Design of an intervention and control plan for psychosocial and occupational risk factors among professors at two universities in Barranquilla

Diseño de un plan de intervención y control de los factores de riesgo psicosociales y laborales en profesores de dos universidades de Barranquilla

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Abstract

The internal conditions of workers, their environment, and their work surroundings play a significant role in educational institutions and business organizations. This study, conducted with professors from the Health Sciences and Engineering faculties of two universities in Barranquilla, aimed to design a strategic plan to control psychosocial and occupational risk factors. The research characterized intra-labor dimensions and sociodemographic variables, using statistical analysis to identify associations and incidences in order to reduce or eliminate factors affecting psychosocial risk

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at work. A cross-sectional study was carried out with twenty-seven professors, applying a standardized psychosocial risk questionnaire developed by the Ministry of Social Protection and Javeriana University for the Colombian population. The analysis revealed extremely high levels of risk in leadership (94% and 100%), social relations at work (100% in both faculties), and other dimensions such as role clarity, opportunities for skill development, recognition, compensation, and organizational rewards. The results also showed that sociodemographic factors—including salary type, contract type, number of dependents, marital status, age, and highest level of education—have a significant impact on psychosocial risk among professors from both faculties.

Keywords: psychosocial risk; work environment; psychosocial risk factors.

Resumen

Las condiciones internas de los trabajadores, su entorno y el ambiente laboral desempeñan un papel significativo en las instituciones educativas y en las organizaciones empresariales. El estudio, realizado con profesores de las facultades de Ciencias de la Salud e Ingeniería de dos universidades de Barranquilla, tuvo como objetivo diseñar un plan estratégico para el control de los factores de riesgo psicosociales y laborales. La investigación permitió caracterizar las dimensiones intralaborales y las variables sociodemográficas, utilizando un análisis estadístico para identificar asociaciones e incidencias orientadas a reducir o eliminar los factores que afectan el riesgo psicosocial en el trabajo. Se llevó a cabo un estudio de corte transversal con veintisiete profesores, aplicando un cuestionario estandarizado de riesgo psicosocial desarrollado por el Ministerio de la Protección Social y la Universidad Javeriana para la población colombiana. El análisis evidenció niveles extremadamente altos de riesgo en las dimensiones de liderazgo (94 % y 100 %), relaciones sociales en el trabajo (100 % en ambas facultades), así como en otras dimensiones como claridad del rol, oportunidades de desarrollo de habilidades, reconocimiento, compensación y recompensas por parte de la organización. Los resultados también mostraron que factores sociodemográficos como el tipo de salario, el tipo de contrato, el número de personas a cargo, el estado civil, la edad y el último nivel de estudios influyen de manera significativa en el nivel de riesgo de los profesores de ambas facultades.

Palabras clave: riesgo psicosocial; ambiente laboral; factores de riesgo psicosocial.

Introduction

This research aims to design a strategic plan to intervene and control psychosocial and occupational risk factors in professors at two universities. The aim is to characterize the sociodemographic variables and factors through a cross-sectional and statistical study, evaluating their association and occurrence to reduce or eliminate intra-occupational psychosocial risk factors.

The central question of the research is: How can an intervention and control plan for psychosocial and occupational risk factors designed in professors at private universities in Barranquilla? The study addresses problems faced by these universities and highlights the importance of psychosocial and occupational risk control to improve the educational environment.

Several studies have shown that these problems generate discomfort, absences and disabilities in professors and employees, affecting their motivation, sense of belonging, job satisfaction and health. Therefore, it was intended to design a strategic intervention plan that meets the psychosocial and labor needs of professors, crucial for the optimal development of educational institutions.

Research includes problem statements, formulation of objectives, and analysis of theoretical and legal issues. Through a survey applied to professors from two universities in Barranquilla, the occupational and sociodemographic variables that affect intra-occupational psychosocial risk were evaluated. Finally, an intervention plan was designed to reduce and control these factors, combining theories from multiple disciplines and improving the work environment through courses, workshops, and specific programs.

Starting from the fact that the academic environments of analysis were immersed in a situation of economic, administrative and financial crisis in which this situation was not alien to the university community, as a result of this crisis the normality of academic activities was impacted; where the most vulnerable were professors, officials and students; most important actors of an alma mater and also those directly affected in the context in which this conjunctural crisis developed

Various studies, such as that of Arriagada and Pujol (2017), have shown that these circumstantial problems cause the appearance of discomfort, absences and disabilities of professors and civil servants, presenting a high rating that indicates vulnerability, psychological demand and double presence of psychosocial risks, affecting the motivation, sense of belonging, job satisfaction and health of the different workers.

In addition, Díaz et al. (2005), noted in their research, that depressive symptoms, anxiety, irritability, low self-esteem, feelings of helplessness, obesity, tobacco use, psychoactive substances, liquor, insomnia (psychological consequences), hypertension, ulcers, asthma, coronary disorders (psychophysiological consequences) develop.

It should be added that since the situation continued (without hope of a solution), importance was given to this issue, because it was observed, in different rooms, that the professor's feelings became negative, losing involvement with the students, increasing physical and mental illnesses, absenteeism and, sometimes, drug use. alcohol, to such an extent that attitudes of cynicism and the presence of intra-occupational psychosocial risk factors.

Materials and methods

In this project, the aim was to achieve the proposed objectives by conducting a cross-sectional and statistical study, which by is classified as descriptive, because it characterizes the sociodemographic factors and intra-occupational psychosocial risk factors of the population under study without manipulating variables or establishing causes.

Table 1. Methodological Summary

	Objectives	Activities	Main Inputs	Products
1	Through a cross-sectional study with the application of a survey of the intra-occupational psychosocial risk factors form A, which affect the risk, specifically in professors of two universities in the city of Barranquilla.	To describe the intra-occupational variables and sociodemographic factors that affect professors	Databases-articles-journals.	Diagnosing the problem.
		To conduct surveys of the professors of the Faculty of Health Sciences and the Faculty of Engineering.	Survey, Google Forms	Real and updated circumstantial information of the faculties.
		Data collected for analysis	Excel- Tables- Charts, Google Forms	Characterization of the variables evaluated in the survey.
2	To evaluate the association and incidence through a statistical study of the sociodemographic determinants of intra-occupational psychosocial risk, to find relationships and define the origin of the risk.	Statistical analysis of the results of the survey	Software (SPSS)	Selection, Correlation, Association
		Define sociodemographic characteristics and intra-occupational dimensions of psychosocial risk.	Tables- Graphs	Information consolidation
3	To design an intervention plan to reduce and control the factors incident in intra-occupational psychosocial risk, specifically in professors from two universities in Barranquilla - Atlántico.	Matrix with recommendations, controls, and activities to be conducted.	Tables -matrices	Evaluation of information
		Design of a plan for the prevention and control of intra-occupational psychosocial risk	Plan design	Final Report

Source: Own elaboration.

