Review Article

Influence of Cushioning Variables in the Workplace and in the Family on the Probability of Suffering Stress

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A B S T R A C T

Stress at work and in the family is a very common issue in our society that generates many health-related problems. During recent years, numerous studies have sought to define the term stress, raising many contradictions that various authors have studied. Other authors have attempted to establish some criteria, in subjective and not very quantitative ways, in an attempt to reduce and even to eliminate stressors and their effects at work and in the family context. The purpose of this study was to quantify so-called cushioning variables, such as control, social support, home/work life conciliation, and even sports and leisure activities, with the purpose of, as much as possible, reducing the negative effects of stress, which seriously affects the health of workers. The study employs data from the Fifth European Working Conditions Survey, in which nearly 44,000 interviewees from 34 countries in the European Union participated. We constructed a probabilistic model based on a Bayesian network, using variables from both the workplace and the family, the aforementioned cushioning variables, as well as the variable stress. If action is taken on the above variables, then the probabilities of suffering high levels of stress may be reduced. Such action may improve the quality of life of people at work and in the family.

1. Introduction

There have been many attempts to establish a good definition of the term stress. Some authors have remarked on the inexactness and controversy of stress as a concept. Because of these uncertainties over the definition of stress, there are many ways of defining it. According to Cox and Mackay [1], these definitions may be categorized into well-differentiated levels in accordance with variables such as perception, stimulus, and response.

Some authors such as Selye and Ogilvie [2] have explained the term stress by likening it to physical and psychological attitudes of the human body that a person experiences in the face of any environmental stimulus, denoting it in this case as a stressor. According to these authors, the definition of stress may therefore be set in the context of a response of the human body to any stressor or stressful behavior.

The term stress, which is defined as a perception, is encapsulated in cognitive processes that have *a posteriori* physical and psychological effects. In this context, other authors such as Edwards [3] recognized that no situation is stressful until a person defines it or experiences it. Other authors mention satisfaction and job dissatisfaction as being associated with stress [4].

Another aspect of the term stress, which is defined as a means of union between people and the environment in which they live, encompasses two possible important definitions:

- Some solutions emphasize differences between the demands placed on an individual and his/her capabilities of confronting them based on his/her assessments of those differences. McGrath and Altman [5] defined it as "an instability between necessity, the person and his capability under circumstances in which individual despair and disappointment at finding an answer will have significant consequences on him".
- Other authors have identified the differences between the environment in which people live and their needs in relation to it. Thus, authors such as Edwards [3], defined stress as "the negative difference between a situation that the person perceives and the hypothetical situation desired by that person".

Many studies have examined stress reduction to improve people's quality of life. Kopelman [6] highlighted that all changes in the

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intervention of any firm or organization can affect states of tension and stress that working people can experience. There are various studies related to the optimization of working conditions that underline important aspects such as environmental noise, toxic products, and ergonomic studies. Moreover, professional improvements and good treatment and management of human resources within the firm will notably reduce the risk of suffering stress. Researchers such as Semmer [7] have highlighted the importance of not overlooking the employment position itself, in other words, the tasks that the worker performs. In this context, different ways of performing work-related tasks and the attachment of greater importance to those tasks by line managers are effective stress-prevention methods. Likewise, measures such as frequent changes in working hours and even in the speed of work can help to prevent stress, provided that control is exercised at all times over the work to be done. Finally, investigators such as Peiró [8] have studied important stress-prevention aspects related to variables of social support, conciliation of work and family life, and involvement in sports and leisure activities. These variables were used in the model that we had generated in our study. They serve as the basis for the reduction of stress levels in both the workplace and in family life. All of these variables are explained below.

Environmental conditions in the workplace, as Kopelman [6] noted, have been the subject of regulations that are intended to establish minimum health and safety requirements in the workplace in matters related to environmental noise, toxic products, ergonomics, and so forth. Firms are capable of proposing improvements in situations that principally create stressful states in the workforce.

A theory by Gil-Monte and Peiró [9] that has recently gained ground is that there are features that often contradict the main principles of scientific organization intended to obtain good results in the workplace. These authors maintain the concept of improving and optimizing employment positions by introducing a degree of autonomy in them, changing the way things are done, giving an identity to the activities themselves within the organization and, consequently, giving strength and importance to all the activities to be developed within the firm. Investigators such as Kopelman [6] conducted experiments on certain working contexts in firms, highlighting that the value of the employment position usually has greater repercussions on the quality than on the amount of work that is carried out. He highlighted a reduction in absenteeism at work and a considerably increased sense of wellbeing in the workplace. He also introduced the concept of the work group, that is, teamwork based on the unity of the entire firm or organization in the performance of their own tasks. In this concept, distribution of activities within the group and planning by the leader of the team within the organization are important.

According to Hall and Hall [10], all issues related to working hours and speed of work are the principal generator of stress in all senses. Firms have proposed different ways of reducing the factors that generate stress, including flexi-time, a shorter work week, half-day working arrangements, and rotation of job posts.

In many cases, organizations offer their workers and directors training on time management, with the fundamental aim of improving their knowledge and skills in areas such as acceptable delegating of work, prioritizing the completion of important activities rather than secondary jobs, as well as phasing out attachment of the term urgent to work-related activities. Introduction of these changes into the organization can result in improvements in stress levels within the firm.

