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Health Problems Related To Living And Working Conditions In Europe

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Abstract: A central aspect that has guided the completion of this study is the influential role of combinations of family and workloadson stress and their direct consequences for family and working life. Important variables caused by stress within the family are advanced in this study such as child-care, care of the elderly and housework. Conversely and in direct relation with working life, the study seeks to confirm that the speed of work in itself affects stress, all the more so in combination with family loads such as child-care, care of the elderly and housework. Othervariables within working life such as working to tight deadlines and even the number of hours at work each week will have considerable influence, in combination with family loads, on the likelihood of suffering high levels of stress. The results demonstrate that the combination of all these variables can generate high levels of stress with repercussions both in family life and in the world of work. The completion of sensitivity studies on combinations between unfavorable variables will, in this sense, mean that the stress levels of people in both the family and at work may be controlled. Thus, action may be taken on both family variables (care of the elderly, child-care, and cooking and housework) and variables at work (speed of work, tight deadlines and number of hours worked each week) to achieve a reduction in so far as may be possible in the probability of suffering high stress levels to improve quality of life.

Keywords: working conditions, stress levels, family loads, fifth European survey.

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I. INTRODUCTION

Even though there have been multiple attempts to find an acceptable definition for the term stress, various authors have pointed to the imprecision and ambiguity of this concept. In this sense, there are different ways of defining it,which may be classified into four groups according to its stimulus, response, perception and transaction [1]:

1. The definitions of stress as a stimulus are inspired in the use of this concept in Physics within the context of material resistance. Thus, stress denotes an external force that is applied to a given material which causes its deformation. If that deformation falls within the elastic limits of material, it will recover its original form once the stress is removed; if it overcomes those limits, it will produce a permanent deformation.
2. From a psychological point of view, some authors have defined stress as the external forces that produce transitory or permanent effects in a person [1].
3. They conceptualize the definitions of stress as physiological and psychological aspects that the person experiences in the face of a particular environmental or "stress" stimulus. Thus, stress is a "general response of the body to any stressor stimulus or stressful situation[1]" [2].
4. Finally, stress that is understood as a transaction between the person and the environment entails two sorts of definitions:

a) There are authors who consider the discrepancies between the demands placed on the individual and the individual's capabilities to confront them, also taking into account the assessment that the individual makes of those discrepancies [3]. Thus, stress is understood as an "important imbalance perceived between demand and capability of the person, under conditions in which failure in solving the situation has important perceived consequences".

b) Other authors consider the discrepancies between the characteristics of the social environment and individual preferences towards that environment [4].

[1] The English translation from the Spanish of the above citations is solely for the purposes of this article and is not a reproduction of the original in English.

Various models seek to explain the relations between stress and their consequences for people. Among them, the model formulated by the Institute of Social Investigation of Michigan University offers the basic components that continue to guide research into stress [5].
Other models formulated over recent decades have advanced contributions that extend, modify or partially remedy the proposals that the model sets out [5].

Examples of these models are the person-environment-fit theory [6], the transactional model[1], the management-oriented stress model [7]and the cybernetic theory of stress, coping and well-being [4]. Faced with these multiple approximations to the study of stress and after having reviewed the principal contributions in the literature, an integral model was also proposed in [8].
One of the aspects to take into account in this article, as well as the work loads, are the family loans and their relevance in the different models that relate stress with those loads. Some authors speak of the importance of care for the elderly and its influence with stress [9], [10]and [11]. Others highlight the relation between child-care and stress [12], [13]. Still others speak of the importance of performing housework in the home to obtain a degree of good satisfaction and, consequently, low levels of stress within the couple [14], [15].
The principal basis of this article is to relate the stress variable with work and family loads. There have been multiple and separate studies that relate this variable with family and work loads, although none of them have studied the effects of the combination of both loads on stress. One of the important tasks for the formulation of the probabilistic model has been to define the variables in clear terms that have a role in its construction.
All the variables that have been introduced in the proposed model have been created on the basis of the data obtained in the fifth European Working Conditions Survey ("V EWCS").
With these assumptions and based on the literature review, the variables that were chosen for the completion of the sensitivity studies for the model that we have generated were as follows:
Among the family loads:
(1) Care and education of the children.
(2) Care of the elderly.
(3) Cooking and housework.
Among the work loads:
(1) Speed of work.
(2) Work with tight deadlines.
(3) Number of hours at work each week.

Finally, as the principal variable under study: stress, the main theme of this article and the foundation of the study. This variable indicatesthe probability of suffering stress to us, through the creation of five levels of intensity in the proposed model. The results demonstrate that the combination of all these variables can generate high levels of stress with repercussions both in family life and in the world of work.

Having defined these variables, a model using Bayesian Networks was generated from the data collected in the fifth European working conditions survey ("V EWCS"). It was validated with the ROC (Receiver Operating Characteristic) curve, a statistical method of validation. This model will relatethe principal variable of this article: on the one hand, stress and, on the other hand, the variables included in the family loads (child-care, care of the elderly, and cooking and housework) and workloads(speed of work, work with tight deadlines, and number of hours at work).