Frame of reference

Psychosocial risk factors

The questionnaire of intra-occupational psychosocial risk factors form A is an instrument designed to evaluate conditions of the work, the organization, and the environment where it is developed, which under certain characteristics can have negative effects on the health of the worker. The questionnaire is composed of 4 large groupings of psycho-occupational factors or domains and in turn these domains are made up of a series of dimensions that represent sources of intra-occupational psychosocial risk, evaluating a total of 19 intra-occupational psychosocial dimensions, based on the battery of instruments for the assessment of psychosocial risk of the Ministry of Social Protection (2010).

On the other hand, studies such as those by Osorio (2011) or Díaz (2011) express that psych occupational risk factors are conditions that affect the appearance of work stress, affecting the performance and health of workers. These symptoms were most often identified in professors, healthcare workers or people who work in customer service. In other words, when the person feels violated, weakened, or affected physically, mentally, and psychologically in the development of their work, we can speak of the existence of psychosocial risks at work.

Different authors throughout history have provided information of significant importance about the study of psychosocial risk factors. One of them was Cubillos (2015), who takes up what Cox and Griffiths noted, who related these factors to the content of the work, overload, rhythm, schedules,

control, environmental conditions, work teams, aspects of organizational culture, functions, interpersonal relationships, the role in the organization, the development of the work-family relationship, and contractual security. As can be seen, these variables are decisive when identifying the levels of job satisfaction, adaptability, and stress in workers.

On the other hand, Rubiano et al. (2007) confirm what Karasek and Theorell have contributed that "these psychosocial risk factors must be understood as any condition that man experiences, as it relates to his surrounding environment and to the society that surrounds him; therefore, it does not constitute a risk, until the moment when it becomes harmful to the well-being of the individual or when it unbalances their relationship with work or with the environment." In accordance with the above, the psychosocial factors associated with the work environment are considered conditions that are present in the daily life of the worker's environment, however, everyone can assume changes and stressful situations differently depending on the perception, aptitude, and ability they must face them.

Likewise, reference is made to the contribution of the authors Díaz et al. (2005) who propose four phases that a person would go through in a process of work stress and professional burnout: enthusiasm; stagnation; frustration and apathy, as noted in 1980 by Edelwich and Brodsky.

In the same way, Guerrero (2003) takes up what Sandín noted, who stated "that the perception of lack of control over stressful situations, passive-emotional coping, responses of helplessness and hopelessness and little emotional expression, seem to be related to certain physiological patterns that affect the health of the worker, reducing immunological competence, increasing vulnerability to diseases associated with the immune system and showing less resistance to infectious diseases." The author describes the consequences on health from the psychological point of view considering two ways of dealing with stressful situations at work.

In turn, Guerrero (2003) notes that "maintaining a certain degree of control over stressful events, confrontational and active coping, responses of strong emotional expression (anger, irritability, and aggression), are associated with chronic increases in cardiovascular response, which lead to a deterioration in vascular structure and functions." Indeed, psychological stress can be considered a risk factor for cardiovascular disease.

Binary Logistic Regression

As for the theory of the applied statistical tool Binary Logistic Regression, it is based on or aims to test hypotheses and/or causal relationships when the dependent variable and the independent variable, where those factors in which statistical significance was not shown were discarded by the Wald step elimination method forward or backward (Harris, 2021).

It is necessary to clarify that Binary Logistic Regression, considered as the most widely used type of multivariate analysis in Life Sciences or researchs with this type of variable, allows to introduce a mixture of categorical and quantitative variables as predictor variables of the response (effect or variables, dependent) (Hernandez, 2021) (Li, 2021).

From the regression coefficients (β) of the independent variables in the model, it is intended by means of Logistic Regression to express the probability of the occurrence of the event in question

as a function of certain variables, which are presumed to be relevant or influential, intending to model or predict, is represented by Y (the dependent variable) and the K explanatory variables (independent and control) are designated by X1, X2, X3,...,Xk**,** the general equation (or logistic function) is:

$$P(Y = 1) = \frac{1}{1 + \exp(\alpha - \beta 1X1 - \beta 2X2 - \beta 3X3 - \cdots - \beta KXK)}$$

Clarifying, that α, β1, β2, β3..., βk are the parameters of the model and *Exp. denotes* the exponential function. This exponential function is a simplified expression that corresponds to raising the number ***e*** to the power contained within the parenthesis, where ***e*** is the number or Euler's constant, or the basis of the Napierian logarithms (whose approximate value to the thousandth is 2.718).

State of the art

In recent years, there has been great interest in knowing the intra-occupational psychosocial factors that affect the teaching professional, especially in some European countries, finding many articles with information about how psychosocial conditions at work can affect the health of professors, citing relevant studies, which served as bibliographic references for the present research.

The study by Guamán M., & Ipanaqué J. (2025). analyzes psychosocial risk factors in footwear workers in Tungurahua, Ecuador, between January and July 2024. A total of 237 workers were evaluated using a questionnaire to collect sociodemographic, business, and psychosocial data at work. The results show three levels of psychosocial risk, the most common being medium and elevated risk. These levels are negatively related to job stability, emotional stability, and work organization. The findings can help design intervention programs to improve workers' physical and mental health and their job performance.

The research of Arriagada & Pujol (2017), "S*tudy of the psychosocial risks of university teaching work approached as emotional work.* They studied the exposure to psychosocial risk of professors at the National University of Mar del Plata, based on the administration of an instrument of their own elaboration that constituted a battery of measurements applied to a sample of 161 professors, which had as results that 78% of the professors present a high rating that indicates vulnerability, psychological demand and double presence of psychosocial risks.

In the research carried out by Rodríguez (2015), "*evaluation of psychosocial occupational risk factors, psychosocial risks (burnout and workplace harassment) and psychological capital of a sample of non-university* professors *in the region of Murcia", it was* determined that 27% of professors show high levels of at least in the symptoms of burnout syndrome, while 4.87% would manifest the three symptoms.

A research work carried out by Cubillos (2015), "*Prevalence of psychosocial risk in a group of* professors *and directors of the Capital District*", was also found, evaluating the psychosocial risk using

the questionnaires of the Psychosocial Risk Assessment Battery of the Ministry of Social Protection and the Javeriana University, which allowed establishing that the levels of risk with symptoms of stress are high; 62% are at very high and high risk, stress symptoms and intra-occupational psychosocial risk factors have a moderate but significant association with leadership and social relationships at work, with control over work and with work demands and rewards, factors that should be prioritized to formulate intervention programs or strategies, therefore, it is recommended to implement an Epidemiological Surveillance System for psychosocial risk based on the diagnoses and management system in occupational safety and health.

