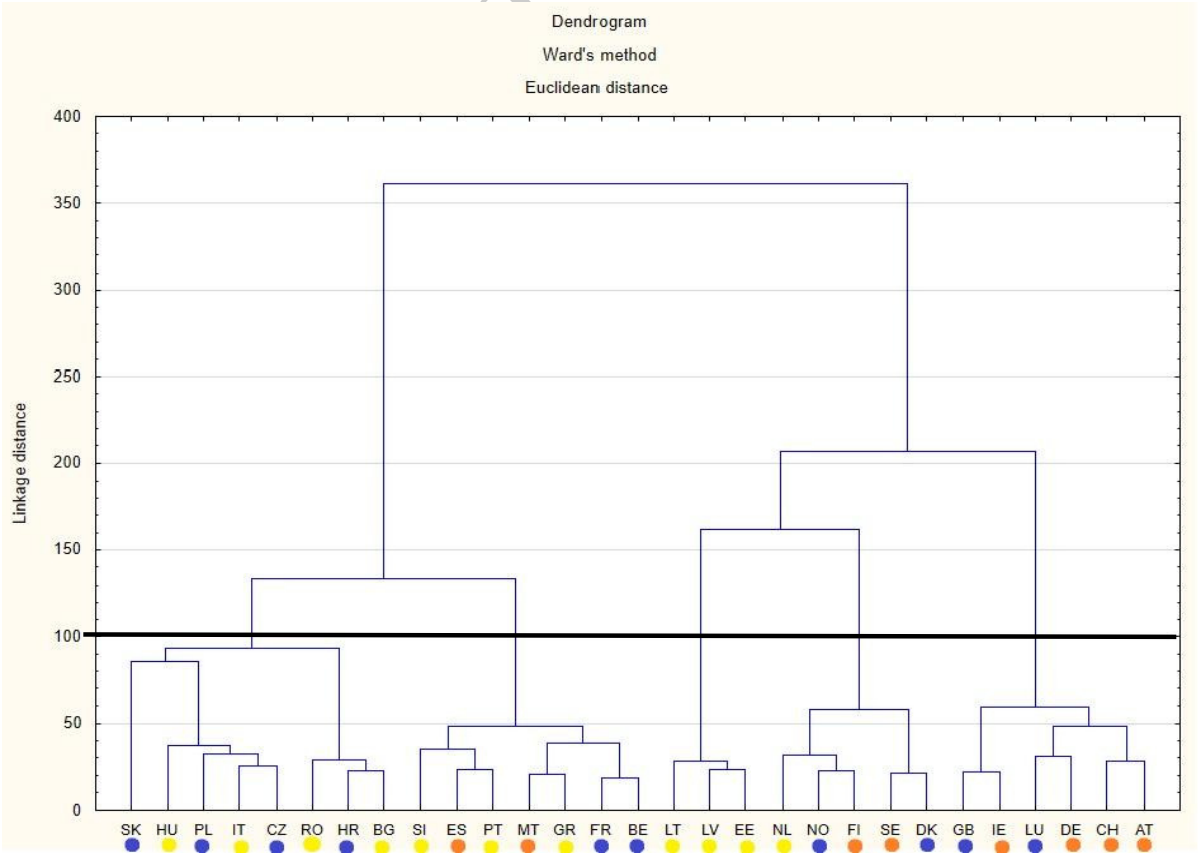
The analysis was carried out separately in 2015 and 2021. The tree was divided according to the Gini index method. Table 6 presents the results of the obtained analyses. In the process of creating classification trees, we also conducted a review of the quality of the obtained model. The results are presented in the Appendix (see Table II).

Low presenteeism, exhibited in the largest relatively homogeneous group (ID=7), can be associated

Table 5. Cluster analysis results.