Karasek [11] proved that the objectives set by directors or management in any firm or organization allow them to establish more precisely the responsibilities of all of its personnel. They thus lead to workers' feeling of greater responsibility, greatly clarifying the responsibilities and the expectations of the management and

increasing the confidence of all workers. According to this author, the participation of operators also increases when they seek solutions to any problem, thereby reducing levels of stress in the organization.

Other researchers such as Peiró [12] found that one of the most important sources of stress mentioned by professional managers and workers is their own career development within the organization. According to this author, one of the techniques that firms can develop to reduce stress indices in the organization is planning and study of the promotion of workers within the organization.

In another study, Peiró and Salvador [13] examined different actions in the programming of human resources that can generate or reduce stressful situations among workers on the basis of the approach to such programming. Therefore, the publication of a job offer and the consequent employee selection process can greatly clarify aspects of the job and its social environment. On the contrary, attention may solely center on the knowledge and the drawbacks of each person. Therefore, they posited that all staff selection and training processes can be sources of stress reduction, especially in the phases following the commencement of employment.

The term control principally refers to how work is done and has two components. (1) The principle of autonomy: this refers to the possibility that a person has to take work-related decisions to control his/her own activities within each organization. (2) Skills development: this component is related to the degree to which the employment position allows people to exercise and to develop their own capabilities through training, as well as application of creativity in their various tasks.

Karasek [11], defined the term control by using a theoretical model. This model, which is introduced in a later section, takes four broad classifications of jobs or occupations as a reference for the levels of psychological demand and control. This theory also introduces the influence of the control variable on conflicts in the workplace, which has direct repercussions on stress. This author highlighted concepts such as job-related autonomy, as well as opportunities for advancement and development at work, identifying two positive characteristics in the definition of control, albeit noting that these are not the only positive attributes. Other aspects of control over the time available to the worker in an organization (breaks, permits, holiday periods, etc.) should also be taken into account. His theory also highlights other important parameters such as feelings towards the job and the level of responsibility held by the worker.

The most negative health-related aspect according to Karasek [11], is the high psychological demands and the low level of variable control, which create high levels of stress. This variable has importance in relation to the health of workers, as it is an available variable for balancing the demands of work in the organization. Johnson et al [14] proposed modification of this model. They also introduced social support as an important variable in the control of stress levels in the workplace, in addition to the variables demand and control. They posited that the variable social control has two basic components: (1) the support of colleagues at work; and (2) the support of line managers and supervisors of work activities in the organization. The variable social support between workers and their line managers, as this theory explains, identifies a functional characteristic of the relations, while the unit of the group within the firm encapsulates it in an emotional aspect. This aspect represents a modifying variable of the effect of stress, in that very high social support in the workplace diminishes the effects of variable stress; conversely, these values increase if social support is low.

According to Artazcoz et al [15], the conciliation of working life (employment) and family life (relatives) is a technique that can facilitate aspects of real equality between men and women and can reduce levels of tension and stress. Conciliation is aimed at obtaining a new distribution of social and economic systems in an organization where women can conciliate different aspects of their

lives (work, family, and time dedicated to themselves) in a real way as much as men can. Therefore, the conciliation of work and family life contributes to a society because of improvements in the quality of life of both men and women, as well as reduction of internal levels of stress within the organization. Other investigators such as Grote et al [16] highlighted the importance of the conciliation of work and family life in the context of caring for children at different stages, as well as how it can affect levels of stress within the family.

Finally, we examine sports and leisure activities, which are cushioning variables of stress that can, in many cases, reduce its negative effects. In their work *Psicología social y ocio: una articulación necesaria* (Social psychology and leisure: a necessary articulation) Rodríguez-Suárez and Agulló-Tomás [17] explained the importance of leisure in improving the quality of life and in reducing levels of stress. Other authors such as Stanton and Howard [18] and Stanton-Rich and Iso-Ahola [19] underlined the importance of leisure in the fight against burnout or overwork syndrome.

2. Materials and methods

2.1. Objectives

The main objective of this work was to analyze the influence of cushioning variables on the probability of suffering high levels of stress in countries in the European Union, taking into account work and family aspects.

The study was conducted on the basis of the following criteria [20]:

- Selection of data-mining techniques, which take into account their relevance in our study to allow work with a reasonable source of data. The variable stress that was selected *a priori* on the basis of the literature review served as an output attribute.
- We established a ranking of the most important predictors that affect the principal variable of study in the workplace and in the family, on the basis of strong evaluators of variables together with data-mining techniques and Matlab programming tools.
- Using Bayesian networks, we found relations indicating conditional dependency between some variables.
- Subsequently, we performed probability calculations for other cushioning variables that intervene in the workplace and in the family for the fundamental variables of study and stress.

2.2. Population of the study

The "V" European Working Conditions Survey (V EWCS) was conducted by the European Foundation for the Improvement of Living and Working Conditions, an agency of the European Union (EU) with its headquarters in Dublin, to establish knowledge in the area of social and work-related policies. The survey was conducted between January and June 2010. Almost 44,000 European workers of 34 nationalities (from 27 member states of the EU, including Albania Croatia, Kosovo, Turkey, Montenegro, Norway, and Yugoslavia) responded to over 100 questions on different topics related to their working situation and their conditions of employment. The results of this survey provide an invaluable source of information on working conditions in different European countries. They permit an evaluation of the differences between such conditions, as the survey covers all of the countries. The survey also provides data for analysis of the last 15 years, as it is the fifth of such survey. Earlier surveys were completed in 1991, 1995, 2000, and 2005 and a sixth has begun in 2015.