Fajardo et al. (2013). authored a research article "*Correlation between Intra-Occupational Risk Factors and Serum Cortisol Levels in University Professors" a* correlational exploratory study conducted in the city of Guadalajara. The information was obtained from 116 professors to whom a standardized instrument was applied, a medical examination was performed, and a blood sample was taken to measure cortisol levels. Results: 51.8% of the professors analyzed presented with a high or extremely high psychosocial risk associated with the activity conducted, 31% showed no risk and 17.2% presented insignificant risk. No relationship was found between intra-occupational risk levels and serum cortisol levels of the participants. After a detailed review of the scientific literature on the subject, several limitations were detected in the methodology used to study the causes, as well as the inadequacy of methodological criteria applied to interventions conducted with professors. The main evaluation instruments and the latest trends in prevention and intervention are presented, highlighting the data that indicate higher rates of absenteeism and sick leave, which imply an excessive cost for the Education Administration. For this reason, a reflection on these aspects and the convenience of adopting experimental designs and early detection systems for their prevention is proposed. Finally, the theoretical models that try to explain this phenomenon, other related variables, personal, family, and organizational consequences associated with the intra-occupational psychosocial issues are presented.

Results

Characterization of intra-occupational variables and sociodemographic factors that affect psychosocial risk.

Next, the different intra-occupational variables and sociodemographic factors that affect psychosocial risk were characterized through a cross-sectional study in the application of a prevalence survey in institutions of the educational sector, specifically in two private universities in the city of Barranquilla.

According to the review of previous studies related to the subject and the results of this research, it was obtained that the population under study is affected in the analysis of the dimension *Environmental demands and physical effort*, finding that the respondents in the Faculty of Health Sciences and the professors of the Faculty of Engineering are at very high risk. being affected by environmental demands, causing their physical effort to be greater for the development of their activities, which may be due to multiple causes of the work environment that are factors of the

environment that can generate discomfort and affect health, which resulted in 78% of professors having a high rating, which indicates vulnerability, psychological demand and double presence of psychosocial risks.

The results also show at the intra-occupational level that in the dimension *Quantitative demands* of work is registered in High risk for both faculties, in this sense it can be stated that the domain demands of work is one of the greatest generators of stress due to the demand that these professors have in their work. In addition to the above, the respondents noted that they are very affected in terms of the dimension of the risk *Quantitative demands,* due to multiple factors, such as the time available to execute the work versus the volume of assigned tasks which is insufficient, therefore, it is required to work at a very fast pace, under time pressure, limit the number and duration of breaks or work additional time to meet the expected results.

Likewise, the *Type of Contract* Specifically in the Faculty of Health Sciences of the surveyed university, it was observed that the vast majority of professors have a contract for less than one year, a smaller percentage have a contract for the provision of service and the minority with 12% is for an indefinite term, which indicates that the laws and regulations issued to protect the labor situation of workers, they are not fully complied with, since it is true that they are hired by these institutions, but in a period of time less than or equal to 1 year under the uncertainty of being hired or not.

Another aspect that was considered was the *Demand in the Working Days*, finding that the professors surveyed in the faculties of the two universities presented high risk, due to the strenuous working days without breaks and that mainly due to the perks of the job make the professor always must be available even outside their working days. According to the results found, we can affirm that the professors of the faculty of engineering compared to the professors of the faculty of health sciences present a higher risk.

It can be shown that the professors of both faculties are very affected in terms of the intra-labor type dimension *Training*, considering mainly the incidence in health professors, because access to activities is limited or non-existent and they do not respond to the training needs for the effective performance of their work.

For the purposes of what has been found, it is necessary to prioritize intra-occupational psychosocial risk factors, to formulate programs or strategies, therefore, it is recommended to implement an intervention plan to mitigate psychosocial risk based on the diagnosis.

Evaluation, association, and incidence through a statistical study of the sociodemographic factors and intra-occupational dimensions determining the psychosocial risk of professors.

As has been studied in this research, the occupational psychosocial factor could be defined as those conditions present in the different jobs in the institutions/companies, which are related to and infer in the organization of work, type of functions assigned, activities, tasks that are performed, which may or may not be a risk to the health of the person who performs it. according to the characteristics of the work. In the same order, the association and incidence were evaluated through a statistical

study, using a binary logistic regression model, of the sociodemographic factors and intra-occupational dimensions determining the psychosocial risk of the professors of the two universities, to find relationships and define the origin of the risk.

As mentioned, it can be said that logistic regression is a group of statistical techniques that aim to evaluate hypotheses or causal relationships when the dependent variable is a dichotomous binary variable, that is, it has only two categories. This binary logistic regression model is discarded or eliminated, step by step, those factors in which statistical significance is not shown, considering the dependent variables or domains that are Leadership and social relations at work, Control and autonomy over work, Work demands and finally Rewards with their respective dimensions.

To estimate the model, all covariates (sociodemographic variables) were used, eliminating those without statistical significance, i.e. with *P-value (P >0.05),* in the end it shows us the only independent variables that are influencing the dependent variables (intra-occupational dimensions) that are considered significant, that is, with *P-value (P<0.05)* and therefore explains how the sociodemographic variables that remain are the ones that have the greatest impact on the dimension of the risk that is being analyzed.

Relationship between intra-occupational dimensions of psychosocial risk in professors and socio-demographic and occupational factors.

- **Independent variable 1.** (characteristics of leadership). Vs dependent variable 19. (type of salary).

To find the association between the risk dimension Leadership characteristics and the sociodemographic variable "*Type of Salary*" in professors, 13 steps were used in the analysis and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of Likelihood -2" of 33.483 and lower than in the previous steps and a Cox and Snell R2 indicating that only 13.6% of the variation in the "Leadership Characteristic" risk is explained by the independent variable. The model shows that there is an association between the risk "*Leadership Characteristic*" and the sociodemographic variable "Type of Salary", p-value=0.056; therefore, the logistic regression equation allows us to evaluate the high risk of "Leadership characteristic", considering the coefficient (B= 0.811) of the variable "Type of salary" is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(0{,}811 \times Tipo\ de\ salario)}}$$

This equation allows us to calculate in professors the probabilities of having an elevated risk in the "*Leadership characteristic*" in each of the categories of the associated sociodemographic variable "Type of salary". Finally, it is concluded that professors who have a "fixed + variable" salary type have a higher probability of risk in the "*Leadership Characteristic*" compared to professors with a "fixed" salary type category.

- **Dependent variable 2**. (social relations at work). Vs independent variable 19. (type of salary).

To find the association between the risk dimension "*Social relations at work"* and the sociodemographic variable "*Type of Salary"* in professors, 1 step was used in the analysis, and its significance was evaluated with the chi-square test (p-value<0.05. The model presents an acceptable "Logarithm of Likelihood -2" of 26.843 and a Cox and Snell R2 indicating that only 32.4% of the variation in the risk "Social Relationships at Work" is explained by the independent variable. The model shows that there is an association between the risk "Social Relations at Work" and the sociodemographic variable "Type of Salary", p-value=0.004. Therefore, the logistic regression equation that allows evaluating the risk of "Social Relations at Work", considering the coefficient (B= 1.435) of the variable "Type of salary" is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(1{,}435 \times Tipo\_Sal(1))}}$$

This equation allows us to calculate in professors the probability of having an elevated risk in the "*Social Relations at Work*" in each of the categories of the associated sociodemographic variable "Type of salary". Finally, it is concluded that professors who have a "fixed + variable" salary present a considerable risk in "*Social Relations at Work*" compared to professors with a "fixed" salary type category.