II. MATERIALS ANDMETHODS

2.1. Objectives

The principal objectiveof this study is to analyze the influence of work and family loads on the probability of suffering high levels of stress in European Union countries.
The study was conducted in four parts as authors have studied [16]:
(1) A selection of data-mining techniques was carried out, taking into account their relevance to our study, with a view to working with a reasonable source of data.The stress variable, chosen a priori in accordance with the literature review, functions as an output attribute.
(2) A ranking was established of the most important predictors that affected the principal variable of study both in the world of work and in the family, by means of strong evaluators of variables, together with data mining and the tools provided by the "Matlab" programming language.
(3) Through the so-called Bayesian Networks, the conditional relations of dependence between some variables and others were identified.
(4) Subsequently, the probability calculations were performed in relation to the fundamental variable under study (stress) with respect to the other variables that intervene in the world of work and in the family.

2.2Population under study.

The Fifth European Working Conditions Survey (V EWCS) was administered by Eurofound (the European Foundation for the Improvement of Living and Working Conditions), a tripartite European Union agency based in Dublin and established under Council Regulation (EEC) No. 1365/75 to provide high-quality, timely and policy-relevant knowledge as input to better informed policies.

The V survey was conducted between January and June 2010 and almost forty-four thousand European workers of 34 nationalities were surveyed (the 27 member states of the Union plus Norway, Croatia, Yugoslavia, Turkey, Albania, Montenegro and Kosovo), who replied to over 100 questions on different topics related to the working situation and the conditions of their jobs.

This information provides an invaluable source of information on working conditions in the different European countries that allows an evaluation of the differences that exist between them, as the same survey was employed in all of them.

It also provides a context that may be analyzed with regard to the last 15 years, as this is the fifth survey of its kind. The earlier surveys were completed in 1991, 1995, 2000 and 2005.

The number of questions and fields that are covered have been widened in each successive survey, maintaining a number of key questions that allow the analysis of trends in working conditions. The development of the survey likewise reflects the development of the EU: the survey was conducted in 12 countries in 1991, 15 in 199, in 25 in 2000, 31 in 2005 and 34 in 2010.

The preparationof the fifth survey included a review of the statistical process and the design of a strict quality system for information employing the most recent methods in use. The quality control system of the information, developed by both internal and external agents, guided the development of the fifth survey. A minimum of 10 percent of the surveys were analyzed in each country, in order to carry out a traceability study.

2.3. Variables

The introduction of a set of variables is necessary to study the degree of intensity of a job that will allow us to quantify its magnitude in a precise way. The following variables are those that refer to work loads and to family loads.

With regard to work loads, the variables under consideration were as follows: speed of work, work with tight deadlines and number of hours worked each week. The set of these three variables are encapsulated in what is called "demands at work". The groups of each of these variables may be (table 1).

GROUPS	WORKING HOURS	SPEED OF WORK	TIGHT DEADLINES
Group 1	Less than 20 hrs per wk	Almost never	Almost never
Group 2	Between 20 and 30 hrs per	wk. Around ¼ of the time	Around ¼ of the time
Group 3	Between 30 and 40 hrs per	wk.Around ½ of the time	Around ½ of the time
Group 4	Between 40 and 50 hrs per	wk. Around ¾ of the time	Around ¾ of the time
Group 5	Between 50 and 60 hrs per	wk. Almost all of the time.	Almost all of the time.
Group 6	Over 60 hrs per wk.	All of the time.	All of the time.

Table 1. Groups of variables for hours worked, speed of work and tight deadlines.

Speed of work is an independent variable that was taken from question Q45a of the survey, which inquiries into how much of the working day is spent working at high speed. Work with tight deadlines is an independent variable that was taken from question Q45-b of the survey, which inquiries into how much of the working day is spent working to tight deadlines. The hours of work were taken directly from question Q 18, identifying 6 groups of hours. All of the questions related to work loads may be (table 2).

	WORK LOADS
Survey question	SPEED OF WORK
Q-45a	And, does your job involve working at very high speed?
Survey question	TIGHT DEADLINES
Q-45b	And, does your job involve working to tight deadlines?
Survey question	HOURS WORKED PER WEEK
Q-18	How many hours do you usually work per week in your main paid job?

Table 2. Questions from the "V EWCS" related to working loads.

In the case of family loads, a dependent variable was sought that would reflect the time spent outside of work on family-related tasks. This variable was very useful, because it is intimately related with conciliation between demands at work and at home according to [17].To do so, survey question EF3 was used, which under sections "c", "d" and "e", respectively, inquiriesinto the number of hours spent 'Caring for and educating your children, grandchildren', 'Housework', and 'Caring for the elderly'. The groups of each variable may be seen in (table 3).