The number of questions and the fields they cover have been expanded with each successive survey; however, a number of key

questions that allow the analysis of trends in working conditions have been maintained. The development of the survey reflects the growth of the EU: it involved only 12 countries in 1991, 15 in 1995, 25 in 2000, 31 in 2005, and as many as 34 in 2010.

The preparation of the fifth survey included the review of the statistical process and the design of a strict quality system for information using state-of-the-art methods. The quality control system for information guided the development of the fifth survey. This system was developed by both internal and external agents. A minimum of 10% of all surveys were analyzed in each country establish traceability of the study.

2.3. Study variables

In this section, we discuss the so-called "cushioning variables of stress", mainly to reduce or to mitigate the effects of stress. The variables of this study were control and social support, conciliation between home and work, and participation in sports and leisure activities, in relation to family and workloads. Each group of variables may be seen in Table 1 (control and social support) and in Table 2 (conciliation and sports and leisure).

The variable control is a dependent variable. It indicates the freedom to choose or to change aspects of work. It was prepared on the basis of sections a, b and c in question Q50. In this question, interviewees are asked to assess whether they are able to choose or to change the order of their tasks (a), the methods of work (b), and the speed or rate of work (c). The response may be either affirmative or negative.

The variable social support is a variable in the group of cushioning variables that refer to work loads. It represents the degree of support that the worker receives for the development of his/her tasks from colleagues and managers. It is, therefore, a dependent variable from subsections a and b of question Q51.

The variable conciliation is an independent variable that indicates whether working hours fit social and family commitments outside work. These results are taken from the responses to question Q41 of the survey.

In the variable sports and leisure, the last of the cushioning variables that were taken into account in the construction of our model, the time spent on those activities outside of work is considered. It is a very important aspect that mitigates the negative effects caused by other family and workloads. The data were taken from the responses to question EF2g of the survey. Tables 3 and 4

Table 1
Groups of the variables control and social support

Group	Control	Social support
1	Very low	Very low
2	Low	Low
3	High	Moderate
4	Very high	High
5	–	Very high

Table 2
Groups of the variables conciliation and leisure and sport

Group	Conciliation	Leisure and sport
1	Very little conciliation	Almost never
2	Little conciliation	1 or 2 times/y
3	Good conciliation	1 or 2 times/mo
4	Very good conciliation	1 or 2 times/wk
5	–	< 1 h/d
6	–	> 1 h/d

Table 3
Groups of the variables control and social support related to workloads

Survey	Cushioning variable (workload)
Question	Control
Q-50a	Are you able to choose or change your order of tasks at work?
Q-50b	Are you able to choose or change your methods of work?
Q-50c	Are you able to choose or change your speed or rate of work?
Question	Social support
Q-51a	Do your colleagues help and support you?
Q-51b	Does your manager help and support you?

Table 4
Groups of the variables conciliation and leisure and sport related to family loads

Survey	Cushioning variables (family loads)
Question	Conciliation
Q-41	Do your working hours fit with your family or social commitments outside work?
Question	Sporting, cultural, & leisure activity
EF2g	How many hours per day are you involved in sporting, cultural, or leisure activity outside your home?

present all questions in the European survey that aided in the construction of cushioning variables. Cushioning variables related to workloads are listed in Table 3, and those related to family loads are shown in Table 4.

The independent variable and the subject of the study is stress. In the survey, question Q51-N asks whether an individual experiences stress at work. Responses to this question were used in the probability calculation of suffering stress considered for the definition of the model. The levels or groups of stress that were considered in accordance with question Q51-N of the survey are given in Table 5.

Finally, the variables that were taken into account in the generation of the Bayesian model are discussed, although they were not the object of study in this article. The variables that directly affect workloads are speed or rate of work, working to tight deadlines, and the number of hours worked each week. The variable speed of work, which was taken from question Q45a of the survey, refers to how much time in the working day is spent working at high speed. The variable tight deadlines, which was taken from question Q45b, it indicates the time spent in the working day on the completion of tasks with tight deadlines. Both variables were constructed on the basis of six different categories: almost never, a quarter of the time, half of the time, three-quarters of the time, almost always, and always. Finally, the variable number of hours worked per week is divided into six different groups (< 20 hours, 20−30 hours, 30−40 hours, 40−50 hours, and > 60 hours per week).

The variables that also affect family loads are childcare, care of the elderly, and housework. Each consists of six different groups that reflect the time spent carrying out these activities (never, once or twice per year, once or twice per month, once or twice per week, less than 1 hour per day, more than 1 hour per day).

Table 5
Groups of the variable stress

Stress	
Group 1	Very low stress
Group 2	Low stress
Group 3	Medium stress
Group 4	High stress
Group 5	Very high stress

Finally, a variable also considered in the generation of the Bayesian model was gender, which required two possible responses for question HH2 of the survey.