- **Dependent variable 3.** (performance feedback) vs independent variable 2 and 9. (marital status and number of dependents).

To find the association between the dimension "Performance feedback" and the sociodemographic variables "*Marital Status and Number of Dependents*" in professors, 12 steps were used in the analysis, and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of Likelihood -2" of 16.938 and lower than in the previous steps and a Cox and Snell R2 indicating that only 53.2% of the variation in the "*Performance Feedback*" risk is explained by the independent variable. The model shows that there is an association between the risk "*Performance feedback*" and the sociodemographic variables "*Marital Status and Number of Dependents*", with p-value=0.035 for divorced professors, p-value=0.014 for married professors, p-value=0.026 for single professors, p-value=0.018 for professors with several dependents. Therefore, the logistic regression equation that allows evaluating the risk of "*Performance feedback*", considering the coefficients (B= 25.944), (B= 8.589), (B= 5.913) and (B= -1.789) of the variables "*Marital Status and Number of Dependents*" is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(25{,}994 \times Est\_Civil(1)\ + 8{,}589 \times Est\_Civil(2) + 5{,}913 \times Est\_Civil(3) - 1{,}789\ \times Nu\_Personas)}}$$

This equation allows professors to calculate the probability of having an elevated risk in the "*Performance feedback*" in each of the categories of the associated sociodemographic variable "*Marital Status and Number of Dependents*". When the Beta (B) value is negative, it is a risk protection factor, that is, it seeks to reduce the risk. Finally, those professors who are in a divorced marital status, married and with fewer dependents, present an elevated risk when the "Performance feedback"

dimension is analyzed against professors who are single, in a common-law union and with a greater number of dependents.

- **Independent variable 4**. (relationship with collaborators).

When observing the results described by the professors in the risk dimension "*Relationship with collaborators*", this is classified according to the analysis carried out with the scale table as "very high", that is, all the responses of the professors are located in the category called risk 2 (High risk), so it can be interpreted that all the covariates are influencing the risk and the intervention is of immediate attention for all professors surveyed. Therefore, it is not possible to perform a regression analysis to find the possible associations between the variables studied.

- **Independent variable 5.** (role clarity)

When observing the results described by the professors in the risk dimension "Role Clarity", it is classified according to the analysis carried out with the scale table as Medium, High Risk or Very High Risk, which were grouped in this analysis as Type 2 risk, so it can be interpreted that all the covariates are influencing the risk and this diagnosis is of immediate attention for all the professors surveyed. Therefore, it is not possible to perform a regression analysis to find the possible associations between the variables studied.

- **Independent variable 6.** (training) vs dependent variable 1.2 (age range)

To find the association between the risk dimension "Training" and the sociodemographic variable "Age range" in professors, 1 step was used, and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of likelihood -2" of 22.011 and a Cox and Snell R2 indicating that only 4.35% of the variation in the "*Training*" risk is explained by the independent variable. The model shows that there is an association between the "*Training*" risk and the sociodemographic variable "*Age range*", p-value=0.0118 for professors in the age range of 30 to 40 years, p-value=0.045 for professors in the age range of 41 to 50 years. Therefore, the logistic regression equation that allows evaluating the risk of "*Training*", considering the coefficient (B= 1.253) for professors in the age range of 30 to 40 years and (B=21.203) for professors in the age range of 41 to 50 years is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(1{,}253 \times Rango\_Edad(1)\ + 21{,}203 \times Rango\_Edad(2))}}$$

This equation allows professors to calculate the probability of having an elevated risk in "*Training*" in each of the categories of the associated sociodemographic variable "*Age Range*".

Finally, it is concluded that professors in the age range of 30 to 40 years and those from 41 to 50 years of age, lack training activities for the effective development of their work and this may be

due to the fact that access to these programmed activities is limited or non-existent; therefore, if it affects psychosocial risk, not being trained and trained to strengthen knowledge and skills. In contrast to professors aged 51 to 65 years, these professors have a lower probability of risk compared to the other ranges due to the experience gained throughout their stay in the institutions and academic contribution, however, it does not hurt to include them and make them participate in activities and training that promote the development and professional growth of the professor.

- **Independent variable 7.** (participation and change management) vs dependent variable 1.2 (age range).

To find the association between the risk dimension "*Participation and change management"* and the sociodemographic variable "*Age range*" in professors, 1 step was used in the analysis, and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of Likelihood -2" of 23.934 and a Cox and Snell R2 indicating that only 3.93% of the variation in the " *Participation and change management*" risk is explained by the independent variable. The model shows that there is an association between the risk "*Participation and management of change*" and the sociodemographic variable "*Age Range*", p-value=0.019 for professors in the age range of 30 to 40 years, p-value (0.0327) for professors in the age of 41 to 50 years. Therefore, the logistic regression equation that allows us to evaluate the risk of "*Participation and change management*", considering the coefficient (B= 21.203) for professors aged 30 to 40 years and (B=0.693) for professors in the age range of 41 to 50 years, is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(21{,}203 \times Rango\_Edad(1)\ + 0{,}693 \times Rango\_Edad(2))}}$$

This equation allows professors to calculate the probability of having an elevated risk in the dimension "*Participation and management of change*" in each of the categories of the associated sociodemographic variable "*Age range*". Finally, it is concluded that professors in the age range of 30 to 40 years and those in the range of 41 to 50 years of age find it more difficult to adapt to the change due to the changes may lack clear, timely information about the changes and their contributions or opinions are not considered.

For the above, these changes negatively affect the worker, unlike those professors with more seniority in the age range of 51 to 65 years, who are easy to adapt to change, despite the fact that over time it is more difficult for them, they must study, practice more with the tools of the information age; Example: office tools, software, virtual platforms.

- **Independent variable 8.** (opportunities for the use and development of skills and knowledge) vs dependent variable 17. (type of contract)

To find the association between the risk dimension "*Opportunities for the use and development of skills and knowledge"* and the sociodemographic variable *"Type of contract"* of the professors, 11 steps were used, and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of the likelihood -2" of 28.416 and lower than in the previous steps and a Cox and Snell R2 indicating that only 2.84% of the variation in the risk "*Opportunities for the use and development of skills and knowledge*" is explained by the

independent variable. The model shows that there is an association between the risk "*Opportunities for the use and development of skills and knowledge*" and the sociodemographic variable "*Type of Contract*", p-value=0.014. Therefore, the logistic regression equation that allows evaluating the elevated risk of "*Opportunities for the use and development of skills and knowledge*", considering the coefficient (B= 1.872) of the variable "*Type of contract*" is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(1{,}872 \times Contrato(1))}}$$

This equation allows us to calculate in professors the probability of having an elevated risk in the dimension "*Opportunities for the use and development of skills and knowledge*" in each of the categories of the associated sociodemographic variable "*Type of contract*". Finally, it is concluded that professors who have a type of contract "*Temporary less than 1 year*" present an elevated risk with a probability of 0.86% in the dimension "*Opportunities for the use and development of skills and knowledge*" compared to professors with a *term contract "Indefinite".* This is because those professors with indefinite term contracts have greater job stability, which is why they perform better in their workplaces, always making the opportunities to develop new skills, skills that contribute to improving their position.