GROUPS	CHILD CARE	CARE OF THE ELDERLY	HOUSEWORK
Group 1	Never	Never	Never
Group 2	1 or 2 times a year	1 or 2 times a year	1 or 2 times a year
Group 3	1 or 2 times a month	1 or 2 times a month	1 or 2 times a month
Group 4	1 or 2 times a week.	1 or 2 times a week.	1 or 2 times a week.
Group 5	Less than 1 hour a day.	Less than 1 hour a day	Less than 1 hour a day.

Table 3. Groups of variables child-care, care for the elderly and housework.

The variable child-care is the first of the variables related to family loads. It is an independent variable that was taken from question EF3c of the survey that inquiries into how much time is spent on care for and education of children. The response depends on the number of hours every day that are spent on that activity and introduces sixgroups.

The variablecare of the elderly is an independent variable belonging to the group of variables related to family load. This variable indicates the time that the worker dedicates to the care of the elderly people and it depends in great measure on the size and the structure of the family and its composition. It is of course not possible to study time spent on their care in families where there are no elderly people.

The variable cooking andhousework also belongs to the group of family loads. It is an independent variable taken from question EF3d that differentiates betweenhousework through the study of the differences in time spent on those tasks. All the questions on variables related to family loads are shown in (table 4).

	FAMILY LOADS
Survey question	CHILD CARE
EF3-c	How many hours per day in caring for and educating your children, grandchildren?
Survey question	HOUSEWORK
EF3-d	How many hours per day cooking and housework?
Survey question	CARING FOR THE ELDERLY
EF3-e	How many hours per day caring for elderly/disabled relatives?

Table 4. Questions from the "V" EWCS related to family loads.

The variable 'stress', the object of study, may moreover be highlighted. In the survey, question Q51-N asks if you experience stress in your work?The calculation of the probability of suffering stress was considered through the responses to this question for the definition of the model. Hence, the levels or stress groups that were considered are shown in the following table, as a function of the responses to question Q51-N of the survey(table 5).

STRESS LEVELS	
Group 1	Very little stress
Group 2	Little stress
Group 3	Stress sometimes
Group 4	Quite a lot of stress
Group 5	A lot of stress

Table 5.Groups of the stress variable.

Finally, the variables also have to be mentioned that are taken into account for the creation of the Bayesian model that will be explained further on, although they are not an object of study in this article. The so-called cushioning variables such as the ranking into four different groups (very low, low, high and very high)

taken from question Q50 of the survey, which inquiries into whether you are able to choose or change your order of tasks, your methods of work and your speed or rate of work.The social support with five different groups taken from question Q51 of the survey, which inquiries into your relation with colleagues or managers.Work/home conciliation with four different groups (Very well, well, not very well, not at all well) is taken from question Q41, which directly asks whether your working hours fit in with your family or social commitments outside work. Finally, sporting, cultural or leisure activity outside your home with 6 different groups in accordance with time spent on that activity (never, once ortwice a year, once or twice a month, once or twice per week, everyday or every second day for less than 1 hour and for more than one hour a day), taken from question EF2g of the survey that inquiries into the time spent on those activities outside work.

Another of the variables that was also considered in the creation of the Bayesian model was the variable 'gender' with two possible options taken from question HH2 of the survey

2.4.Statistical procedures

In this section, the probabilistic methodology of Bayesian Networks is described for the construction of the "family loads-work loads-stress" model. The relations between the variables of the model are represented in an intuitive way by means of directed graphs, which code the marginal and conditioned dependencies present in the different variables, allowing visual exploration of the relations established in the data sets. In the model generated through the Bayesian Networks, presented in (figure1), stress is shown to depend principally on the variables related to the world of work and of the family. In this article, we will focus mainly on the variables referred to as work loads (speed of work, tight deadlines, and hours at work) and family loads (child-care, care of the elderly and housework), in order subsequently to study the influence of the combination of both loads on stress. The variables that directly influence a given variable are referred to as its parents. (figure1).

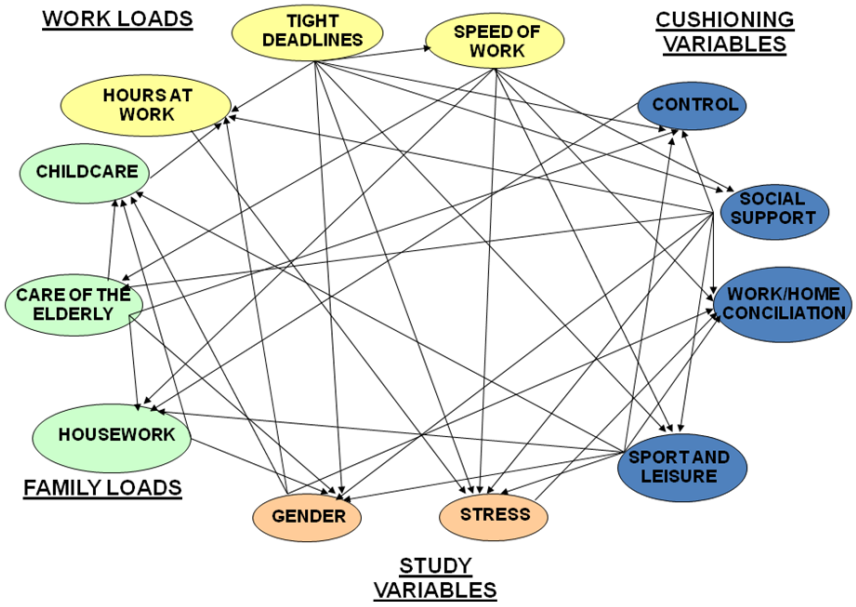

Fig. 1. Model: Family loads-work loads-stress.

