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Development of a descriptive study of work stress, physical activity, eating habits and obesity in the maquiladora industry using software applications

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Abstract. Workers around the world face major changes in work organization and industrial relations to fulfill the demands of modern working life. The problem of work stress and obesity have become rather delicate subjects because of the negative consequences it brings for employees and companies. The objectives of this research perform a descriptive analysis using the SPSS v.23 software on work stress, physical activity, eating habits and obesity in the industry for sample characterization.

Methods entail the application of a questionnaire for gathering information, the creation of the database in the software and the accomplishment of the descriptive analysis of each section of the questionnaire with the help of the software.
As results, physical activity is that all three dimensions show the degree of sedentariness as values fall below 9.

As for the diagnosis of eating habits, from the resulting scores, the population shows a diagnosis of food anxiety since all the dimensions of the instrument were among the mean values obtained.

As conclusions, manufacturing industries must take preventive actions to reduce them by increasing physical activity and improving eating habits among staff. It is also recommended to implement techniques to improve health, ergonomics and safety practices in the manufacturing industry, so it is that all three dimensions engage in more activity that is physical.

Keywords: Work Stress, Physical activity, Eating habits, Obesity.

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1. Introduction

Workers around the world face major changes in work organization and industrial relations; they are under pressure to meet the demands of modern working life. It is known that there is a relationship between stress and the onset of obesity. Constant preoccupation with work responsibilities often leads to erratic eating habits and insufficient exercise, resulting in obesity problems, high blood pressure and high cholesterol levels [1]. In other words, work-related stress can alter appetite and hunger and, as a consequence, proper eating behaviour and nutrition. Recently, studies have shown that when people face a stressful situation, a chain reaction releases cortisol, a hormone involved in the accumulation of body fat [2]. Being stressed can also make running or eating healthier foods lazier. People who gain weight in response to stress often report cravings for calorie-dense "comfort foods," which are high in fat and sugar, and are known to act on opioid receptors in the brain to inhibit stress responses. Stress at work, in particular, is linked to increased consumption of fast food and to doing so during the performance of other activities (meal-task).

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2. Background

In this decade, the problem of stress has become a rather delicate subject because of the negative consequences it brings for the people who work. In our daily lives as well as at school, we are all prone to stress. According to Forbes Staff [3], Mexico ranks first in the world with the highest percentage of work-related stress with 75%, followed by China with 73% and the United States with 59%. Mexicans are the most stressed in the world. That is why many consider stress as the disease of the 21st century. In addition, nowadays, eating habits influence workers for the appearance of Obesity, and we must add the fact that very few people get to perform physical activity, mainly because they do not have time or because they are very tired from their jobs do not want to exercise or practice any sport for leisure and this impacts on their health. This research focuses on being able to study and know the level of work stress and obesity, as well as eating habits and physical activity presented by middle and senior managers in the maquiladora industry. The objectives of this research are mainly to be able to provide diagnoses on the variables of work stress, eating habits, obesity and the level of physical activity in the middle and upper management of the 6 participating companies by means software application. Additionally, contribute with recommendations, suggestions for managers for developing programs for the prevention or reduction of all these factors and to be able to improve the emotional and physical well-being of the workers.

One of the main topics of the research is work stress and the Mexican Institute of Social Security [4], defines stress as a set of physical and mental reactions that the person suffers when subjected to various external factors that exceed their ability to face them. In other words, work-related stress occurs when the worker's abilities are surpassed by the qualities and demands of various problems. There are many methods to measure work stress, but in this case, the Job Strain Index and Burnout will be used to measure work stress. The Job Content Questionaire that in the '70s, Robert Karasek [5] formulated the demand-control model, which explains work stress according to the balance between the psychological demands of work and the level of control of the worker over them. [6]. Karasek [7] hypothesized that not only the psychological demands that work imposes define the experience of stress or illness; but also the degree of control that workers have in their task. In this manner, control over work is fundamental and functions as a moderating mechanism of such demands. In the case of control over work, this includes opportunities to develop one's own skills, and the autonomy that work comes to provide. The latter refers to the ability to make decisions about tasks. Likewise, in Karasek's formulation, psychological demands have a quantitative conception: volume of work in relation to the time available to do it (time pressure) and the interruptions that force to leave the tasks and return to them later shortly.