In addition, in the case of indefinite-term professors, there is no uncertainty as those professors who have their contract renewed by the employer for certain periods, as well as the uncertainty of whether they are part of the work group.

- **Independent variable 9. (**control overwork) vs dependent variable 3 and 17. (last level of study and type of contract)

To find the association between the risk dimension "*Control over work"* and the sociodemographic variables "*last level of study and type of contract"* of the professors, using 2 steps in the analysis, and evaluating its significance with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of likelihood -2" of 12.781 and a Cox and Snell R2 indicating that only 5.99% of the variation in risk "*Control over work*" is explained by the independent variable. The model shows that there is an association between the risk "*control over work*" and the sociodemographic variable "*Last level of study*", p-value=0.018, and *"Type of contract",* p-value=0.048*.* Therefore, the logistic regression equation that allows evaluating the considerable risk of "Control over work", considering the coefficient (B= 1.386) for professors with the last level of postgraduate study and (B= 20.113) for professors with temporary contracts of less than one year is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(1{,}386 \times Ult\_Niv\_Est(1) + 20{,}113 \times Contrato(1))}}$$

This equation allows professors to calculate the probability of having an elevated risk in the dimension "*Control over work*" in each of the categories of the associated sociodemographic variable "*Last level of study and Type of contract*". Finally, it is concluded that professors who have a temporary contract of less than one year with a postgraduate degree are those who have a higher probability of risk in the dimension "*Control over work*" compared to professors with the category of indefinite term contract with postgraduate level.

This may be due in large part to the type of contract, given that those professors with more time employed manage the assigned academic loads better and have greater autonomy when planning their work compared to those professors who, due to their type of contract, despite having a postgraduate degree, manage a type of temporary contract of less than 1 year. It means that they are always in the process of adaptation and uncertainty under what may happen with their contract.

- **Independent variable 10.** (environmental and physical exertion demands)

When observing the results described by the professors in the risk dimension "*Environmental demands and physical effort*", this is classified according to the analysis carried out with the scaled table as Medium Risk, High Risk, or Very High Risk, which were grouped in this analysis as Type 2 risk for all the professors surveyed. Therefore, it is not possible to perform a regression analysis to find the possible associations between the variables studied.

- **Independent variable 11.** (emotional demands) vs dependent variable 14 and 19 (position and type of salary).

To find the association between the risk dimension "*Emotional demands*" and the sociodemographic variables "*Position and type of salary"* of the professors, 2 steps were used in the analysis, and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of Likelihood -2" of 6.390 and a Cox and Snell R2 indicating that only 6.83% of the variation in the risk *"Emotional Demands*" is explained by the independent variable. The model shows that there is an association between the risk "*Emotional demands*" and the sociodemographic variables "*Position*", p-value=0.0338 and "Type of salary", p-value=0.0215. Therefore, the logistic regression equation that allows evaluating the risk of "Emotional Demands", considering the coefficient (B= 19.817) for professors with a professional position and (B=1.386) for professors with a more variable fixed part is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(19{,}817 \times Cargo(1) + 1{,}386 \times Tipo\_Sal(1))}}$$

This equation allows professors to calculate the probability of having elevated risk in the dimension "Emotional demands" in each of the categories of the associated sociodemographic variable "Position" and "Type of salary".

Finally, it is concluded that professors with professional positions present a high probability of risk in the dimension "*Emotional Demands*" compared to professors whose position is head, since the salary type is not very influential due to the similarity in probabilities.

This may be because professors involve feelings according to the situations of each person in the classrooms, unlike professors who have positions of directors or deanships, they do not have direct communication with students. The individual is exposed to the feelings, emotions, or negative treatment of other people in the exercise of their work.

- **Independent variable 12.** (quantitative demands) vs dependent variable 17. (type of contract).

To find the association between the risk dimension "*Quantitative demands*" each and the sociodemographic variable "*type of contract"* of the professors, 11 steps were used, and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of Likelihood -2" of 34.033 and lower than in the previous steps and a Cox and Snell R2 indicating that only 11.8% of the variation in the "*Quantitative Demands*" risk is explained by the independent variable. The model shows that there is an association between the risk "Quantitative Demands" and the sociodemographic variable "Type of Contract", p-value=0.033. Therefore, the logistic regression equation that allows evaluating the risk of "Quantitative demands", considering the coefficient (B= 1.012) of the variable "Type of contract" is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(1{,}012 \times Contrato(1))}}$$

This equation allows professors to calculate the probability of having an elevated risk in the "Quantitative Demands" in each of the categories of the associated sociodemographic variable "Type of contract". Finally, it is concluded that professors who have a type of temporary contract of less than one year have a higher probability of risk in the "*Quantitative Demands*", compared to professors with a type of indefinite term contract.

This may be because professors with an indefinite term contract manage their academic loads better and have better control over them, they perform better in the work environment due to their time of experience, unlike those hired temporarily because they are always in the process of adaptation and under uncertainty of what may happen with their employment.

- **Independent variable 13.** (influence of work on the non-work environment) vs dependent variable 19. (type of salary)

To find the association between the risk dimension "*Influence of work on the non-work environment*" and the sociodemographic variable "*Type of salary"* of the professors, 1 step was used in the analysis, and its significance was evaluated with the chi-square test (p-value<0.05. The model presents an acceptable "Logarithm of the likelihood -2" of 15.488 and a Cox and Snell R2 indicating that only 5.56% of the variation in the risk *"Influence of work on the extra-work environment* " is explained by the independent variable. The model shows that there is an association between the risk *"Influence of work on the non-work environment*" and the sociodemographic variable "Type of Salary", p-value=0.001. Therefore, the logistic regression equation that allows evaluating the risk of "*Influence of work on the extra-work environment*", considering the coefficient (B= 2.485) of the variable "Type of salary" is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(2{,}485 \times Tipo\ de\ salario(1))}}$$

This equation allows professors to calculate the probability of having an elevated risk in the "*Influence of work on the extra-work environment*" in each of the categories of the associated sociodemographic variable "Type of salary". Finally, it is concluded that professors who have a "*fixed +*

variable" salary present a considerable risk in the dimension "*Influence of work on the extra-work environment*" compared to professors with a "fixed" salary type category.

This may be because those professors with a fixed salary have greater economic stability, which provides their non-work environment with a positive influence, compared to professors with a changing salary that can directly affect their financial stability, something directly proportional to their extra-work and personal environment.