With the above variables, we may study the effect of stress on the two sets of family and work loads. In general, it may be said that Bayesian Networks allow the construction of global probabilistic models for a set of variables $X = (X_1 \ldots\ldots X_{n)}$,on the basis of a given dataset input. This model explicitly represents the knowledge of the given problem, in probabilistic terms, through a joint probability function of the variables (Bayes theorem):

$p(\mathbf{x})=p(x_1,....,x_n)$.

It was not a difficult task to define a joint probability in the model that has been created, as it has many degrees of freedom. In this way and using Bayesian Networks, the problem was resolved in an efficient way, limiting the number of degrees of freedom on the basis of the dependencies and independencies obtained from the data, shown in the resulting graph. In this case, groups 1 and 5 of these variables were taken into account for the variable 'stress', thereby limiting the degrees of freedom of the proposed model.

Thus, the joint probability function was defined by means of a factorization of local probability functions, on the basis of the probability of each variable conditioned by its parents:

$p(\mathbf{x}) = \prod_i p(x_i | \pi_i)$ donde Π_i es el conjunto de los padres del nodo xi del grafo.

Having defined the probabilistic model p(**x**), the Bayesian Networks allow us to calculate, on the one hand, the initial or marginal probabilities $p(X_{i=} x_i)$, for each state $x_i$of each variable $x_i$of x. These probabilities are referred to as '*a priori*' or initial probabilities and refer to the initial state of the variables in the dataset (the frequencies of the different states). In this case, the initial probabilities for each variable of the model under study are represented as follows:

The (table nº 6) represents six different levels or groups of initial probabilities for the variable speed of work. For example, for group 2, with the data taken from the European survey, approximately 13% of interviewees affirmed that they spent a fourth of the working day working at high speed (table 6).

SPEED OF WORK		INITIAL PROBABILITY
Group 1	Almost never	**19.16%**
Group 2	Around ¼ of the time	**13.33%**
Group 3	Around ½ of the time	**12.93%**
Group 4	Around ¾ of the time	**9.21%**
Group 5	Almost all the time	**13.76%**
Group 6	All of the time	**9.84%**

Table 6 .Initial probabilities for the variable "high speed of work".

The (table 7) represents six different levels or groups of initial probabilities for the variable "hours at work per week". For example, for group 2, with the data taken from the European survey, approximately 9.27 % of interviewees affirmed that they worked between 20 and 30 hours per week.

HOURS AT WORK/WEEK		INITIAL PROBABILITY
Group 1	Less than 20 hours a week	**10.33%**
Group 2	Between 20-30 hours a week	**9.27%**
Group 3	Between 30-40 hours a week	**50.28%**
Group 4	Between 40-50 hours a week	**16.99%**
Group 5	Between 50-60 hours a week	**6.43%**
Group 6	Over 60 hours a week	**3.65%**

Table 7. Initial probabilities for the variable "hours at week/week"

The (table 8) represents six different levels or groups of initial probabilities for the variable tight deadlines. For example, for group 5, with the data obtained from the European survey, approximately 14% of those surveyed affirmed that they almost always worked to tight deadlines.

TIGHT DEADLINES		INITIAL PROBABILITY
Group 1	Almost never	**18.48%**
Group 2	Around ¼ of the time	**13.59%**
Group 3	Around ½ of the time	**12.19%**
Group 4	Around ¾ of the time	**8.39%**
Group 5	Almost all the time	**13.99%**
Group 6	All of the time	**11.48%**

Table 8.Initial probabilities for the variable "tight deadlines".

For the following case, the marginal or initial probabilities are identified in (table 9) through six different groups or levels that indicate the time spent on child-care.

CHILD-CARE		INITIAL PROBABILITY
Group 1	Never	**30.70%**
Group 2	1 or 2 times a year	**4.54%**
Group 3	1 or 2 times a month	**6.76%**
Group 4	1 or 2 times a week.	**9.13%**
Group 5	Less than 1 hour a day.	**8.52%**
Group 6	More than 1 hour a day.	**28.81%**

Table 9.Initial probabilities for the variable child-care.

Exactly the same as in the earlier case, the marginal or initial probabilities may be seen in (table 10), showing the 6 groups or levels that indicate the time spent by interviewees on the care of the elderly.