On the other hand, Burnout is considered a consequence of work stress, and in this research, it is described as psychophysical exhaustion that leads to the worker having feelings of failure, lack of interest in people or in the task assigned to him. This stress occurs in phases where at first there is a gradual imbalance between the demand for work and the resources to face it. Then there is an emotional imbalance of the worker and that is when there is a change of behaviour towards work, doing the minimum essential, but avoiding danger at work. The Burnout consists of 3 dimensions that are the emotional exhaustion that is when one perceives the experience of being emotionally exhausted by the demands of the work; the cynicism that is when the degree in which each one recognizes attitudes of coldness and distancing; and finally the professional effectiveness that treats of the feelings of self-efficacy and personal accomplishment in the work.

On the other hand, there is talk of eating habits and physical activity as factors that can help reduce both stress and obesity. Morales [8] defines eating habits as a set of customs that determine man's behaviour in relation to food and nutrition. It includes the way food is selected until the way it is consumed. In this sense, it should be considered that eating habits are acquired, assimilated, and integrated into the personality during the first years of life until lasting into adulthood. As previously mentioned physical activity is also taken into account in this research and the World Health Organization [9], defines physical activity as any body movement produced by skeletal muscles, with the consequent consumption of energy. This includes activities performed while working, playing and travelling, household chores and recreational activities. The expression "physical activity" should not be confused with "exercise," which is a subcategory of physical activity that is planned, structured, repetitive, and intended to improve or maintain one or more components of physical fitness. Both moderate and vigorous physical activity is beneficial to health.

And last but not least, obesity is spoken of as a consequence of the subjects previously presented, since it is a crucial factor in people's lives, especially in workers because of its impact on their jobs. For Aguilar Cordero et al, [10], this disease is characterized by an excess of fat, which translates into weight gain, and is identified by the Body Mass Index (BMI), a simple indicator that relates weight and height (weight in kilograms divided by the square of height in meters). Barrera, Rodríguez, and Molina [11], refer that the fundamental cause of overweight and obesity is an energetic imbalance between calories consumed and spent and unfortunately the quantity and quality of physical activity have been reduced considerably in today's society. The World Health

Organization considers that obesity has reached epidemic proportions and today is one of the most worrying issues. The increase in the number of people with obesity from 1975 to date has tripled. Statistics show that at least 2.8 million people die each year from diseases related to overweight and obesity [12].

3. Methodology

3.1 Materials

Software

The software used is SPSS 23® (Statistical Package for the Social Sciences) which is a statistical software able to working with very large databases. This software was created by IBM Company in 1968, and now there are 25 versions of this software.

The questionnaire

The questionnaire consists of five sections where the first section measures the Job Strain Index. The second section is for Burnout, the third section is for eating habits, the fourth section is for physical activity and the fifth section is a questionnaire of sociodemographic questions to describe the sample.

Job Strain Index

To measure the job strain index we will use the Karasek [13] questionnaire of Work Content. This questionnaire consists of 27 questions divided into 6 dimensions that are work demands, use of skills, decision authority, supervisor support, peer support and job insecurity.

Burnout Syndrome Analysis

The questionnaire used to measure burnout is that of Maslach Burnout Inventory in its Spanish version by Moreno [14] This questionnaire consists of 16 questions divided into its 3 dimensions which are emotional exhaustion, cynicism and professional effectiveness.

Eating habits Questionnaire

This questionnaire is the FCQ (Food Craving Questionnaire) -Rasgo by Cepeda-Benito [15] is the food anxiety questionnaire. It contains 37 questions divided into 9 dimensions. These dimensions refer to having intentions and plan to consume food, the anticipation of positive reinforcement that may result from eating, the anticipation of relief from negative states and feelings because of eating. Additionally, are loss of control over eating, thoughts or worry about food, cravings as a physiological state, emotions that may be experienced before or during food cravings or eating, Signs that can cause food cravings and blame for cravings and/or surrendering to them[16].

Physical Activity Questionnaire

The instrument of gathering data about physical activities of the sample is Baecke's Physical Activity questionnaire by Baecke [17] consists of 23 questions divided into 3 dimensions that are work activity, sports activity and leisure activity.

Sociodemographic data

This questionnaire consists of a series of 19 questions on personal data such as gender, marital status, job position, weight, height, academic grade, among other questions this to have a better description of the sample.