- **Independent variable 14.** (requirements of responsibility of the position) vs dependent variable 17. (type of contract).

To find the association between the risk dimension "Demands of responsibility of the position" and the sociodemographic variable "Type of contract" of the professors, 13 steps were used in the analysis, and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of Likelihood -2" of 32.674 and lower than in the previous steps and a Cox and Snell R2 indicating that only 15.1% of the variation in the risk "*Demands of Position Responsibility*" is explained by the independent variable. The model shows that there is an association between the risk "*Demands of the responsibility of the position"* and the sociodemographic variable "Type of Contract", p-value=0.044. Therefore, the logistic regression equation that allows evaluating the risk of "*Demands of the responsibility of the position*", considering the coefficient (B= -1.705,) of the variable "Type of contract" is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(0{,}693 - 1{,}705 \times Contrato(1))}}$$

This equation allows professors to calculate the probability of having an elevated risk in the *"Demands of the responsibility of the position*" in each of the categories of the associated sociodemographic variable "Type of Position". Finally, it is concluded that professors who have a type of contract "indefinite" present a considerable risk in the dimension "*Demand for Responsibility of the position*" compared to professors with the category of type of position "*Temporary less than one year*".

This is due to the fact that professors who generally have an indefinite term contract are those full-time professors who, in addition to complying with the hours stipulated for classes, have administrative assignments, additionally they must provide accompaniment and advice in research projects, grade exams, prepare classes, place grades, factors that in comparison with the responsibilities of the position of a professor or with a temporary contract of less than one year is minor.

When Beta (B) is a negative value, it is a risk protection factor, that is, it seeks to reduce the risk.

- **Independent variable 15.** (mental demands).

When observing the results described by the professors in the risk dimension "*Mental load demands",* it is classified according to the analysis carried out with the scaled table as No Risk or Low Depreciable Risk, which were grouped in this analysis as Type 1 risk for all the professors surveyed.

Therefore, it is not possible to perform a regression analysis to find the possible associations between the variables studied.

- **Independent variable 16.** (role consistency)

When observing the results described by the professors in the risk dimension "*role consistency",* it is classified according to the analysis conducted with the scaled table as Very high risk, which were grouped in this analysis as Type 2 risk for all the professors surveyed. Therefore, it is not possible to perform a regression analysis to find the possible associations between the variables studied.

- **Independent variable 17**. (demands of the working day) vs dependent variable 14 and 19. (type of position and type of salary)

To find the association between the risk dimension *"Demands of the working day"* and the sociodemographic variables *"Position" and "Type of Salary"* of the professors, 2 steps were used in the analysis, and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of the likelihood -2" of 6.390 and lower than in the previous steps and a Cox and Snell R2 indicating that only 6.83% of the variation in the risk "*Demands of the working day*" is explained by the independent variable. The model shows that there is an association between the risk "Demands of the working day" and the sociodemographic variables "Type of position with p-value=0.0338 and type of salary", p-value=0.0215. Therefore, the logistic regression equation that allows evaluating the risk of "Demands of the Working Day", considering the coefficient (B= 19.817) for professors with a professional position and (B=1.386) for professors with a fixed part + a variable salary type is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(19{,}817 \times Cargo(1) + 1{,}386 \times Tipo\_Sal(1))}}$$

This equation allows professors to calculate the probabilities of having an elevated risk in the "Demands of the working day" in each of the categories of the sociodemographic variable associated with the "Type of Position" and "Type of Salary". Finally, it is concluded that the professors who, regardless of the type of salary, are more exposed are those whose position is that of a professional in a specific area compared to professors who are program directors, deans or have some leadership in charge.

- **Independent variable 18.** (rewards derived from belonging to the organization and the work that is done)

When observing the results described by the professors in the risk dimension "Rewards derived from belonging to the organization and the work that is done", it is classified according to the analysis carried out with the scaled table as High Risk or Very High Risk, which were grouped in this analysis as Type 2 risk for all the professors surveyed. Therefore, it is not possible to perform a regression analysis to find the possible associations between the variables studied.

- **Independent variable 19.** (recognition and compensation) vs dependent variable 3. (last level of study)

To find the association between the risk dimension "Recognition and compensation" and the sociodemographic variable "*Last level of study*" in professors, 1 step was used, and its significance was evaluated with the chi-square test (p-value<0.05). The model presents an acceptable "Logarithm of Likelihood -2" of 31.948 and a Cox and Snell R2 indicating that only 18.4% of the variation in the "Recognition and Compensation" risk is explained by the independent variable. The model shows that there is an association between the risk "*Recognition and compensation*" and the sociodemographic variable "*Last level of study",* p-value=0.028. Therefore, the logistic regression equation that allows evaluating the risk of "*Recognition and compensation*", considering the coefficient (B= 1.041) of the variable "Last level of study" is:

$$P(Riesgo = Alto\ ) = \frac{1}{1 + e^{-(1{,}041 \times Ult\_niv\_Est(1))}}$$

This equation allows professors to calculate the probability of having elevated risk in the dimension "*Recognition and compensation*" in each of the categories of the associated sociodemographic variable "*Last Level of study*":

Finally, it is concluded that professors who have a postgraduate academic level present a high probability of risk in the dimension "*Recognition and compensation*" compared to professors who are only professionals and this is because the greater the training achieved, the professor will be recognized and compensated, additionally the research production of the same is taken into account since this contributes significantly to any program of any of the faculties under study.

The analysis of the data or associations showed that the covariate that has the greatest impact on the risk on the psycho-occupational dimensions are the *type of salary and the number of dependents*, this is due to the fact that a large part of the professors surveyed have a more variable fixed salary rate, that is, that it is a salary that is not the same every time it is always changing, and deviated from an average basic salary, which directly affects the economic part of each of these professors.

It should be added that with regard to occupational aspects, one of the covariates that allowed a type of analysis to be made in this second item is the *Last level of study,* where it is evident that those professors with a higher level of training have a greater probability of suffering psychological burnout, which is perhaps due to the fact that professors, in contrast to the intra-occupational variable*, Control over work*, have little Level of decision about the conditions of their position, that is, the margin of decision that the professor has on aspects such as the order of activities, the quantity, the rhythm, the way of working, the breaks during the day and rest times is restricted or non-existent. An analysis like that of Klusmann et al. (2022) where it was found that the variable level of professional training is associated with the fact that professors who have more academic training understand their students better, but they feel more tired.

On the other hand, the results of this study are also related to the study carried out by Grau et al, (2009) who found in their work that the greater seniority in the job acts as a protective factor against

risk, which is consistent with this analysis because in the covariate *Age* versus *training, participation and change* management Professors in the 51 to 61 age range have a high but lower probability of risk compared to younger professors in the 30 to 40 and 41 to 50 age ranges, this is because these professors have influences on the aspects related to their position, a higher level of empowerment, decision-making and autonomy in the face of their functions, the aforementioned earned by their time and contribution to the institution.