CARE OF ELDERLY/DISABLED RELATIVES		INITIAL PROBABILITY
Group 1	Never	**65.18%**
Group 2	1 or 2 times a year	**3.43%**
Group 3	1 or 2 times a month	**5.24%**
Group 4	1 or 2 times a week.	**6.79%**
Group 5	Less than 1 hour a day	**3.18%**
Group 6	More than 1 hour a day.	**5.70%**

Table 10.Initial probabilities for the variable care of the elderly.

In the case of the variable cooking and housework, the six groups that are defined, to establish the time that the interviewees spent on those tasks, may be seen in (table 11).

COOKING AND HOUSEWORK		INITIAL PROBABILITY
Group 1	Never	**17.71%**
Group 2	1 or 2 times a year	**4.60%**
Group 3	1 or 2 times a month	**6.60%**
Group 4	1 or 2 times a week.	**12.68%**
Group 5	Less than 1 hour a day	**14.18%**
Group 6	More than 1 hour a day.	**40.51%**

Table 11. Initial probabilities for the variable housework and cooking

Thus, 5 different levels are created for the variable "stress" that may be associated with five different initial probabilities, as shown in (table 12). The high levels of stress correspond to level 5, and the low levels to level 1. For example, stress in their work is very high for approximately 10% of interviewees.

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	Quite high stress	**10.64%**

Table 12. Initial probabilities for the variable "stress"

Having obtained the probabilities "a priori", the networks allowthe calculation of the conditionedprobabilities $p\left(\frac{x_i}{e}\right)$for each variable $X_i \notin E$, given certain evidence and (for example, given the value of some variables of the model: speed of work=1).

These new probabilitiesreflect the effect of the evidence of the remaining variables of the model (for example, the effectof the variable "child-care" with a value of 1).

The difference between the marginal and the conditioned variables allows us to analyze which responses have a greater influence on high stress levels, allowing us to explore and to quantify the results of the survey through sensitivity studies that will be explained in the section on the results.

The most complex process in the use of Bayesian Networks is the training of the model with the dataset. To do so, different algorithms were developed based on statistical dependency tests and automated searches for optimal models that represent the given dataset [18].

These algorithms allow us to generate a Bayesian Network, with minimal human supervision, on the basis of the available data. There are nowadays numerous tools that perform this process in a convenient and efficient manner: [19], Genie (http://genie.sis.pitt.edu/), Neticahttp://www.norsys.com), Matlab etc.

In this article, owing to the large quantity of data with which the work has been done, we calculated the Bayesian Network using the "Matlab" programming language. This program will generate valid results in a speedy and efficient manner. Various authors have applied Bayesian Networks methodology in the field of working conditions and health and safety at work [20-22],[23-26].

2.4. Validation of the global model (Stress-work loads-family loads)

The results were validated with the Receiver Operating Characteristic (ROC) curve, a graphic representation of sensitivity as opposed to (1 – specificity) for a binary classification system,according to variations in the discrimination threshold (figure 2). ROC can also mean Relative Operating Characteristic, because it is a comparison of two operative characteristics (True Positive Rate and False Positive Rate) according to variations introduced in the decision threshold [27-30].

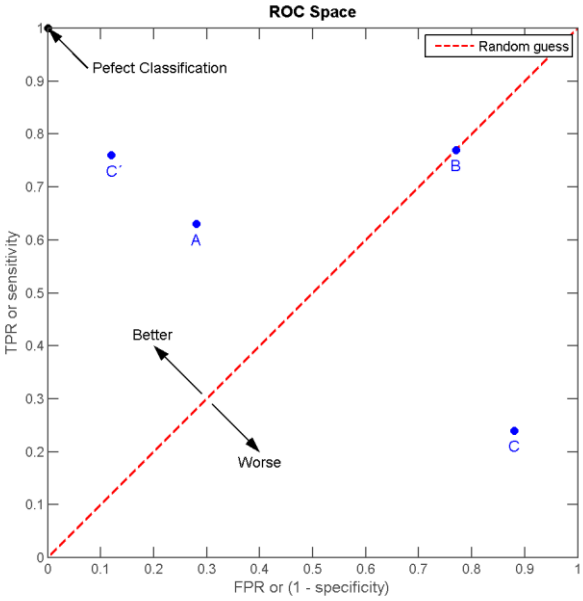

Fig. 2. ROC space [31].

The use of the ROCH AUC statistic for model comparison among the machine learning community is reported in [31].

As explained earlier, the "Matlab" programming language was also used as a tool for the application of the Bayesian Networks, both for the validation of the model that is presented and for the sensitivity studies of all the variables, and for the calculation of the stress probabilities of the global model, which cover all the variables that are used in this model (family loads, work loads and stress). The "Matlab" code was designed with the fundamental objective of plotting the stress probabilities for each proven outcomethat was decided for the variables of the study that constitute the global model defined in (figure 1).

The proposed model tookinto account 75% of the data under analysis for its generation and 25% of the remaining data for its validation, attributingit the consistency and the necessary accuracy for its application.

In this particular case and in the model that has been defined, the "AUC" taken from the ROC curve through the direct application of Bayesian Networks in "Matlab". It has been demostratedthat they have always been over 0.6, which represents a sufficiently high degree of reliability, as explained by [31]in his studies.