3.2 Methods

Software application

The application of software was of great importance since it helps to generate the results faster and without errors. In our research, the software was used to create the descriptive statistics of the sample, as they are to take out means, frequencies, and percentages and so on.

3.2.2 Method for obtaining the Job Strain Index

To obtain the stress index, the JCQ questionnaire is used. After a general validation of the data obtained, we continue with the creation of variables for each of the scales, the formulas are as follows:

The *q* in the equation means a question.

Use of skills = [q1 + q3 + q5 + q7 + q9 + 5 - q2] * 2.

Decision-making = [2*(q4 + q6 + q8)] * 2.

Work Request = 3*(q10 + q11) + 2*(15 - q13 - q14 - q15).

Latitude of decision = use of skills + decision making

The following formula is used to obtain the stress index:

(Demands*2)/ Latitude of decision

Where if the result is > 1 indicates that stress does exist.

Methods for Burnout Syndrome Analyses

For the descriptive study of burnout is presented in 3 different ways that are by mean scores, degrees and burnout levels.

Obtaining Burnout Presence by Mean scores

To obtain the midpoints according to Guerrero-Vicente [18], the SPSS software is used to calculate the variables of each one of the dimensions. Then, we analyze each one of the dimensions where we extract the mean and the maximums and minimums of each dimension and compare them with the results of other researches that have been elaborated such as Guerrero, Vicente [18].

Obtaining the presence of Burnout by degrees

The degree of Burnout (high, medium and low) is evaluated according to whether the mean scores are in the upper, middle or lower third of the possible values. This is done by dividing the 3 degrees, low, medium and high with cut-off points in the 33rd and 66th percentiles, according to Vicente [18].

Obtaining the presence of Burnout by levels

At this point, the level of burnout individuals is shown, presenting them in 5 categories. To obtain this point, we used the data obtained from the obtaining of degrees and with them, we began to make the 27 combinations to obtain the categories.

Method for craving analysis

As in the previous step, this diagnosis was made with the mean values and standard deviations of each of the 9 dimensions of the questionnaire, separating the sample into men and women. Table 1 shows the scores for dimensions of FCQ-Rasgo.

Table 1. Dimensions of eating habits

Dimensions	***Scores***
Having intentions and plans to consume food	3-18
Anticipation of positive reinforcement that may result from eating	5-30
Anticipation of relief from negative states and feelings as a result of eating	3-18
Loss of control over eating	6-36
Thoughts or worry about food	7-42
Cravings as a physiological state	4-24
Emotions that may be experienced before or during food cravings or eating	4-24
Signs that can cause food cravings	4-24
Blame for cravings and/or surrendering to them	3-18
QUESTIONNAIRE TOTAL	Min 39 Máx 234

Method for the Study of the Physical Activity of the sample

To obtain this diagnosis, the means and standard deviations of the 3 dimensions of the questionnaire were calculated, separating the sample in men and women with the help of the SPSS software.

The diagnosis is then shown by interpreting the values obtained. The table 2 shows the values suggested in Vilaro's [19] study were used:

Table 2. Diagnostic of Physical Activity

Diagnostic	*Values*
Sedentary	< 9 points
Moderated	9 – 16 points
Assets	> 16 points

Reference values of the Descriptive Study of Obesity

Obesity is defined by the body mass index (BMI), which is an indicator of the relationship between weight and height. The BMI is defined as the weight in kilograms divided by the square of the height in meters (kg/m2) and is the same in both sexes and at all ages (in adults).

The classifications of obesity are presented in the following table that shows the corresponding BMI according to each classification. In table 3 present the categories of Body Mass Index.

Table 3. Grades of Obesity

Grade	*BMI values*
Normal weight	18.5 – 24.9
Overweight	25 – 29.9
Obesity type I	30 – 34.9
Obesity type II	35 – 39.9
Obesity type III	≥ 40

4. Results

The results of Job Strain Index using JCQ

The results of Job Strain Index shows in table 4 where almost a quarter of the sample presents a Job Strain Index.

Table 4. Results of JCQ

		Frequency	*Percentage*	*Percentage Accumulated*
Values	No	77	75.5	75.5
	Yes	25	24.5	100.0
	Total	102	100.0	

Results of Burnout using Maslach Burnout Inventory

In this part, the results of Burnout prevalence are presented by means of mean scores, grades and levels.