Intervention plan to reduce or eliminate factors incident to intra-occupational psychosocial risk.

As has been observed, throughout the research work, in which the main factors that cause psychosocial and occupational risk in professors of two universities in Barranquilla were detected, among which we can cite: job instability.

It should be considered that nineteen women and eight men participated, 66% of the professors of the Faculty of Health Sciences and 73% of the Faculty of Engineering are married, 56% and 27% of the professors of the two faculties have fixed-term contracts. They are between the ages of 41 and 60 (38%), so the affective load that professors modulate is obvious, due to the extra-work commitments they have.

In addition to the above, it is observed that 94% of the Faculty of Health Sciences, and 100% of the Faculty of Engineering, are at very high risk due to environmental demands, forcing them to have a greater physical effort for the development of their activities, generating discomfort and can affect physical health.

In addition, it was evidenced that the faculties of health sciences and Engineering present high risk with 65% and 55%, respectively, in the dimension of intra-labor demands of the working day, which impacts on their 40-hour working days, the low availability of professors in the different faculties, due to the fact that there are few and the few that are assigned multiple responsibilities.

Every worker who performs any work in different areas is prone to suffer some physical or mental injury within work. Everything is related to the work they do, organization of the environment and labor relations.

After the above considerations, the design of an intervention plan was proposed to reduce or control the factors incident in intra-occupational psychosocial risk, specifically in professors of two private universities in Barranquilla.

In view of the above, the intervention plan was planned and focused, with the development of tasks, activities and their respective strategies, which were established to mitigate the psychosocial risks presented in the work environment of the professors of the two universities under study and that they can perform their work in an optimal way.

It can be stated that, due to the answers obtained in the application of the questionnaire, it was impossible for statistical analysis to be carried out with other statistical tools, since the dependent

variables were mostly dichotomous; that is, of only two categories, shortening the possibilities of giving different treatments to the one performed.

However, it allowed establishing the causal relationships of intra-occupational psychosocial risk in professors, where the associations of sociodemographic factors and intra-occupational dimensions were studied, determinants in the psychosocial risk of professors in which through a binary logistic regression analysis the statistical association was defined with respect to the value of (P-Value) less or greater than 0.05 where the older ones were eliminated because they did not have an association and the minors were those who presented statistical significance, that is, they were related. The proposed intervention plan is set out below:

Table 2. Intervention Plan

Associations of intra-occupational risk dimensions with socio-demographic variables	Objective	Strategy	Activity	Indicator	Calculation	Responsible	Compliance Goal	Periodicity
Environmental and physical exertion demands	Conduct periodic evaluations (temperature, noise, and lighting) in the different facilities and offices of the professors to identify the physical conditions to which they are exposed; in accordance with the risks identified in both faculties.	1. Development of a periodic schedule of physical irrigation evaluations to facilities and teaching offices. 2. Submit reports of temperature, noise, and lighting assessments for corrective action.	1. Formation of the group in charge of conducting field sampling 2. Field sampling with measuring instruments.	Assessment and compliance	(Number of evaluations conducted in the semester) (Number of evaluations scheduled in the semester) *100	Specialist professor in occupational safety and health and students of the OSH laboratory course	>90%	Semi annual
Performance feedback vs status civil and numbers of people in charge	Implement effective communication channels between bosses, collaborators, and co-workers in relation to the work needs of the area.	1. Regular meetings between employees and bosses with the aim of allowing workers to express their needs and proposals.	1. Hold meetings with different programs of the Faculty of Engineering, with prior programming and published on the website.	Assessment and compliance	(No. Of professors attending meetings)/ (No. Of scheduled meetings) * 100	Dean and/or Head of each area, program management	100%	Monthly and/ or bi-monthly
Social relations at work vs type of salary	Identify social support networks based on the generation of support groups.	1. Promoting positive relationships. 2. Social skills training (communication, empathy, conflict resolution)	1. Motivational educational workshops. 2. Rumba therapy 3. Soccer tournaments 4. Celebration of festivities 5. Birthday Celebration	Assessment and compliance	(No. Meeting attendance) / (No. Attendance at scheduled meetings) * 100	Social welfare, Dean and/or head of each area, program management	100%	Bimonthly
Training vs age range	Design the training process, giving priority to those training needs that are in line with the performance of the job.	1. Design induction, training, and updating programs to promote the culture of self-training.	1. Make a training / update schedule for professors. 2. Conduct workshops so that they know the different risks and their respective controls.	Assessment and compliance	(No scheduled meetings) / (No. Attendance at scheduled meetings)	Social Welfare, Dean and/or Head of each area, Program Management	100%	Monthly
Participation and change management vs age range	Encourage teamwork that favors collaboration between colleagues.	1. Creation of spaces in which the worker can give suggestions in the face of the different changes that occur in their work area.	1. Create a web page so that professors (in any form of contract) can give their opinions and suggestions.	Assessment	(No opinions) / (Number of faculty members) * 100	Dean and/or Head of each area, Program Management	50%	Semi annual
Work control vs last level of study	Establish an active break program to prevent musculoskeletal disorders caused by identified risk factors.	1. Training for leaders in the operation of the active break program with professors.	1. Choose a trained leader who will oversee active breaks and stretches 1. Suspension of work every 2 hours, for periods of 5 to 10 minutes (maximum) in each workplace.	Assessment and compliance.	(No activities executed per month) / (No scheduled activities per month) * 100	Social Welfare / Active Break Leaders / H & S Manager	>90%	Daily / Monthly
Emotional demands vs position and type of salary	Provide educational material on the recognition and assertive management of conflict situations to be socialized with each work team in charge.	1. Sensitization and training in the recognition of control and expression of emotions	1. Conduct workshops on control and expression of emotions 2. Promote the culture of good inter extra personal relationships	Assessment and compliance	(No activities executed) / (No scheduled activities) * 100	Social welfare,	90%	Each of the months
Recognition and compensation vs. Last level of study	Establish mechanisms of reward and recognition for the work done.	1. Establishment of remuneration systems as a measure to avoid negative competitive behavior.	1. To reward and encourage professors for their training, dedication, academic work, research.	Assessment and compliance	(No activities executed) / (No scheduled activities) * 100	Rector, Dean of Social Welfare,	100%	Annual

Source: *Own elaboration*

Conclusions

In the present research, the variables of labor type and sociodemographic factors were characterized through a cross-sectional study, with the application of a survey of the intra-occupational psychosocial risk factors form A, which affected the risk, specifically in professors of two universities in the city of Barranquilla.

University professors from two faculties, Health Sciences and Engineering of the city of Barranquilla, participated, corresponding to 59% and 41% respectively, with sociodemographic characteristics, such as 30% of the professors corresponded to the male sex and 70% to the female between 40 and 65 years of age. with 72% married, with completed postgraduate studies (87%) and 55% of the population belong to stratum three of the city of Barranquilla. It should be added that regarding occupational aspects, it was evident that 77% of the professors are professionals and analysts, 24% correspond to heads, that is, with personnel in charge, of the respondents 54% perform more than 40 hours of work a week.