2.4. Statistical procedures

In this section, the probabilistic methodology of Bayesian networks for the construction of the family load−workload−cushioning variable−gender−stress model is developed. This methodology was applied in analyzing working conditions, safety, and health in the workplace [21−27].

The relations between the variables of the Bayesian network models are represented in intuitively through directed graphs, which codify the marginal and conditioned dependencies between the different variables. The graphs present an overview of the relations that can be established in the dataset. In the proposed model of Bayesian networks (Fig. 1) stress depends principally on variables related to the workplace and the family. In this article, we focus on the variables known as cushioning loads in the context of workloads (control and social support) and family loads (conciliation and completion of sports and leisure activities) to study the influence of these variables on stress in relation to work and family loads. The variables that directly influence a given variable are referred to as its parent variables (Fig. 1).

Using the models, we thus studied the effect of stress on the set of family and workloads. In general, Bayesian networks permit the construction of probabilistic global models for a set $X = (X_1 \ldots, X_n)$ on the basis of a particular dataset input. This model explicitly represents knowledge of the given problem in probabilistic terms through a joint probability function of the variables (Bayes theorem):

$$p(x) = p(x_1, \ldots, x_n).$$

Joint probability in the model is not well-defined, as it contains many degrees of freedom. Using Bayesian networks, was resolved the problem efficiently, limiting the number of degrees of freedom on the basis of the dependencies and independencies that were obtained from the data, as shown in the resulting graph. We took into account only Groups 1 and 5 of these variables, thus limiting the degrees of freedom of the proposed model.

Therefore, the joint probability function is defined through factorization of local probability functions on the basis of the probability of a variable conditioned by its parent variables, that is, $p(x) = \Pi_i p(x_i | \pi_i)$, where Π_i is the set of parent variables of the node x_i of the graph. Therefore, the independencies of the graph are immediately translated to the probabilistic model in a very practical way. For example, a practical application of Bayesian networks in the model in Fig. 1 is its calculation of the conditioned probability resulting from the variable stress under very high rhythm of work (evidence = 6) and very low conciliation (evidence = 1).

With a defined probabilistic model $p(x)$, Bayesian networks permit the calculation of the initial or marginal probabilities $p(X_i = x_i)$ for state x_i of each variable x_i of x. These probabilities are referred to as *a priori* or initial probabilities. They correspond to the initial state of the variables in the dataset (the frequencies of the different states). In this case, the initial probabilities for each cushioning variable of the model under study are presented in the Results section.

With the obtained *a priori* probabilities, Bayesian networks enable the conditioned probabilities $p(x_i/e)$ for each variable $X_i \notin E$, given certain evidence e (for example, given the value of some variables of the model, speed of work = 1). These new probabilities reflect the effect of evidence on the other variables of the model (for example, the effect of the variable childcare having the value 1).

The difference between marginal and conditioned probabilities means that we can analyze which responses have greater effect on
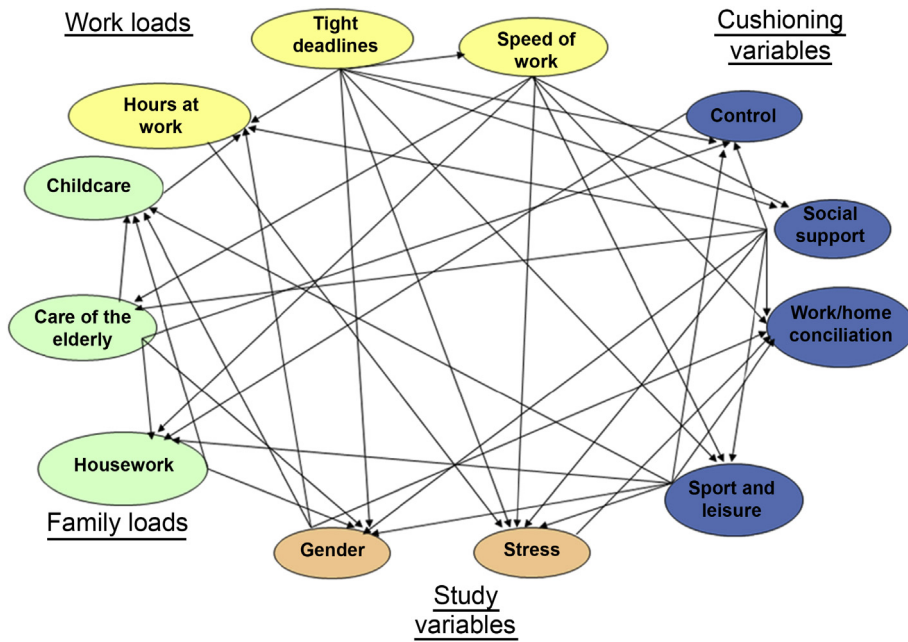
Fig. 1. Bayesian model for family load−workload−stress.

high levels of stress. It thus allows us to explore and to quantify the results of the survey though sensitivity studies that are presented in the Results section.

The most complex process in the use of Bayesian networks is the training of the model on the basis of the data. To do so, different algorithms were developed from test statistics of dependency and in automated searches for optimal models, which represent the given dataset [28].