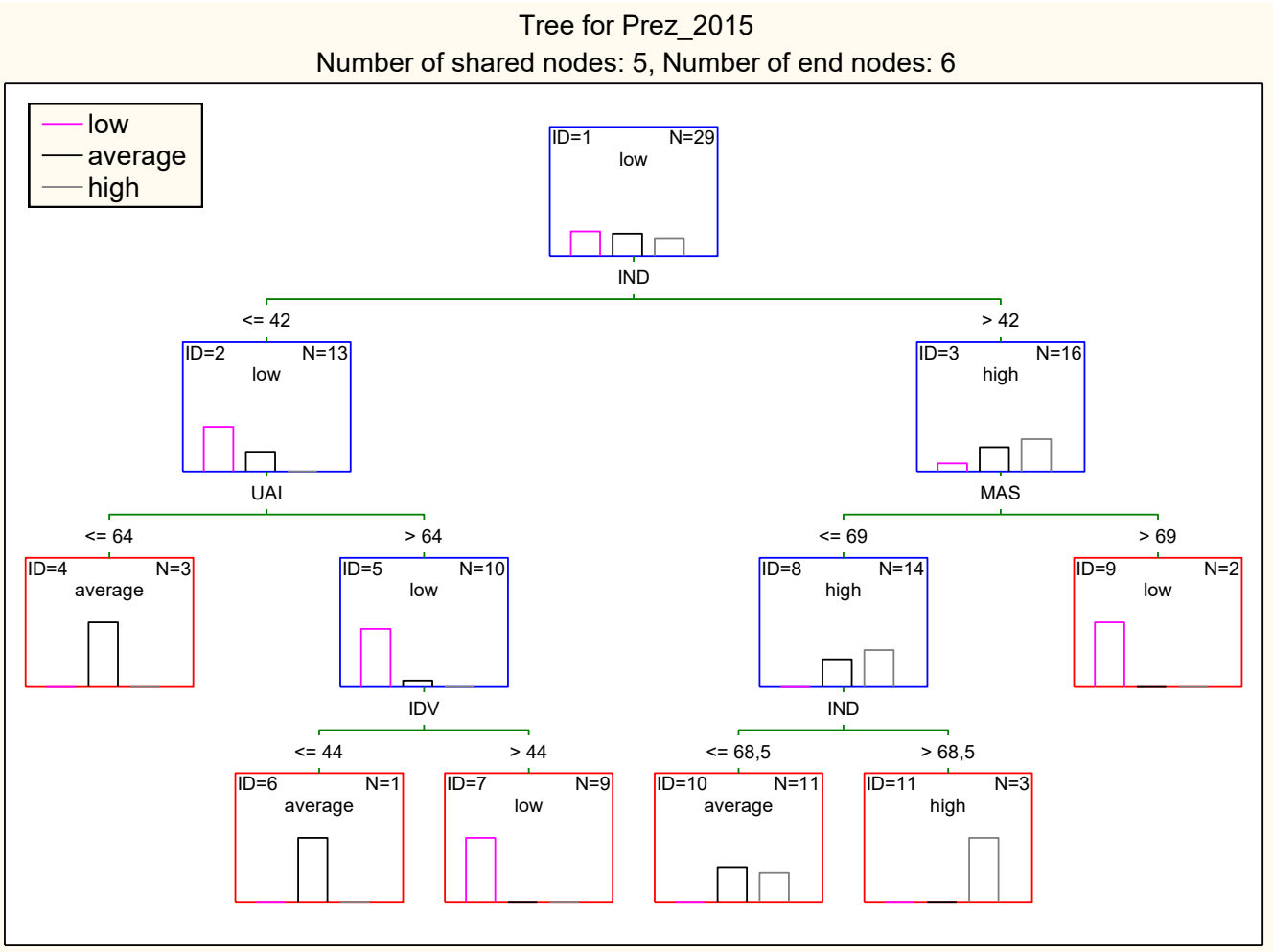
a) Year 2015



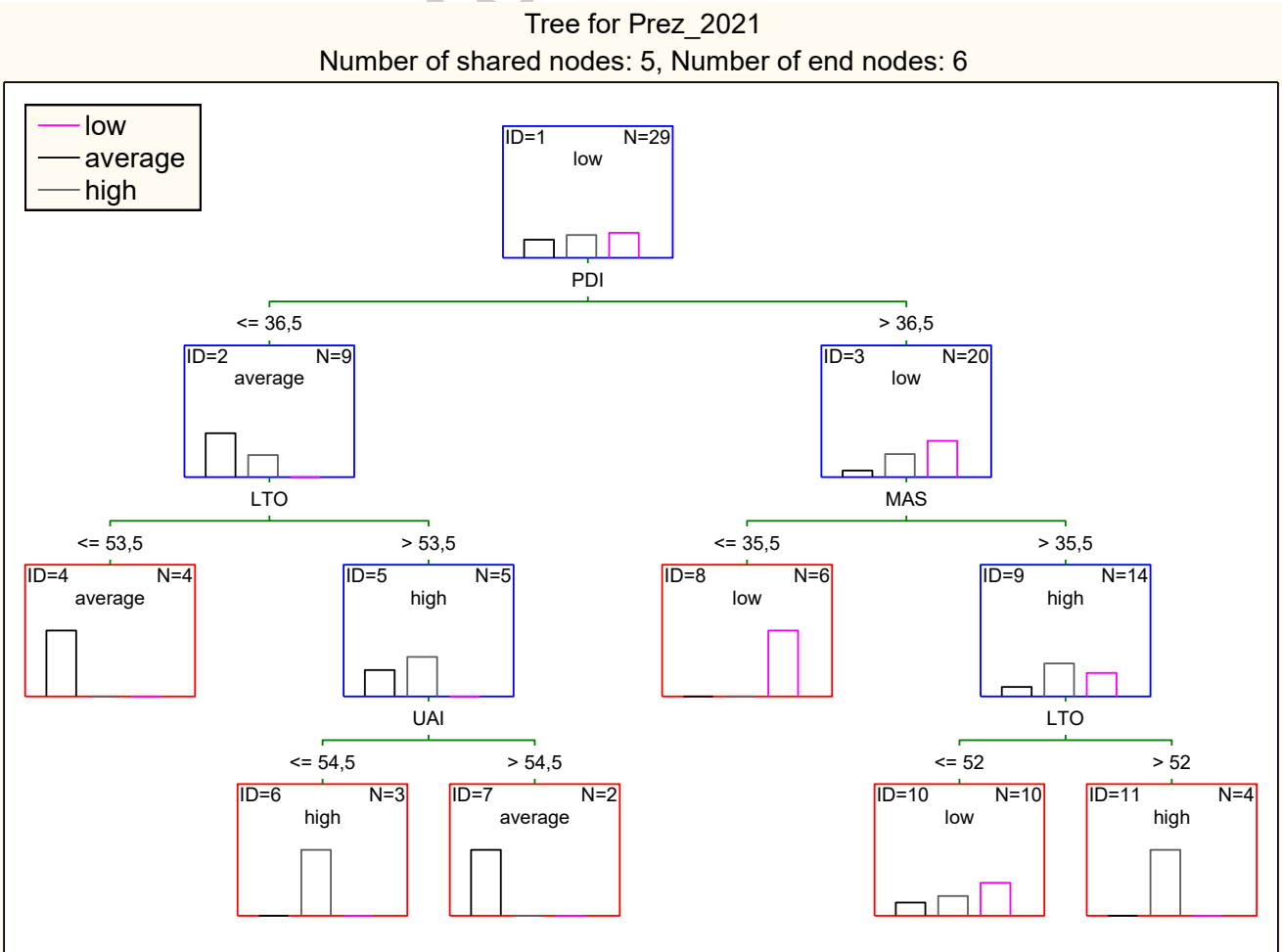
b) Year 2021

Source: own elaboration. Dendrograms obtained with Ward's method and the Euclidean distance.

Table 6. Classification trees – results.



a) Year 2015



with high restrictiveness (low Indulgence scores), medium to high Individualism, with Germany the highest (79), and very high Uncertainty Avoidance, especially in Poland (93) and Portugal (99). Also, Long-Term Orientation ranges from low to moderate. Additionally, Switzerland (CH) and Austria (AT) – also with a low presenteeism index, grouped in ID=9 – show high Individualism, medium to high Uncertainty Avoidance, moderate Long-Term Orientation, but, in contrast to ID=7, high Indulgence and, moreover, high Motivation towards Achievements and Success.

Moderate presenteeism, exhibited by Slovakia (SK), Estonia (EE), Latvia (LV) (ID=4), and Croatia (HR) (ID=6), is characterized by high restrictiveness (low Indulgence scores), moderate Uncertainty Avoidance (only Croatia showing high UAI), and moderate to high Long-Term Orientation (LTO) scores.

High presenteeism seems most difficult to associate with specific homogeneous cultural profiles, as there is one group (ID=11) composed of Great Britain (GB), Denmark (DK), and Sweden (SE), distinguished by a relatively high rate of Indulgence and Individualism, low Power Distance, low Uncertainty Avoidance, and moderate Long-Term Orientation.