Burnout by Mean Scores

The mean by 3 dimensions presents in table 5.

Table 5. Results of Burnout by mean punctuations

	Emotional Exhausted	*Cynicism*	*Professional Efficacy*
No.	102	102	102
Mean	8.0980	5.3039	27.7647

Burnout by Grades

In table 6 shows the results and all dimensions present medium grade.

Table 6. Burnout by Grades

	Emotional Exhausted	*Cynicism*	*Professional Efficacy*
Low	<= 5	<=2	>33
Medium	6-9 (8.0980)	3-7 (5.3039)	27-32 (27.7647)
High	>10	>8	<=27

Burnout by Levels

In this part, it was found that more than 75% of the sample present some level of Burnout. Table 7 shows the results.

Table 7. Burnout by levels

		Levels			
		Frequency	Percentage	Percentage valid	Percentage accumulated
Valid	Nothing	14	13.7	13.7	13.7
	Low	23	22.5	22.5	36.3
	Medium	24	23.5	23.5	59.8
	Quite	23	22.5	22.5	82.4
	Extreme	18	17.6	17.6	100.0
	Total	102	100.0	100.0	

Results of eating habits

In this part, you can see in table 8 that all dimensions of eating habits present Craving.

Table 8. Results of eating habits

Eating Habits

	N	Minimum	Maximum	Mean	Standard Deviation
Having intentions and plans to consume food	102	3.00	18.00	5.6275	3.08917
The anticipation of positive reinforcement that may result from eating	102	5.00	28.00	11.4118	5.13067
The anticipation of relief from negative states and feelings as a result of eating	102	3.00	18.00	5.5294	2.91023
Loss of control over eating	102	6.00	35.00	10.1863	5.12947
Thoughts or worry about food	102	4.00	22.00	5.5490	2.58184
Cravings as a physiological state	102	4.00	24.00	9.3922	4.00781
Emotions that may be experienced before or during food cravings or eating	102	2.00	11.00	3.0882	1.87798
Signs that can cause food cravings	102	4.00	22.00	7.4804	3.32625
Blame for cravings and/or surrendering to them	102	3.00	18.00	4.8137	2.93065
	102				

Results of Physical Activity

The results of physical activity present in table 9 and they show that the 3 dimensions of physical activity present sedentary.

Table 9. Results of physical activity

		SPORTSCORE	SPORTIDEX	LEISURE
N	Valid	102	102	102
	Lost	0	0	0
Mean		1.1471	1.9632	2.5025
Standard Deviation		.60357	.58593	.66237
Minimum		1.00	1.00	1.00
Maximum		5.00	4.25	4.25

Results of Obesity

In table 10 show the results by grades of body mass index and they show that 40% of the sample present obesity.

Table 10. Results of obesity

		Frequency	Percentage	Percentage Accumulated
Valid	Normal	20	19.6	19.6
	Overweight	42	41.2	60.8
	Obesity I	24	23.5	84.3
	Obesity II	9	8.8	93.1
	Obesity III	7	6.9	100.0
	Total	102	100.0	

5. Conclusions

In conclusion, it is recommended that manufacturing industries take preventive actions to reduce work stress by increasing physical activity and improving eating habits among staff. It is also recommended to implement techniques to improve health, ergonomics and safety practices in the manufacturing industry.

One of the main interests in carrying out this research was to know the level of stress shown by employees in the manufacturing industry of the city of Juarez. This is a field of opportunity since studies related to the industrial sphere that address this topic are scarce in developing countries such as Mexico. It is recommended to improve the research on the topic that looks for the causes that lead to stress in workplaces.

As for the diagnosis of eating habits, from the resulting scores, it can be concluded that this population shows a diagnosis of food anxiety since all the dimensions of the instrument were among the mean values obtained.

The conclusion for Physical Activity is that the three dimensions show the degree of sedentary as the values fall below 9, so it is recommended that the three dimensions perform more physical activity.

Other research opportunities include analysis of the dimensions of work tension, desire for food, and physical activity to determine whether stress is related to each individual's physical activity and eating habits.

Finally, it would be useful to conduct a separate study among operational and middle management personnel to compare these jobs, as high rates of stress and obesity were found in this manufacturing company. These issues are part of a complex problem in the manufacturing industry, and additional analyses can provide a better understanding of the problem, thus contributing to its eradication or reduction.

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