In view of the above data, we may confirm the validation of the results set out below through the ROC curve.

III. RESULTS

What follows will show the results from the sensitivity analysis of the combination of family loads and the family loads on stress.

3.1.Sensitivity study of the combination of work and family loads on the probability of suffering stress.

The tables that are shown below indicate the probabilities of suffering stress at level 1 and 5, in the initial situation and the probabilities of stress when the different states of the variables that we wish to analyze are qualified as evidence. These circumstances are shown in the tables between brackets to the right of the corresponding variable.

3.1.1.Sensitivity study of the combination of work loads and child-care on the probability of suffering stress (table 13).

In the case of studying the combination of work loads with child-care, the most significant values may be highlighted, obtained when the worker was under a high work load and, moreover, spent over one hour caring for children. In this case, the value rises from 57.69% to 60.29%, a difference of 2.6 points.

	% PROBABILITY OF SUFFERING STRESS			
	WORK LDS + CARE FOR ELDERLY		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 (more than 60 hours a week) CARE FOR THE ELDERLY (more than 1 hour a day)	5.44	**60.08**	6.29	**57.69**
SPEED OF WORK (very high) TIGHT DEADLINES (always) HOURS AT WORK (over 60 hours a week) CARE FOR THE ELDERLY (almost never)	6.4	56.35	6.29	57.69
SPEED OF WORK (very low) TIGHT DEADLINES (almost never) HOURS AT WORK (over 60 hours a week) CARE FOR THE ELDERLY (more than 1 hour a day)	32.52	2.81	30.25	2.92
SPEED OF WORK (very low) TIGHT DEADLINES (almost never) HOURS AT WORK (over 60 hours a week) CARE FOR THE ELDERLY (almost never)	31.05	3.02	30.25	2.92

Table 13. Probabilities of stress with regard to work loads and child-care

3.1.2.Sensitivity study of the combination of work loads and care for the elderly on the probability of suffering stress (table 14).

When studying the effect of care for the elderly on work loads, the results were very similar to the earlier example, rising from a 57.9% probability of stress, with work loads, to a 60.08% probability of suffering stress, if the work loads are added to care for the elderly.

	% PROBABILITY OF SUFFERING STRESS			
	WORK LDS + CARE FOR ELDERLY		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 (more than 60 hours a week) CARE FOR THE ELDERLY (more than 1 hour a day)	5.44	**60.08**	6.29	**57.69**
SPEED OF WORK (very high) TIGHT DEADLINES (always) HOURS AT WORK (over 60 hours a week) CARE FOR THE ELDERLY (almost never)	6.4	56.35	6.29	57.69
SPEED OF WORK (very low) TIGHT DEADLINES (almost never) HOURS AT WORK (over 60 hours a week) CARE FOR THE ELDERLY (more than 1 hour a day)	32.52	2.81	30.25	2.92
SPEED OF WORK (very low) TIGHT DEADLINES (almost never) HOURS AT WORK (over 60 hours a week) CARE FOR THE ELDERLY (almost never)	31.05	3.02	30.25	2.92

Table 14. Probabilities of stress with regard to work loads and care for the elderly.

3.1.3.Sensitivity study of the combination of work loads and housework on the probability of suffering stress (table 15).

In the case of the analysis of the influence of housework on work loads, it may be seen that if the speed of work for housework is very high, the probability of suffering stress would increase a little, moving from a 56.69% probability of suffering stress to a probability of 55.47% (2.22 points). Whereas for a very high speed of work, if housework is almost never done, the probability of suffering stress would slightly increase by 2.54 points.

	% PROBABILITY OF SUFFERING STRESS			
	WORK LDS + HOUSEWORK		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 (more than 60 hours a week) HOUSEWORK (more than 1 hour a day)	7.9	55.47	6.29	57.69
SPEED OF WORK (very high) TIGHT DEADLINES (always) HOURS AT WORK (over 60 hours a week) HOUSEWORK (almost never)	5.49	60.23	6.29	57.69
SPEED OF WORK (very low) TIGHT DEADLINES (almost never) HOURS AT WORK (over 60 hours a week) HOUSEWORK (more than 1 hour a day)	30.67	3.22	30.25	2.92
SPEED OF WORK (very low) TIGHT DEADLINES (almost never) HOURS AT WORK (over 60 hours a week) HOUSEWORK (almost never)	31.79	3.17	30.25	2.92

Table 15.Probabilities of stress with regard to work loads and housework.

3.1.4.Sensitivity study of the combination of family loads and speed of work on the probability of suffering stress (table 16).

If the effect of the speed of work on family loads is analyzed, the most significant results are as follows:

The probability of suffering stress under high family loads and a high speed of work rises from 14.91% to 34.06%, in other words, 19.15 points.The probability of suffering stress falls under high family loads and a very low speed of work by 9.55 points, in other words, from 14.91% to 5.36%. The probability of suffering stress would increase by 21.78 points under low family loads and a high speed of work.It may be observed from this analysis that the speed of work has a very important influence on stress, both in relation to high family loads and low family loads.