In this case, the algorithms are fundamentally based on the calculation of the joint probability function $p(x) = \Pi_i p(x_i|\pi_i)$. The calculation of these expressions as functions of the number of variables and of the degrees or levels of freedom of each one is complex. On the one hand, we have the variables that affect the work and the family environment; on the other hand, we have the cushioning variables. In total, there are 12 variables with an interval of degrees of freedom of between 4 and 6 for each. For example, there are 6 degrees of freedom for the variable conciliation or involvement in sports and leisure activities, in both the work and the family context. Calculation of the joint probability function $p(x)$ allows us to calculate the relation between all other variables of the model and thus to obtain the Bayesian network. In this case, it is the influence of the cushioning variables on the probability of suffering high levels of stress, considering variables in the context of both work and the family.

There are numerous tools that allow convenient, efficient calculations, including Hugin (http://www.hugin.com), Genie (http://genie.sis.pitt.edu/), Netica (http://www.norsys.com), and Matlab.

Because of the large quantity of data with which we are working, we used the Matlab programming language to calculate the Bayesian network through the joint probability function $p(x)$, as mentioned earlier. This program allowed us to obtain valid results rapidly and effectively.

2.5. Validation of the global model (stress−workload−family load)

The Bayesian network model was generated with 75% of the data, and the remaining 25% of the data was used for its validation.

This approach ensured the necessary consistency and veracity for application of the model. Validation of the results was done by using the receiver operating characteristic (ROC) curve. According to reported by authors such as Fawcett [29], Zou et al [30], Swets [31] and Fogarty et al [32], this curve is a graphic representation of sensitivity $(1 −$ specificity$)$ for a binary classification system in which the discrimination threshold varies. The ROC curve may be used to calculate probabilities and to create statistics that define the solution to a particular problem on the basis of a classifier. The following points may be highlighted: (1) the point at which the convex line of the ROC curve joins the diagonal line; (2) the area between the ROC curve and the diagonal line in the ROC space; and (3) the study of the area below the ROC curve, referred to as area under the curve (AUC).

The AUC, which is the identifier most widely used by authors such as Swets [31] and Fawcett [29], was employed in the present study to validate the results obtained. According to Fawcett [33], this identifier may be defined as the probability of a set of randomly selected positive distances being superior to the negative ones. The Matlab programming language was used for both the generation of the model and calculation of the AUC, as well as for the sensitivity studies. In this particular case, the AUC was always over 0.6, which as Fawcett [33] explained in his studies, is sufficient. The relevant AUC for various combinations of workloads and cushioning variables are shown in Tables 6−9. The AUC obtained in the case of combinations of family loads and cushioning variables are shown in Tables 10−13.

Table 6
AUC values for the combination of workload and control

Variable	AUC	
	Level 1	Level 5
Speed of work	0.62	0.72
Tight deadlines		
Hours worked		
Control		

AUC, area under the curve.

Table 7
AUC values for the combination of workload and social support

Variable	AUC	
	Level 1	Level 5
Speed of work	0.62	0.71
Tight deadlines		
Hours at work		
Social support		

AUC, area under the curve.

Table 8
AUC values for the combination of workloads and work/home conciliation

Variable	AUC	
	Level 1	Level 5
Speed of work	0.62	0.72
Tight deadlines		
Hours at work		
Conciliation		

AUC, area under the curve.

Table 9
AUC values for the combination of workload and sports and leisure

Variable	AUC	
	Level 1	Level 5
Speed of work	0.61	0.71
Tight deadlines		
Hours at work		
Sports & leisure		

AUC, area under the curve.

Table 10
AUC values for the combination of family load and control

Variable	AUC	
	Level 1	Level 5
Childcare	0.62	0.61
Care of the elderly		
Domestic tasks		
Control		

AUC, area under the curve.

Table 11
AUC values for the combination of family load and social support

Variable	AUC	
	Level 1	Level 5
Childcare	0.61	0.62
Care of the elderly		
Housework		
Social support		

AUC, area under the curve.

Table 12
AUC values for the combination of family load and conciliation

Variable	AUC	
	Level 1	Level 5
Childcare	0.61	0.63
Care of the elderly		
Housework		
Conciliation		

AUC, area under the curve.

Table 13
AUC values for the combination of family load and sports and leisure

Variable	AUC	
	Level 1	Level 5
Childcare	0.62	0.61
Care of the elderly		
Housework		
Childcare		

AUC, area under the curve.

3. Results

3.1. Calculation of the a priori probabilities in the Bayesian model

Results correspond to the *a priori* probabilities obtained with the statistical procedures of the model (Section 2.4) are presented. These probabilities were calculated by taking into account each group or the level of each variable (family, work, and cushioning), in accordance with the data from the European survey:

The first of the cushioning variables is control. We may observe that in this case (Table 14), more than 50% of interviewees affirmed that they had very high control in their work, while only 12.35% reported to low control.

Another cushioning variable is social support, for which the most notable initial probabilities (Table 15) fit into Group 2. In this group, 20.45% of interviewees affirmed that they had social support, with 31.65% indicating that the social support from their colleagues and managers was high.

It is worth noting that for the variable conciliation, only 29.58% of interviewees affirmed that they had very good work and family conciliation, while 4.15% highlighted very little conciliation (Table 16). Moreover, it may also be seen that over 50% of interviewees affirmed that they had good work and family conciliation, while less than 5% stated that they had very little conciliation.