In 2015, there was also quite a large group of countries representing moderate and high presenteeism (ID=10): Norway (NO), the Netherlands (NL), Slovenia (SI), Finland (FI), Spain (ES), France (FR), Malta (MT), Luxembourg (LU), Belgium (BE), Greece (GR), and Ireland (IE), which do not exhibit any unique cultural pattern. Generally, they represent medium Indulgence scores, relatively high Individualism, mostly high Uncertainty Avoidance, and rather low Motivation towards Achievements and Success. However, within-group variation is greater than in other groups, and there are no clear differentiating characteristics from other groups.

In 2021, the situation concerning the cultural patterns reflecting different presenteeism scores is somewhat similar to 2015. The largest, relatively homogeneous group presents low presenteeism scores (ID=8): Latvia (LV), Lithuania (LT), Estonia (EE), Slovenia (SI), the Netherlands (NL), and Portugal (PT). They are characterized by low Motivation towards Achievements and Success (MAS), low Indulgence (IND) with the exception of the Netherlands (68), medium to high Individualism (IDV), especially in the Netherlands (100), moderate Long-Term Orientation (LTO), and moderate to high Uncertainty Avoidance (UAI), particularly in Portugal (99).

Moderate presenteeism was indicated within 2 groups: ID=4 (Switzerland (CH), Austria (AT), Ireland (IE), Sweden (SE)) and ID=7 (Finland (FI), Germany (DE)). Both groups show low Power Distance (PDI), high Individualism (IDV), strong Motivation towards Achievements and Success (MAS) (with the exception of the Scandinavian countries), moderate Long-Term Orientation (LTO), relatively high Indulgence (IND), and moderate to high Uncertainty Avoidance (UAI), with Austria (70) being the highest.

High presenteeism was also indicated in two distinct groups: ID=6 (Denmark (DK), Great Britain (GB), Norway (NO)) and ID=11 (Slovakia (SK), France (FR), Belgium (BE), Luxembourg (LU)). Their cultural profiles are extremely distant. Group ID=6 shows low Power Distance (PDI), especially in Denmark (18), high Individualism (IDV), low to moderate Uncertainty Avoidance (UAI), moderate Long-Term Orientation (LTO), and high Indulgence (IND). The latter group, ID=11, exhibits high Power Distance (PDI), especially in Slovakia (100), medium to high Individualism (IDV), mostly high Uncertainty Avoidance (UAI), especially in Belgium (94), and moderate both Long-Term Orientation (LTO) and Indulgence (IND).

Finally, as in 2015, there remained a large group of countries (ID=10; consisting of Romania (RO),

Italy (IT), Croatia (HR), Hungary (HU), Spain (ES), Malta (MT), Poland (PL), Bulgaria (BG), the Czech Republic (CZ), and Greece (GR)) with varying levels of presenteeism, which culturally could not be assigned to any of the previously identified groups. These countries can be described by relatively high Power Distance (PDI), especially in Romania (90) and Croatia (73), medium Individualism (IDV), with Italy (53) and Hungary (71) scoring highest, very high Uncertainty Avoidance, especially in Greece (100) and Malta (96), but low to moderate Long-Term Orientation (LTO) and Indulgence (IND).

5. Discussion

The results of this study reveal that the associations between Hofstede's cultural dimensions and presenteeism rates across European countries are neither uniform nor stable over time. Several patterns, however, deserve particular attention.

First, Indulgence (IND) emerged as the most consistently associated dimension in both analyzed periods. Countries with lower indulgence scores – where social norms emphasize duty, restraint, and suppression of personal gratification – tended to exhibit lower presenteeism in 2015 and showed more varied patterns in 2021. This finding aligns with the theoretical expectation that restrained societies create normative pressure to prioritize work obligations over personal well-being, yet it challenges the intuitive assumption that such pressure would uniformly increase presenteeism. One possible explanation is that in restrained cultures, illness may also carry stigma, discouraging employees from appearing visibly unwell at work. Another interpretation is that restrained cultures may have stronger informal norms around "proper" sick leave behavior, which paradoxically reduces attendance while ill.