	% PROBABILITY OF SUFFERING STRESS			
	FAM. LOADS + SPEED OF WORK		FAMILY LOADS	
	LEVEL 1	LEVEL 5	LEVEL 1	LEVEL 5
% INITIAL PROBABILITY OF STRESS	**16.14**	**10.64**	**16.14**	**10.64**
CHILD-CARE (more than 1 hour a day) CARE OF THE ELDERLY (more than 1 hour a day) HOUSEWORK (more than 1 hour a day) SPEED OF WORK (very high)	12.35	**34.06**	11.66	**14.91**
CHILD-CARE (more than 1 hour a day) CARE OF THE ELDERLY (more than 1 hour a day) HOUSEWORK (more than 1 hour a day) SPEED OF WORK (very low)	18.3	**5.36**	11.66	**14.91**
CHILD-CARE (almost never) CARE OF THE ELDERLY (almost never) HOUSEWORK (almost never) SPEED OF WORK (very high)	10.66	**34.17**	13	**12.39**
CHILD-CARE (almost never) CARE OF THE ELDERLY (almost never) HOUSEWORK (almost never) SPEED OF WORK (very low)	19.43	4.76	13	12.39

Table 16.Probabilities of stress with regard to family loads and speed of work.

3.1.5 Sensitivity study of the combination of family loads and tight deadlines on the probability of suffering stress (table 17).

In the case of studying the set of family loads with tight deadlines at work, it may be seen that the data are very similar to the earlier case. It may be highlighted that when working with high family loads and tight deadlines, the probability of suffering stress increases by 17.79 points, rising from 12.39% to 30.67%.

	% PROBABILITY OF SUFFERING STRESS			
	FAM. LOADS + TIGHT DEADLINES		FAMILY LOADS	
	LEVEL 1	LEVEL 5	LEVEL 1	LEVEL 5
% INITIAL PROBABILITY OF STRESS	**16.14**	**10.64**	**16.14**	**10.64**
CHILD-CARE (more than 1 hour a day) CARE OF THE ELDERLY (more than 1 hour a day) HOUSEWORK (more than 1 hour a day) TIGHT DEADLINES (almost always)	10.15	**32.7**	11.66	**14.91**
CHILD-CARE (more than 1 hour a day) CARE OF THE ELDERLY (more than 1 hour a day) HOUSEWORK (more than 1 hour a day) TIGHT DEADLINES (almost never)	17.19	**5.31**	11.66	**14.91**
CHILD-CARE (almost never) CARE OF THE ELDERLY (almost never) HOUSEWORK (almost never) TIGHT DEADLINES (almost always)	10.2	**30.67**	13	**12.39**
CHILD-CARE (almost never) CARE OF THE ELDERLY (almost never) HOUSEWORK (almost never) TIGHT DEADLINES (almost never)	19.61	4.62	13	12.39

Table 17.Probabilities of stress with regard to family loads and tight deadlines.

3.1.6 Sensitivity study of the combination of family loads and the number of hours at work on the probability of suffering stress (table 18).

In the case of studying the combination of family loads and number of hours at work per week, the most representative values were found when both the family loads and the number of hours at work were high; in other words, when the circumstances are evident. In this case, the probability of suffering high levels of stress would rise from 14.91% to 30.74%, a difference of 15.83 points.

	% PROBABILITY OF SUFFERING STRESS			
	FAM. LOADS + SPEED OF WORK		FAMILY LOADS	
	LEVEL 1	LEVEL 5	LEVEL 1	LEVEL 5
% INITIAL PROBABILITY OF STRESS	**16.14**	**10.64**	**16.14**	**10.64**
CHILD-CARE (more than 1 hour a day) CARE OF THE ELDERLY (more than 1 hour a day) HOUSEWORK (more than 1 hour a day) SPEED OF WORK (very high)	12.35	**34.06**	11.66	**14.91**
CHILD-CARE (more than 1 hour a day) CARE OF THE ELDERLY (more than 1 hour a day) HOUSEWORK (more than 1 hour a day) SPEED OF WORK (very low)	18.3	**5.36**	11.66	**14.91**
CHILD-CARE (almost never) CARE OF THE ELDERLY (almost never) HOUSEWORK (almost never) SPEED OF WORK (very high)	10.66	**34.17**	13	**12.39**
CHILD-CARE (almost never) CARE OF THE ELDERLY (almost never) HOUSEWORK (almost never) SPEED OF WORK (very low)	19.43	4.76	13	12.39

Table 18. Probabilities if stress with regard to family loads and hours at work per week.

IV. CONCLUSIONS

In view of the results, various ideas may be discussed in relation to the model that has been presented for the calculation of the probabilities of stress, taking into account the variables that constitute the family loads and the work loads used in the research. These inferences conjugate the theoretical, empirical and methodological contexts, in line with the implications that each one of them entails. When conducting a study that analyzes working reality from a communicative viewpoint with the data collected in the "V EWCS", the intention in this study was to lay emphasis on all the dependent and independent variables that conditioned and distinguished the principal variable of our investigation, stress. This approach yielded interesting results that condition the working and family environments.

