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**Distress antecedent factor to the symptoms of major depressive disorder**

**Distrés factor antecedente a la sintomatología del trastorno depresivo mayor**

**José Félix Brito Ortíz**

Autonomous University of Baja California (Mexico)

(felix.brito@uabc.edu.mx) (<https://orcid.org/0000-0002-9435-1711>)

**Martha Eugenia Nava Gómez**

Autonomous University of Baja California (Mexico)

(martha.nava40@uabc.edu.mx) (<https://orcid.org/0000-0003-2000-8520>)

**Estefania Brito Nava**

National Institute of Public Health (Mexico)

(estefania.brito@insp.edu.mx) (<https://orcid.org/0000-0001-7298-3438>)

**Arturo Juarez Garcia**

Autonomous University of the State of Morelos (Mexico)

(arturojuarezg@hotmail.com) (<https://orcid.org/0000-0003-3264-679X>)

**Gustavo Alejandro Román Brito**

Autonomous University of the State of Morelos (Mexico)

(tavolexfelix@gmail.com) (<https://orcid.org/0000-0003-4576-2976>)

**Rubén Vargas Jiménez**

Autonomous University of Baja California (Mexico)

(ruben.vargas.jimenez@uabc.edu.mx) (<https://orcid.org/0000-0002-6106-8020>)

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|  | **Abstract** |
| **Keywords:**  Mental health, university students, nursing. | Nursing students are exposed to psychosocial factors that generate distress, this being a risk factor that predisposes to depression. Objective: The objective of this study was to analyze the relationship between distress and symptoms of major depressive disorder in nursing students in Baja California, Mexico. Method: To do this, a research was carried out with the participation of 900 students from a public university in northern Mexico. Results: The results revealed acceptable levels of reliability, factorial validity and construct validity in the measurement instruments used: the Perceived Stress Scale (PSS-14) and the Patient Health Questionnaire (PHQ-9). It was observed that women reported higher levels of distress and depression compared to men. Furthermore, those students who worked while studying perceived a higher income, less distress and less depression than those without employment; These differences were statistically significant (p<.05). Discussion and conclusion: In the discussions, the study hypotheses were confirmed, including a significant positive correlation between distress and depression (r=.5, p<.05), as well as a significant negative correlation between eustress and depression (r=-.6, p<.05). Finally, it was concluded that eustress contributes to reducing distress, and that distress precedes the symptoms of major depressive disorder in the sample of nursing students (Chi2/gl=3.85; RMSEA=.06; NNFI=.98, NFI=.98, CFI=.99, IFI=.99, RFI=.98). |
|  | **RESUMEN** |
| **Palabras clave:**  Salud mental, estudiantes universitarios, enfermería. | Los estudiantes de enfermería están expuestos a factores psicosociales que generan distrés, siendo este un factor de riesgo que predispone a la depresión. Objetivo: El objetivo de este estudio fue analizar la relación entre el distrés y los síntomas del trastorno depresivo mayor en estudiantes de enfermería en Baja California, México. Método: Para ello, se llevó a cabo una investigación con la participación de 900 estudiantes de una universidad pública en el norte de México. Resultados: Los resultados revelaron niveles aceptables de confiabilidad, validez factorial y validez de constructo en los instrumentos de medición utilizados: la Escala de Estrés Percibido (PSS-14) y el Cuestionario sobre la Salud del Paciente (PHQ-9). Se observó que las mujeres reportaron niveles más altos de distrés y depresión en comparación con los hombres. Además, aquellos estudiantes que trabajaban mientras estudiaban percibieron un mayor ingreso económico, menos distrés y menos depresión que aquellos sin empleo; estas diferencias fueron estadísticamente significativas (p<.05). Discusión y conclusión: En las discusiones, se confirmaron las hipótesis del estudio, incluida una correlación positiva significativa entre el distrés y la depresión (r=.5, p<.05), así como una correlación negativa significativa entre el eustrés y la depresión (r=-.6, p<.05). Finalmente, se concluyó que el eustrés contribuye a reducir el distrés, y que el distrés precede a la sintomatología del trastorno depresivo mayor en la muestra de estudiantes de enfermería (Chi2/gl=3.85; RMSEA=.06; NNFI=.98, NFI=.98, CFI=.99, IFI=.99, RFI=.98). |

**Introduction**

Stress is present everywhere, even in academic settings (Alvites-Huamaní, 2019). Nursing students who perform clinical practice and social service constitute a group vulnerable to stress due to their commitment to patient health, which demands high concentration and responsibility (Muvdi et al., 2021). By interacting directly with patients facing health difficulties, these students are exposed to suffering, hopelessness, and sometimes death; these emotional demands can become a constant source of distress (Silva et al., 2019).