Second, the roles of Individualism (IDV) and Uncertainty Avoidance (UAI) proved significant in 2015 but weakened considerably in 2021. This instability may reflect the disruptive role of the pandemic period on established cultural patterns. The exceptional circumstances of 2020–2021 – including the widespread adoption of remote work, modifications to sick-leave regulations in many countries, heightened social awareness regarding the risks of working while ill, and the emergence of new attendance behaviors such as working remotely instead of taking formal sick leave – may have temporarily overridden the behavioral norms that cultural dimensions typically sustain. Importantly, the decline in presenteeism observed between 2015 and 2021 cannot be attributed solely to the Covid-19 pandemic as a health crisis; the institutional and behavioral shifts that accompanied it likely played an independent role. This interpretation is consistent with the broader theoretical observation that institutional shocks can weaken the explanatory power of cultural variables in the short term [22].

Third, the cluster analysis revealed that geographic and cultural proximity do not guarantee similar presenteeism outcomes. While the Baltic and Scandinavian clusters showed relatively consistent behavior across both periods, the Central and Eastern European cluster exhibited considerable within-group variation in 2021. This suggests that country-specific institutional factors – such as labor market flexibility, healthcare system design, sick-leave compensation policies, or employer-level practices – interact with cultural dimensions in shaping presenteeism patterns. Similarly, the classification tree analysis produced two culturally distant groups with high presenteeism in 2021 (Scandinavian/Anglo-Saxon vs. Central European), reinforcing the conclusion that no single cultural profile deterministically produces high or low presenteeism.

Moreover, the decline in presenteeism observed between 2015 and 2021 cannot be attributed solely to the Covid-19 pandemic as a health crisis. The pandemic period coincided with a range of institutional and behavioral changes that may have independently affected presenteeism patterns. These include the widespread adoption of remote work arrangements, modifications to sick-leave regulations in many countries, heightened social awareness regarding the risks of working while ill, and the emergence of new attendance behaviors such as working remotely instead of taking formal sick leave. While disentangling these factors from the direct role of the pandemic lies beyond the scope of this study, their potential contribution should be acknowledged when interpreting the observed shifts.

These findings carry implications for both research and practice. For researchers, the results underscore that cultural dimensions should be treated as contextual factors shaping the normative environment rather than as direct predictors of presenteeism. Future studies could benefit from multilevel designs that incorporate both cultural and institutional variables, as well as individual-level data on employee motivations, access to sick leave, and remote work arrangements. For practitioners and policymakers, the results suggest that interventions aimed at reducing presenteeism should be culturally sensitive – approaches effective in high-indulgence, individualist contexts may not transfer to restrained, collectivist ones. In particular, awareness campaigns about the costs of working while ill may need to be framed differently depending on whether the target culture emphasizes individual autonomy or group responsibility.

Several limitations of this study should be acknowledged. First, the analysis relies on aggregate country-level data, which limits the ability to draw inferences about individual behavior. Ecological fallacy remains a concern: country-level associations do not necessarily reflect individual-level decision-making processes. Second, Hofstede's cultural dimensions are treated as static, while in reality cultural change – however slow – does occur, and within-country cultural heterogeneity may be substantial. Third, the comparison between 2015 and 2021 is complicated by the exceptional nature of the pandemic period, and the cross-sectional design does not permit causal inference. Fourth, the Hofstede model, while widely used and offering the advantage of quantifiability, captures only selected aspects of national culture. Incorporating dimensions from alternative frameworks (e.g., Trompenaars, GLOBE) could provide a more comprehensive picture. Finally, the presenteeism measure is based on self-reported survey data, which may be subject to social desirability bias and differences in interpretation across linguistic and cultural contexts.

6. Conclusions

This study examined the association between Hofstede's cultural dimensions and presenteeism rates in 29 European countries using data from the EWCS 2015 and EWCTS 2021 surveys. Employing cluster analysis and classification trees, we identified groups of countries with similar cultural profiles and examined how these profiles relate to different levels of presenteeism.

The results indicate that cultural dimensions – particularly Indulgence, Individualism, and Uncertainty Avoidance – are meaningfully associated with cross-country variation in presenteeism, though the strength and configuration of these associations shifted between the two periods. The Covid-19 pandemic and its accompanying institutional changes appear to have disrupted previously stable cultural patterns, suggesting that the relationship between culture and presenteeism is context-dependent rather

than deterministic.