Table 14
Initial probabilities for the control variable

Control		Initial probability (%)
Group 1	Very low	18.33
Group 2	Low	12.35
Group 3	High	16.90
Group 4	Very high	52.41

Table 15
Initial probabilities for the variable social support

Social support		Initial probability (%)
Group 1	Very low	3.98
Group 2	Low	20.45
Group 3	Moderate	9.48
Group 4	High	31.65
Group 5	Very high	23.70

Table 16
Initial probabilities for the variable conciliation

Conciliation		Initial probability (%)
Group 1	Very little conciliation	4.15
Group 2	Little conciliation	15.19
Group 3	Good conciliation	50.31
Group 4	Very good conciliation	29.58

For the last of the cushioning variables in the model, involvement in sports or leisure activities (Table 17), more than 29% of interviewees spent no time on sports or leisure activities, while 20.97% of interviewees stated that they participated in those activities once or twice a week.

Initial probabilities for the central variable of this article, stress, which were obtained from responses to question Q51 of the survey, may be seen in Table 18. The most significant values are those that show that more than 10% of interviewees assess their levels of stress to be high, while 16.14% deemed having very low levels of stress. Among the interviewees, 35.72% reported medium levels of stress.

3.2. Study of sensitivity family loads and control to the probability of suffering stress

The most representative analysis of the effect of control on workloads, is that performed on high workloads and low control. In this case, the probability of suffering stress rises by 14.61 points from 20.40% to 35.01% (Table 19). Also notable is that when workloads are high and when control is high, the percentage level of stress falls by 0.42 points.

Table 17
Initial probabilities for the variable sporting, cultural, or leisure activities

Sporting, cultural, or leisure activities		Initial probability (%)
Group 1	Never	29.47
Group 2	1 or 2 times/y	9.32
Group 3	1 or 2 times/mo	14.67
Group 4	1 or 2 times/wk	20.97
Group 5	< 1 h/d	10.14
Group 6	> 1 h/d	8.98

Table 18
Initial probabilities for the variable stress

Stress		Initial probability (%)
Group 1	Very low stress	16.14
Group 2	Low stress	19.16
Group 3	Medium stress	35.72
Group 4	High stress	15.38
Group 5	Very high stress	10.64

Table 19
Probabilities of suffering stress in terms of the variables workload and control

	% Probability of suffering stress			
	Family loads + control		Family loads	
	Level 1	Level 5	Level 1	Level 5
% Initial probability of stress	16.14	10.64	16.14	10.64
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Housework (over 1 h/d) Control (very high)	12.3	13.29	11.66	14.91
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Housework (over 1 h/d) Control (very low)	10.91	20.01	11.66	14.91
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Control (very high)	12.72	12.11	13	12.39
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Control (almost never)	13.44	13.86	13	12.39

3.3. Study of the sensitivity of the combination of workloads and social support to the probability of suffering stress

The most significant differences in the relations between social support and are at high workloads and very low social support. In this case, the probability of suffering stress increases by 10.08 points. Another remarkable combination is that of low workloads and very high social support, which increases the probability of suffering low levels of stress by 19.51 points (30.25−49.76%; Table 20).

3.4. Study of the sensitivity of the combination of workloads and conciliation to the probability of suffering stress

The most notable values for the effect of conciliation on workloads are for combinations of high workloads and very good conciliation. In this case, the probability of suffering stress drops by 28.1 points (Table 21). The combination of low workloads and very

Table 20
Probabilities of suffering stress in terms of the variables workload and social support

	% Probability of suffering stress			
	Work loads + social support		Work loads	
	Level 1	Level 5	Level 1	Level 5
% Initial probability of stress	16.14	10.64	16.14	10.64
Speed of work (very high) Tight deadlines (always) Hours at work (over 60 h/wk) Social support (very high)	4.75	57.56	6.29	57.69
Speed of work (very high) Tight deadlines (always) Hours at work (more than 60 h/wk) Social support (very low)	1.01	67.77	6.29	57.69
Speed of work (very low) Tight deadlines (almost never) Hours at work (less than 20 h/wk) Social support (very high)	49.76	2.73	30.25	2.92
Speed of work (very low) Tight deadlines (almost never) Hours at work (less than 20 h/wk) Social support (almost never)	22.24	7.37	30.25	2.92

Table 21
Probabilities of suffering stress in terms of the variables workloads and conciliation

	% Probability of suffering stress			
	Workload + conciliation		Workload	
	Level 1	Level 5	Level 1	Level 5
% Initial probability of stress	16.14	10.64	16.14	10.64
Speed of work (very high) Tight deadlines (always) Hours at work (over 60 h/wk) Conciliation (very good)	9.97	29.59	6.29	57.69
Speed of work (very high) Tight deadlines (always) Hours at work (more than 60 h/wk) Conciliation (very little)	3.86	55.79	6.29	57.69
Speed of work (very low) Tight deadlines (almost never) Hours at work (less than 20 h/wk) Conciliation (very good)	30.52	3.33	30.25	2.92
Speed of work (very low) Tight deadlines (almost never) Hours at work (less than 20 h/wk) Conciliation (very little)	17.85	12.49	30.25	2.92

little conciliation is worth highlighting. In this case, the probability of suffering stress rises by 9.57 points (2.92−12.49%).