However, exposure to these emotional demands does not always immediately lead to distress, as students may have personal characteristics such as balanced temperament or effective coping strategies that protect them and modulate the relationship between stressors and distress into eustress. However, when these strategies fail, the level of stress can become negative (distress), which in turn can generate discouragement and be associated with depression, especially when witnessing the suffering of patients (Ruidiaz-Gomez et al., 2020).

***Stress and eustress.***

Palacios and Monte de Oca (2017) explain that stress is a response to psychosocial stimuli that the individual must face, and can generate a negative (distress) or positive (eustress) reaction depending on the ability to adapt to the stimulus. Espinosa, Pernas, and Gonzalez (2018) define eustress as an optimal response that enables adequate performance in the face of environmental demands, whereas distress implies overexertion leading to consternation and impairment, often stemming from psychological maladjustment.

Psychological stress is the psychological response of a person when trying to adapt to internal or external pressures (Cruz-Carbajal, 2024). According to Gutiérrez and Amador (2016) negative psychological stress or distress is a precursor of mental disorders, affecting 50% of the university student population, generating a public health problem.

***Negative Stress and Depression in Nursing Students a Public Health Problem***

There are several studies that relate negative stress (distress) to depression in university students. Depression is a mental affectation suffered by approximately 350 million people in the world (Bermudez, 2018, Trunce-Morales et al., 2020). However, the above, and so far the interrelationships that these psychological aspects have when pursuing a bachelor's degree in nursing are not clear, so this article analyzes distress as a public health problem that exacerbates depression in undergraduate nursing students (Muvdi *et al.,* 2021).

Medrano-Hernández and collaborators (2017) conducted a research considered 314 nursing professionals in Mexico, they identified that negative stress correlated with symptoms of depression (r=.573), such correlation was statistically significant (p<.01). Negative stress or distress can be defined as a psychological state that disrupts the normal state of the body, causing in its wake noticeable affections in the person, its consequences have an impact on health (Chau and Villela, 2017).

Currently, stress has been considered as a precursor of the most widespread health complications globally, living in a constantly changing world that involves dealing daily with stressful conditions, which sometimes exceed one's own capacities of resistance, affecting psychological and physical health; scientific evidence has reported that stressful events precipitate psychological distress and worsen physical and mental health (De la Rosa-Gómez, 2020).

***Risk factors associated with psychological stress from a distress perspective.***

It is worth mentioning that perceived stress is the psychological response of a person when trying to adapt to internal or external pressures. Nursing students, when performing clinical practice and social service face stressful situations activating their emotional regulation mechanisms, other elements that should be taken into account associated with perceived stress are sociodemographic factors such as sex, age, and economic income (Muñoz-Fernández *et al.,* 2020).

1. Sex:

Based on data provided by the American Psychological Association (APA), psychological stress is increasing year after year in both men and women, with the latter presenting more stress in relation to the opposite sex (Herrera-Covarrubias et al., 2017). In a study conducted in Warsaw Poland on 254 undergraduate nursing students, it was identified by stepwise linear regression analysis that sex is a significant predictor of the level of psychological stress or distress (B=-3.07; SE=1.11; p=0.006), the levels of distress in women were on average 3.07 points higher than in men (Pawlak et al., 2022).

1. Age:

Adolescence is an important stage for the presentation of distress, since according to the American Psychological Association (APA) adolescents present higher levels of negative stress compared to adults, all this related to the socioemotional and biological changes that adolescents experience, presenting greater emotional response to distress (Chiang et al., 2019).

Distress can increase susceptibility to depression especially if it begins to be experienced early in life; during adolescence and late adolescence various forms of adversity experienced by young people such as social isolation or confinement can significantly increase the occurrence of depressive symptoms (Xua et al., 2018).

In adolescence some areas of the brain are still undergoing development-related changes, making young people more vulnerable to produce alterations, with a higher intensity and more prolonged response of the adolescent hypothalamic-pituitary-adrenal axis compared to adults (Xua *et al.,* 2018).

Kamali et al. in 2023 identified a statistically significant negative correlation (r=-.28; p<.05) between age with stress in a group of 235 Iranian nursing students, it can be interpreted that the older the age the lower the stress (Kamali et al., 2023).

1. Financial income

The relationship between socioeconomic level and health is documented in different articles, which refer that the higher the economic income, the lower the risk of health problems, on the contrary, a low socioeconomic level has a negative impact on health (Mola *et al.,* 2019).