Once the data was analyzed, very high risk was obtained in the dimension of environmental demands and physical effort, as well as very high risk in the leadership domain and social relations at work, specifically in the characteristic dimensions of leadership with 94% and 100% respectively, social relations at work with a percentage of 100% very high risk for both faculties, likewise, there is also a very high risk in the dimension of role clarity, opportunities for the use and development of skills and knowledge, recognition and compensation, and finally rewards derived from belonging to the organization and the work that is done.

Subsequently, the association and incidence were evaluated through a statistical study of Binary Logistic Regression, which aimed to evaluate hypotheses and/or causal relationships between the crossings of dependent and independent variables where those factors in which statistical significance was not shown were discarded. It can be stated according to the correlation analysis conducted that the sociodemographic characteristics have the greatest impact. The results mentioned above are the type of salary, type of contract, number of dependents, age, last level of education and marital status.

In view of the situation raised, it was necessary to design a strategic plan for intervention and control of psychosocial and occupational risk factors in professors of universities in the city of Barranquilla, to be applied in the faculties under study, according to the needs identified in the management of intra-occupational psychosocial risk in professors, to reduce or eliminate the factors in intra-occupational psychosocial risk, in the following variables:

Table 3. Dependent and independent variables

Dependent variable (intra-work dimensions)	Independent variable (sociodemographic characteristics)
Environmental and Physical Exertion Demands, Role Clarity	According to the results according to the table, we scale all the covariates
Performance feedback	Marital status and numbers of dependents
Characteristics of leadership, social relationships at work	Salary Type
Training	Age Range
Participation and change management	Age Range
Work control	Last Level of Study, Type of Contract
Emotional demands	Type of Position and Type of Salary
Recognition and compensation	Last level of study

Source: Own elaboration

To conclude, it can be said that this study fulfilled the objectives set, characterized the intra-occupational psychosocial factors that have an impact, analyzed the proposed hypotheses, and designed an intervention plan to reduce and control the factors incident in the intra-occupational psychosocial risk in the two universities under study.

Fulfilment of objectives

According to the reasoning that has been carried out, the intra-occupational variables and the sociodemographic factors that affect psychosocial risk were characterized through a cross-sectional study with the application of a survey of intra-occupational psychosocial risk factors form A, specifically in professors of two private universities in the city of Barranquilla of the faculties of Engineering and Health Sciences, finding in which immediate intervention is required because they present a very high risk. *Characteristics of leadership, social relationships at work, Clarity of the role, Opportunities for the use and development of skills and knowledge, Environmental and physical exertion demands, consistency of the role, Recognition and compensation, and Rewards derived from belonging to the organization and the work that is performed.*

In addition, when evaluating the association and incidence through a statistical study of the sociodemographic factors and intra-occupational dimensions determining the psychosocial risk of professors, relationships and definitions of the origin of the risk were found, where it was possible to establish that the covariates that may be having the greatest impact on the risk are the *Type of salary, type of contract, marital status, age, number of dependents, type of position and last level of study.*

Consequently, from what was found in this research, an intervention plan was proposed to reduce and control the factors incident in the intra-occupational psychosocial risk, specifically in professors of the two universities of Barranquilla, to favor what to do in educational work environments, avoiding risk factors for physical health, mental and emotional.

General discussion

The present study aimed to evaluate the psychosocial risk factors in the work environments of professors from two universities in Barranquilla; in addition, it is constituted as a research contribution on how professors of higher education institutions are affected in environments with conjunctural problems.

To achieve this, a standardized psychosocial risk questionnaire or battery was applied, developed, and adapted by the Ministry of Social Protection and the Javeriana University for the Colombian population. According to the results obtained in this research, it was possible to characterize and identify the psychosocial risk factors that altered the well-being of a sample of professors from the Faculties of Engineering and Health Sciences. designing an intervention plan that controls these factors.

Regarding the sample, because it was non-probabilistic, it was thought that there could be a bias, even more so when the participation of the surveyed professors in the two institutions did not complete a significant sample with respect to the total population; therefore, it cannot be assumed that the sample is representative of its population and there is a possibility of selection bias,

On the other hand, it would have been ideal to have a stratified probabilistic sample, but it was not done in this way to maintain the confidentiality of the information of the institutions, considered as a relevant point to obtain validity from this information.

However, the topic discussed is not the first study that has been carried out, therefore, the results should be considered as provisional and can be used in future studies, because in the information collection phase, results of extra-occupational psychosocial risk factors and stress levels were obtained for future research on the subject and only intra-occupational risks were deepened. Thus, leaving possibilities to continue investigating the issue seen from other points of view such as what is related to the non-work issue.

In addition, the study by Sans et al. (2023), found an extremely elevated level of risk in the domain of work demands, as well as in the dimensions of emotional demands and demands of the working day. Similar to what was found in this research, because *the quantitative demands and demands of the working hours* are one of the factors that most affect the intra-occupational psychosocial risk of the professors of the two universities of Barranquilla, except for the emotional demands since there the risk is depreciable or without risk, all of the above is tied to the fact that the professors must prepare and teach classes regularly, they have an increase in administrative tasks, they must comply with a minimum of research productivity for the articles that are published in indexed journals, make research contributions to macro and micro projects that the faculties advance in projection and extension. In addition, to have the answer to the requirements of the students.

Recommendations

To raise awareness among all teaching professionals about the meaning and importance of psychosocial risks, encouraging the development of physical, sports and recreational activities.

Conduct pedagogical campaigns to reduce psychosocial factors such as stress, conducting relaxation activities where the professor participates in personal and family relationships in the workplace.

Encourage the participation of professors in different areas that make up the work, from the organization itself, distribution, and planning of roles, which preserve a healthy work environment, away from any negative energy of the work environment.

Analyzing the current means that the institution must channel the participation of the different professors, they are adequate, agile, and effective, evaluating what aspects can be improved. And, if necessary, create new channels of participation.

Adapt the various levels of participation of the teaching professional (mailboxes, panels, meetings, writings, direct contact) to the object and content of the aspects on which participation and manifestation of psychosocial risks are regulated. If such means do not exist, consider the possibility of creating them, considering that the fact of creating one will not mean an effective increase in identifying the psychosocial risk suffered by a professor, but rather it will carry out an agile procedure of attention, follow-up and solution of negative factors.

Perform psychotherapy focused on the problem to prevent psychosocial risk factors in the teaching profession.

Hold a workshop to further strengthen responsibility with the tasks of the position, the sense of belonging and responsibility with the work. Training in business and professional ethics.

Train leaders and positions with personnel management in effective leadership, personnel management skills and assertive communication, as well as motivation and reward.

To expand the number of professors' participation in this type of study to expand the analysis of Binary Logistic Regression.

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