From a theoretical perspective, this study contributes to the presenteeism literature by demonstrating that national culture constitutes a relevant contextual factor that should be incorporated into analytical frameworks alongside individual and organizational determinants. From a practical standpoint, the findings suggest that one-size-fits-all policies aimed at reducing presenteeism may be insufficient; culturally informed approaches are needed.

Future research should extend this analysis to post-pandemic survey waves to assess whether the 2021 patterns represent a temporary disruption or a lasting shift in the culture–presenteeism relationship. Incorporating additional cultural frameworks, institutional variables, and individual-level data would further enrich our understanding of the complex, multi-layered determinants of presenteeism.

Data availability statement

The data that support the findings of this study are available from the corresponding author, Katarzyna Miszczyńska, upon reasonable request.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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Table I. Presenteeism and culture – literature review.

Authors and title	Sample (countries)	Study period	Independent variables (incl. cultural variables)	Impact on presenteeism	Method
Li, M., Chen, R., Liu, Q. et al. (2026). The relationship between perceived organizational support and presenteeism among pediatric nurses in China. BMC Nursing.	China (485 pediatric nurses, 3 tertiary hospitals, Weifang, Shandong)	Cross-sectional (data collected ∼2024–2025)	Perceived organizational support (POS); professional identity (mediator); demographic and job characteristics. No national-culture dimensions (single-country study).	POS is negatively associated with presenteeism ($r = -0.307$). Professional identity partially mediates the POS–presenteeism link (mediating effect $= 39.2\%$).	Questionnaire survey; t-tests, Pearson correlation, ANOVA, multivariate linear regression, PROCESS 4.0.
Li, C., Meng, Z. X., Lin, Y. B., & Zhang, L. (2025). Cross-cultural adaptation and psychometric evaluation of the Chinese version of the sickness presenteeism scale-nurse (C-SPS-N). BMC Nursing, 24(1), 494.	China (clinical nurses; Jinzhou Medical University)	Cross-sectional; data ∼2024, published May 2025	Instrument validation study – cross-cultural adaptation of the SPS-N (21 items) via Brislin model.	Not a determinant study. Provides a validated tool (C-SPS-N) with good reliability and validity.	Translation/back-translation (Brislin); exploratory and confirmatory factor analysis; reliability and validity testing.
Hidayat, S., Darmanto, D., Mu'min, H., & Dja'wa, A. (2025). Work-life balance and employee performance: Reviewing global perspectives. ECOTECHNOPRENEUR, 4(03), 245–262.	Global (literature review across multiple countries)	Systematic literature review (Sept 2025)	Work-life balance (WLB); technology/flexibility; gendered care burden; institutional context; cultural norms.	Presenteeism appears as a cultural norm moderating how WLB is used; chronic imbalance increases stress, burnout, absenteeism and turnover.	Systematic literature review.
Lu, L., & Cooper, C. L. (2022). Sickness presenteeism as a link between long working hours and employees' outcomes. IJERPH, 19(4), 2179.	Taiwan (275 employees, various sectors)	Two-wave panel, 5-month interval (∼2020–2021)	Long working hours (predictor); intrinsic and extrinsic work-value orientations (moderators). Single-country.	Long working hours positively associated with presenteeism, which is negatively associated with well-being. Intrinsic values buffer the effect.	Two-wave survey; latent moderated structural equation modeling (LMS).
Tatliyer, M., & Gur, N. (2022). Individualism and working hours: macro-level evidence. Social Indicators Research, 159(2), 733–755.	Cross-country (macro-level, multiple countries)	Macro/aggregate data (cross-country)	Individualism–collectivism (Hofstede); controls (GDP, labour-market institutions). DV = working hours.	Not about presenteeism directly. Individualism negatively associated with working hours – more collectivist countries work longer hours.	Cross-country regression with instrumental variables (IV).

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Table I (continued)