In the city of Salvador, Bahia, Brazil, it was identified that nursing students with low economic status present a higher level of stress in their academic training, those with monthly income equal to or less than one minimum wage, presented 64% higher level of stress, compared to students with more than one minimum wage (PR: 1.64, 95% CI: 1.64, 95%): 1.06; 1.27) (Ribeiro, 2020).

***Factors Resulting from Stress***

According to the Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE, 2016), the consequences of stress can be physical, as a response to the maladaptation of the organism to the stressful stimulus that can generate gastrointestinal, cardiovascular, respiratory, endocrine, dermatological disorders, as well as alterations in the immune system; and psychic consequences, producing psychological alterations, deteriorating the quality of personal relationships such as family or academic, generating sleep disorders, anxiety disorders, eating disorders, affective disorders, substance abuse and depression.

In the adolescent population, risk factors that have been found to be strong predictors of depression are stressful life events. Distress is a predictor of depressive symptoms, a risk factor that triggers depression is the presence of elevated levels of distress for a prolonged period of time (Pineda & Gonzalez, 2016).

***Depression***

Today, major depressive disorder (often referred to as depression) is a common mental disorder. It involves a depressed mood or loss of pleasure or interest in activities for long periods of time. Depression is distinct from the usual mood swings and feelings about day-to-day living. It can affect all areas of life, including family, friendship and community relationships. It may be due to or cause problems at school (WHO, 2023).

Piñar et al. (2020) based on the DMS-V mentions that the main characteristic of major depressive disorder is the presence of the illness for at least two consecutive weeks together with a mood of sadness and a loss of interest and pleasure in activities previously enjoyed by the affected individual, together with at least four associated symptoms which are a significant increase or decrease in weight and appetite, insomnia or hypersomnia, fatigue, feelings of worthlessness or guilt, difficulty concentrating and recurrent thoughts of death as well as suicidal ideation, being the most serious consequence.

***Risk factors associated with major depressive disorder.***

The problem statement of the present research project is based on the information provided by Borja-Delgado et al. (2019), who establish that the risk factors that predispose to major depressive disorder can be classified into two groups: internal and external

It defines the internal ones as those that can cause an individual to be organically vulnerable and classifies them into neurological, temperamental and personal, such as age and gender. Likewise, they classify externalities as psychosocial factors including low economic social class (Borja-Delgado et al., 2019).

Risk factors are defined as those attributes which increase the probability of the appearance of some mental disorder in people with similar characteristics, in major depressive disorder there are multiple psychosocial factors that predispose to its appearance (González, Pineda, & Gaxiola, 2018).

In the adolescent population, risk factors that have been found to be strong predictors of depression are stressful life events and the context in which the individual develops, such as the university academic context (González et al, 2018).

For the aforementioned reasons, it is necessary to evaluate distress in undergraduate nursing students and its negative effects generated by the COVID-19 pandemic, such as depression, with a public health perspective (Sanchez, 2021).

It should be noted, that depression has been identified as a consequential factor of distress in university students (González-Olaya *et al.,* 2014). Therefore, the aim of the study is to analyze the relationship between distress and symptoms of major depressive disorder in nursing students in Baja California, Mexico.

Based on the literature review, the following study hypotheses are proposed:

H1 depression increases with distress.

H2 depression decreases with eustress.

H3 eustress increases with age.

H4 distress and depression decreases with age.

H5 the level of eustress is lower in students who only study compared to those who study and work.

H6 the level of distress is higher in students who only study compared to those who study and work.

H7 the symptomatology of depression is greater in students who only study than in those who study and work.

H8 eustress is lower in women than in men.

H9 distress is greater in women than in men.

H10 symptomatology of major depressive disorder is higher in women than in men.

**Method**

***Design***

The study is quantitative, cross-sectional, observational, and correlational correlational. The sampling strategy was by convenience.

***Participants***

The sample size was 900 students, the sample represents 90% of the population under study which is made up of 1000 students from a university faculty in Baja California, Mexico (Otzen and Manterola, 2017).

The source of information was primary, using the self-completion questionnaire technique. The instruments were placed on the Google Forms electronic platform from June 2020 to December 2021. The first section contains sociodemographic data (age, sex, income, marital status, whether working (in addition to studying) or only studying. The second section contains the PSS perceived stress scale (Brito *et al.,* 2010) and the Patient Health Questionnaire PHQ-9 (Arrieta *et al.,* 2017).