3.5. Study of the sensitivity of the combination of workloads and sports and leisure to the probability of suffering stress

Upon analysis of the workloads in relation to sports and leisure, we found that the probability of suffering stress under high workloads and sports and leisure activities falls by 29.08 points (57.69−28.61%; Table 22).

3.6. Study of the sensitivity of the combination of family loads and control to the probability of suffering stress

Analysis of the loads showed that high family loads and very high control in the job reduces stress levels by between 14.91% and 13.29% (1.62 points). On the contrary, the probability of suffering

stress rises by 5.1 points under very low control in the job and under very high family loads (Table 23).

3.7. Study sensitivity of the combination of family loads and social control to the probability of suffering stress

The highest probability corresponds of suffering much stress to high family loads and very low social support. In this case, the probability increases by 5.78 points (14.91−20.69%). Another significant combinations in this section is low family loads coupled with very little social support, in which the probability increases from 12.39% to 24.54% (Table 24).

3.8. Study of the sensitivity of the combination of family loads and conciliation to the probability of suffering stress

The effect of conciliation on family loads was also significant, as the most notable effects were seen in relation to high

Table 22
Probabilities of suffering stress in terms of the variables workload and sports and leisure

| | % Probability of suffering stress | | | |
| | Workload + sports & leisure | | Workload | |
	Level 1	Level 5	Level 1	Level 5
% Initial probability of stress	16.14	10.64	16.14	10.64
Speed of work (very high) Tight deadlines (always) Hours at work (more than 60 h/wk) Sports & leisure (more than 1 h/d)	1.1	28.61	6.29	57.69
Speed of work (very high) Tight deadlines (always) Hours at work (more than 60 h/wk) Sports & leisure (almost never)	9.08	53.82	6.29	57.69
Speed of work (very low) Tight deadlines (almost never) Hours at work (less than 20 h/wk) Sports & leisure (more than 1 h/d)	35.21	3.53	30.25	2.92
Speed of work (very low) Tight deadlines (almost never) Hours at work (less than 20 h/wk) Sports & leisure (almost never)	41.99	6.21	30.25	2.92

Table 23
Probabilities of suffering stress in terms of the variables family load and control loads

| | % Probability of suffering stress | | | |
| | Family loads + control | | Family loads | |
	Level 1	Level 5	Level 1	Level 5
% Initial probability of stress	16.14	10.64	16.14	10.64
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Housework (over 1 h/d) Control (very high)	12.3	13.29	11.66	14.91
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Housework (over 1 h/d) Control (very low)	10.91	20.01	11.66	14.91
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Control (very high)	12.72	12.11	13	12.39
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Control (almost never)	13.44	13.86	13	12.39

Table 24
Probabilities of suffering stress in terms of the variables family loads and social support

| | % Probability of suffering stress | | | |
| | Fam. loads + social support | | Family loads | |
	Level 1	Level 5	Level 1	Level 5
% Initial probability of stress	16.14	10.64	16.14	10.64
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Housework (over 1 h/d) Social support (very high)	17.84	16.42	11.66	14.91
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Housework (over 1 h/d) Social support (very low)	13.48	20.69	11.66	14.91
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Social support (very high)	18.75	14	13	12.39
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Social support (almost never)	14.3	24.54	13	12.39

Table 25
Probabilities of stress in terms of the variables family load and conciliation

| | % Probability of suffering stress | | | |
| | Family loads + conciliation | | Family loads | |
	Level 1	Level 5	Level 1	Level 5
% Initial probability of stress	16.14	10.64	16.14	10.64
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Care for the elderly (over 1 h/d) Conciliation (very good)	15.9	12.47	11.66	14.91
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Housework (over 1 h/d) Conciliation (very little)	5.54	35.47	11.66	14.91
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Conciliation (very good)	17.55	9.88	13	12.39
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Conciliation (very little)	8.32	32.01	13	12.39

family loads and very little conciliation; in such a case, the probability of suffering high stress would rise from 14.91 to 35.47%, a rise of 20.56 points. When high family loads are analyzed alongside good conciliation, the probability of suffering stress would fall from 14.91% to 12.47% (2.44 points; Table 25).

Table 26
Probabilities of suffering stress in under high family loads and with sports and leisure

	% Probability of suffering stress			
	Family loads + conciliation		Family loads	
	Level 1	Level 5	Level 1	Level 5
% Initial probability of stress	16.14	10.64	16.14	10.64
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Housework (over 1 h/d) Conciliation (very good)	15.9	12.47	11.66	14.91
Childcare (over 1 h/d) Care for the elderly (over 1 h/d) Housework (over 1 h/d) Conciliation (very little)	5.54	35.47	11.66	14.91
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Conciliation (very good)	17.55	9.88	13	12.39
Childcare (almost never) Care for the elderly (almost never) Housework (almost never) Conciliation (very little)	8.32	32.01	13	12.39

3.9. Study of the sensitivity of the combination of family loads and sports and leisure to the probability of suffering stress

The most significant combination for sports and leisure and its influence on family loads is at high family loads together with sports and leisure activities for more than 1 hour per day. In this case, the probability of suffering stress increases by 6.66 points (14.91−21.57%; Table 26). Notably, sports and leisure activities that are performed for more than 1 hour per day in combination with high family loads increase the probability of suffering high stress levels.