Authors and title	Sample (countries)	Study period	Independent variables (incl. cultural variables)	Impact on presenteeism	Method
Lu, L., Cooper, C. L., & Lin, H. Y. (2013). A cross-cultural examination of presenteeism and supervisory support. Career Development International, 18(5), 440–456.	China and UK (245 Chinese + 128 British employees)	Cross-sectional (∼2011–2012)	Presenteeism (predictor); supervisory support (moderator); national culture (China vs UK).	Presenteeism more prevalent among Chinese employees; supervisory support buffered its impact on exhaustion in both cultures.	Structured questionnaires; hierarchical regression; cross-cultural comparison.
Garczynski, A. M., Waldrop, J. S., Rupprecht, E. A., & Grawitch, M. J. (2013). Differentiation between work and nonwork self-aspects as a predictor of presenteeism and engagement. J. of Occupational Health Psychology, 18(4), 417–429.	USA and India	Cross-sectional (∼2011–2012)	Work/nonwork self-concept differentiation (predictor); nationality/culture (moderator: USA vs India).	Indian participants reported lower self-differentiation and higher presenteeism than US participants; nationality moderated the link.	Questionnaire survey; moderated regression (cultural interaction).
Ferreira, A. I., Mach, M., Martinez, L. F., et al. (2019). Working sick and out of sorts: a cross-cultural approach on presenteeism climate, organizational justice and work–family conflict. IJHRM, 30(19), 2754–2776.	6 countries: Brazil, Ecuador, Lebanon, Portugal, Russia, Spain (healthcare)	Cross-sectional (∼2016–2017)	Presenteeism climate (predictor); organizational justice (mediator); national/cultural context (Latin vs non-Latin).	Presenteeism climate and justice perceptions affect work–family conflict (WFC); higher WFC in non-Latin countries.	Cross-national questionnaire survey; mediation analysis.
Balda, M. L. G. (2022). Employees' well-being: the study of the determinants of job satisfaction and presenteeism in public and private sectors. Doctoral dissertation, Universidad Pública de Navarra.	European context (public vs private sector)	Doctoral dissertation, 2022 (likely EWCS data)	Sector (public vs private); working conditions, autonomy, job security, pay, development, coworker relations.	Determinants of presenteeism differ between public and private sectors; public-sector employees report higher job satisfaction.	Analysis of survey data; regression/multilevel modeling; sector comparison.
Addae, H. M., Johns, G., & Boies, K. (2013). The legitimacy of absenteeism from work: a nine nation exploratory study. Cross Cultural Management, 20(3), 402–428.	9 countries (1,535 employees, 10 multinationals)	Cross-sectional (∼2008–2011)	Work centrality, locus of control, polychronicity, gender-role preference, social support; cross-national differences. DV = legitimacy of absenteeism.	Not directly about presenteeism. Legitimacy of absence and reported absence differed across countries; norms shape attendance attitudes.	Questionnaire survey across 9 countries; comparative analysis.

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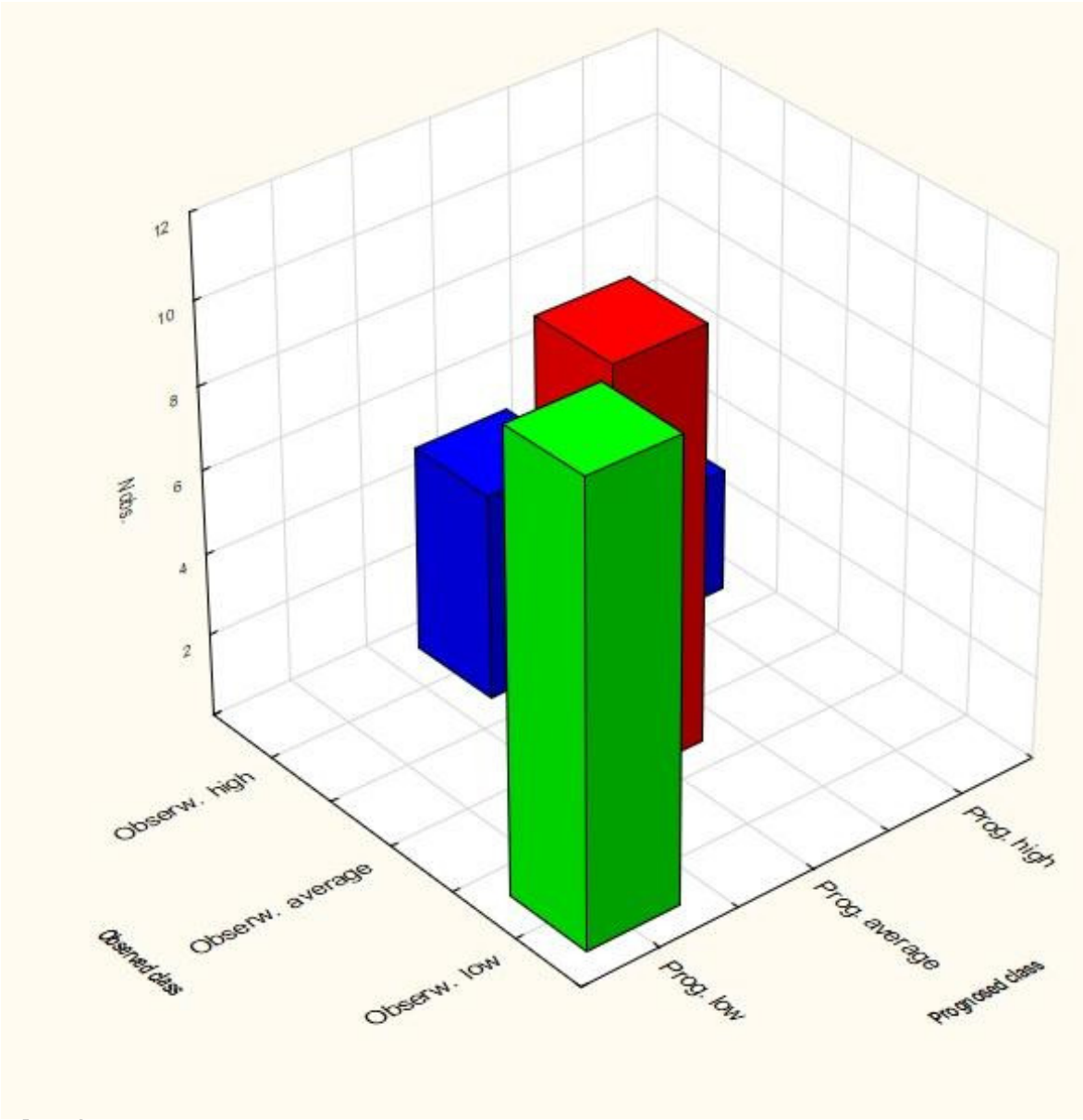
Table I (continued)