As argued throughout the whole analysis, the variable stress and its combination with the work and the family loads is essential to the development of all the models that have been generated over time, as confirmed in the theoretical framework, in such a way that their analysis will be influential now and in the future. Nevertheless, it has to be pointed out that up until now independent models have been developed that study the variable stress in its global and subjective context, without taking into account the combination of variables in

the world of work and in the family.This study seeks to generate a model, on the basis of authentic, validated data from the V EWCS, which satisfies and quantifies in an objective way the variable stress in combination with work loads and family loads.

From what has been said, the specific conclusions of the present research are divided into two large groups: the influence of the set of work loads in relation to each individual family load on stress and the influence of the set of family loads and each individual work load on stress.

4.1 The influence of the set of work loads and each individual family load on stress

One of the important aspects in this study has centered on the study of the variable stress through the analysis of the combination of the other variables that constitute the work loads and the family loads.

In an initial study, and following the validation results for the combination of both the work-related and the family-related aspects, the model of the variable stress was validated, and the joint variable of work loads (high speed of work, work always to tight deadlines and working more than 60 hours per week) and family loads (child-care, care of the elderly, and housework).

When studying the influence of the set of work loads with each of the three family loads on the principal variable stress, it may be said that the most likely combination to induce high levels of stress were obtained by combining the set of work loads (high speed of work, work to tight deadlines and working over 60 hours per week) with the variable child-care (more than one hour a day), which increases the likelihood of suffering stress by as much as 60.29%.

In addition, the most likely combination not to induce high levels of stress in combination with the variable child-care, when you almost never spend time on child-care tasks, arises when the work loads are low (low speed of work, few tight deadlines, and working less than 20 hours per week). In this case, the probabilities of suffering low levels of stress increased from 2.92% to 30.28% (a difference of 27.36 points).

If the combination of the variables work loads and care of the elderly is studied, it is seen that the results obtained are very similar to the earlier case (child-care). In this case, the probability of suffering high levels of stress would rise to as much as 60.08%.Also in this case, the probability of suffering low levels of stress would rise as high as 31.05% with a combination of low work loads and little time spent on care of the elderly.

For the combination of variables that constitute work loads and housework, it may be said that this latter variable has no great measure of influence on high levels of stress, as if work loads are high, the probability of suffering high levels of stress would pass from 57.69% to 55.47 %; in other words, the probability of suffering high levels of stress would fall slightly.An important conclusion may be reached from this last section, which is that far from heightening stress, housework, in combination with high work loads, can slightly reduce the probability of suffering high levels of stress (figure 3).

Fig. 3. Probabilities of suffering high levels of stress in combination with high work loads.

4.2 Influence of family loads and individual work loads on stress

Another of the points to bear in mind has been the study of how stress affects the joint set of family loads and each individual work load. This model has the following variables: stress, work loads (speed of work, tight deadlines and hours at work per week) and family loads (child-care, care of the elderly, and housework).

First of all the validation of the model was confirmed with statistical tools for the above combination of variables. It was then demonstrated that stress influences the set of family loads (child-care, care of the elderly, and housework) together with each individual work load. It may be seen that the work load with the highest likelihood of inducing stress is the speed of work, raising its probability from 14.91% up to 34.06%. If we study this combination when family loads are very low and the work speed is very low, the probabilities of suffering little stress solely increase by 12.39% up to 19.43%, or by 7.04 points. It may therefore be concluded in this section that the combination of family loads with the variable speed of work is the most influential when there are high family loads and very high speeds of work.

As we have seen in the section on results, if we analyze the set of family loads with the variable tight deadlines, it may be seen that this is less representative than the variable speed of work seen in the preceding paragraph. In this case, for high family loads and work with tight deadlines, the probability of suffering high levels of stress would rise from 14.91% to 32.7% (Figure 4).

The probability of suffering little stress would increase a little more for low family loads than in the case of the variable speed of work, up to 19.61% in the case of working almost never with tight deadlines.

In the case of the variable hours worked in combination with family loads, it may be affirmed that this variable affects the probability of suffering stress least, if we compare it with the variable speed of work and tight deadlines. In this case, the most significant results were from the combination of high family loads and more than 60 hours of work per week. The probability of suffering high levels of stress would rise to 30.74%

while it would rise to 34.06% in relation to the variable speed of work, and to 32.7% in relation to the variable tight deadlines, as previously seen.

On the other hand, if we center on low family loads with the variable less than 20 hours per week at work, then this combination would be the most influential in yielding low probabilities of stress. In this case, the probability of suffering low levels of stress would be 21.76%.

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CONFLICT OF INTEREST

Dr. David Cárdenas Gonzalo, the corresponding author of this article,informs to the editor that there are no any potential conflicts of interest that could influence the author's interpretation of the data.

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