Results based on the influence of cushioning variables on the probability of suffering stress indicate that the variable with the strongest influence on high levels of stress among workers with high workloads is participation in sports and leisure activities. In the case of high workloads, the probability falls from 57.69% to 28.61%. The cushioning variable with most effect on family loads and stress is the variable conciliation. When there is very low conciliation, the probability increases from 14.91% to 35.47%. Hence, we studied the importance of this variable when family loads. The results also suggest that the influence of cushioning variables such as control and social support on workloads greatly affects the probability of suffering stress. For example, the probability increases from 57.69% to 66.67% if control and social support are very low. For the cushioning variables sports and leisure, as well as conciliation between the combination of high family loads (dedicating over 1 hour per day to childcare, care for the elderly and housework), the probability increases notably from 14.91% to 32.87%.
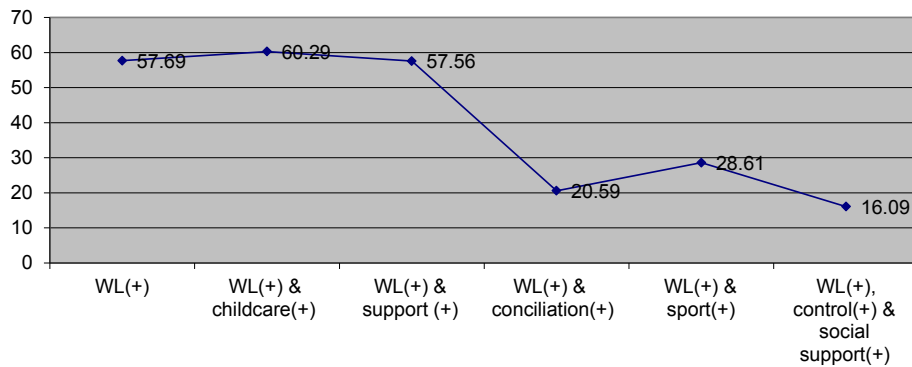

Fig. 2. High probability of suffering stress at high workloads.
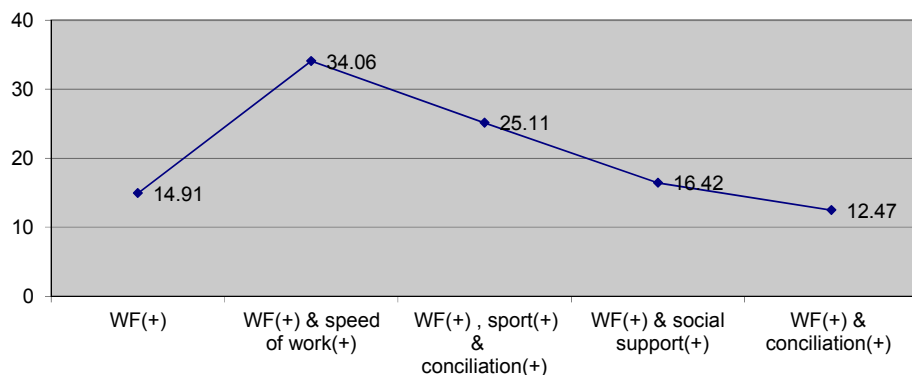

Fig. 3. High probability of suffering stress under high family loads.

We may therefore conclude that the probability of stress may be considerably reduced, by taking action on the cushioning variables for both workloads and family loads. From a business perspective, acting directly on workloads to obtain lower levels of stress is not easy, as demands on management increase by the day. Thus, actions on other variables for reducing stress levels are vital. As established, taking action on the variable sports and leisure is important for reducing stress levels. One solution that we proposed for firms is inclusion of sports and leisure activities within their own facilities in order to reduce those effects. This approach enables control of stress in the workplace without increasing the number of hours at work.

The significant influence of cushioning variables such as control and social control in the workplace has been demonstrated. By placing these two variables in the hands of the human resource departments, high levels of stress may be reduced from 66.67% to 57.69%. However, if action is taken on the cushioning variable conciliation, which affects family loads the most, the probability of suffering stress may be reduced from 35.47% to 14.91%. One of the solutions that may be adopted in this regard is the establishment of childcare facilities in the company. This solution allows balance between work and family loads through the variable conciliation. Overall, we clearly showed the importance of our model for stress reduction.

4. Discussion

We present in this section the most significant conclusions in relation to the cushioning variables that reduce the likelihood of high stress levels. When workloads are high and when family responsibilities are high (Fig. 2), the influence of cushioning variables are apparent when the work loads are high. In this case, when loads are high, that is, when working at high speed to meet tight deadlines for many hours each week, the probability of suffering stress is 57.69%. In this case, the probability of suffering stress may be improved from 57.69% to 16.09% if variables such as control and social support are considered (Fig. 2). The effect of the variable conciliation (Fig. 3) reduces the probability of suffering stress from 14.91% to 12.47%. In this case, much time is spent on childcare, caring for the elderly, and housework (high family loads). Moreover, the probability of suffering high levels of stress may be reduced from 34.06% to 25.11% through sports and leisure activities. It may be further reduced to 16.42% if the level of social support at work is high (Fig. 3).

Conflicts of interest

The author has no conflicts of interest to declare.

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