Authors and title	Sample (countries)	Study period	Independent variables (incl. cultural variables)	Impact on presenteeism	Method
Peretz, H., & Fried, Y. (2012). National cultures, performance appraisal practices, and organizational absenteeism and turnover. J. of Applied Psychology, 97(2), 448–459.	21 countries (organization-level, Cranet)	Two time periods (Cranet data)	Performance-appraisal (PA) practices; national culture (GLOBE); culture×PA congruence. DV = absenteeism.	Not about presenteeism. Congruence between culture and PA practices associated with lower absenteeism and turnover.	Multilevel analysis; culture×practice interactions.
Ruhle, S. A., & Süß, S. (2020). Presenteeism and absenteeism at work – an analysis of archetypes of sickness attendance cultures. J. of Business and Psychology, 35(2), 241–255.	Various organizations (28 interviewees; German/international)	Qualitative, cross-sectional	Individual perceptions of attendance norms, values and behaviors; legitimacy of absence and presenteeism.	Identifies three archetypes of sickness attendance cultures; presenteeism and absenteeism are highly interrelated.	Qualitative; 28 semi-structured interviews; GIOIA method.
Czakert, J. P., Reif, J. A. M., & Berger, R. (2022/2024). Leadership behavior, stress, and presenteeism: A cross-cultural comparison. Proc. 25th IACCP Congress (Art. 293).	4 countries: Germany, Ireland, Latvia, Spain (979 employees)	Cross-sectional (online survey)	Transformational leadership (positive); passive-avoidant leadership (negative); stress; national culture (Hofstede masculinity).	Presenteeism prevalence differed markedly across countries (∼3.93 days in Ireland to 22.11 days in Spain).	Online questionnaire; single-item presenteeism; mean comparisons and Spearman correlations.
Punnett, B. J., Greenidge, D., & Ramsey, J. (2007). Job attitudes and absenteeism: A study in the English speaking Caribbean. Journal of World Business, 42(2), 214–227.	Barbados (5 manufacturing companies)	Cross-sectional	Job satisfaction facets; organizational commitment; personality; cultural dimensions (IDV, UAI, PDI). DV = absenteeism.	Not about presenteeism. Satisfaction with co-workers, responsibility, job security and loyalty related to absenteeism.	Questionnaire survey; correlational/regression analysis.

Source: own elaboration.

Table II. Classification trees – the quality of the obtained results.



a) Year 2015