The Spanish version of the Perceived Stress Scalewas used to assess stress. It consists of 14 items, 7 in favor of eustress (4 items; e.g., "How often have you successfully managed life's small irritating problems") and 7 in favor of distress (3 items; e.g., "How often have you felt nervous or stressed or full of tension"). The items are evaluated using a 5-grade frequency scale ranging from 1 (Never) to 5 (Very frequently: every day), corresponding to a case equal to 3 (Occasionally) in the total score.

***Instrument***

The perceived stress scale is an instrument used to measure psychological stress. Its items assess the degree of perceived control in unpredictable or unexpected situations. Specific questions probe the feeling of being in control (eustress) or the perception that situations are uncontrollable (distress) (Calderón-Carvajal *et al.,* 2017).

According to Brito, Nava and Juárez (2019) the Perceived Stress Scale PSS, presents adequate consistency and validity to be used in Mexican population, with a reliability level of .86, and adequate construct validity, the structural equation model presented an adequate fit considering a sample of 537 students: GFI=.91, RMSEA=.056, NFI=.97, CFI=.98, IFI=.98.

The second measurement instrument used to identify depression was the Patient Health Questionnaire (PHQ-9).The Patient Health Questionnaire (Patient Health Questionnaire or abbreviated PHQ-9) is a questionnaire that was designed to diagnose major depression (Arrieta *et al.,* 2017).

The PHQ-9 consists of 9 items (item 2; e.g., "Have you felt sad, hopeless or down"), uses a severity measure of zero to 27, with a scale of zero to three for each of its nine items, all referring to the symptoms presented by the subject to whom the test is applied within the last two weeks. The above allows you to rate the severity of depression using frequently used cut-off scores such as: none or minimal (0-4), mild (5-9), moderate (10-14), moderately severe (15-19) and severe (20 or more).

Cassiani-Miranda et al. (2017) identified a Cronbach's Alpha coefficient value of .85 when analyzing the consistency of the depression scale (PHQ-9).

In relation to its construct validity, the fit indices of the structural equations model carried out by Matrángolo, Azzollini, and Simkin in the year 2022 were adequate, with appropriate fit indices, RMSEA= .053, CFI= .99.

***Measurements.***

The assessment of stress, depression and the collection of sociodemographic data was carried out during the years 2020 and 2021 when the COVID-19 pandemic was still active, through the link https://forms.gle/6Wpvwqti9GEBKNb7A.

***Data Analysis***

The database was created in Excel format and exported to SPSS software version 19 with the support of a computer science graduate, who was not familiar with the study hypothesis. In other words, the personnel who participated in the research did not plan or control the production of the phenomenon, nor its results.

To identify the reliability of the measurement instruments (PSS-14 dystrophobic and PHQ-9), the internal consistencies were analyzed using Cronbach's Alpha technique for each of the items, using an iterative process to identify those items that reduced the Cronbach's Alpha value or that did not contribute positively to increase it. To identify the factorial validity of the PSS-14 and PHQ-9 scales, an exploratory factor analysis was carried out using principal components analysis with varimax rotation, taking into account items with factor loadings above .50. In addition, the sedimentation graphs of the items that make up the measurement instruments are shown.

To analyze the normality of the study variables, the Kolmogorov-Smirnov test was used; in order to analyze the results, descriptive statistics were used, as well as measures of dispersion; considering that the data do not follow a normal distribution, to verify the difference between distress and depression, the Mann Whitney U test was applied for independent samples; for the analysis of correlation between variables, the Spearman correlation test was used.

LISREL version 8.30 software was used to test the measurement model and the structural equation model, and the Chi2/gl, RMSEA, GFI, NFI, NNFI, CFI, IFI, and RFI indices were used to analyze the good fit of the model.

***Ethical Aspects***

The research project was approved by the Department of Teaching and Research Support of the Universidad Autónoma de Baja California, registered under code 350/3311. The participants analyzed the document related to informed consent, voluntarily agreed to participate in the research project. The authors declare that for this research there are no potential risks for the subjects participating in the study. As for the confidentiality of the data, the identity, confidentiality and privacy of each of the participants was carefully safeguarded.

**Results**

***Demographic characteristics of the study subjects.***

As for the average age, the participants presented 24 years on average with a standard deviation 2.8, a median of 25 years and a mode of 27; the youngest participants are 17 years old and the oldest are 30 years old, 64.7% of the students indicate that they study and work, while 35.3% only study.

***Reliability and validity of measurement instruments.***

Table 1 shows the analysis of the Kolmogorov-Smirnov test, which indicates non-normality in each item of the scales considering the sample of 900 students. In the same table it can be observed that the reliability (Cronbach's alpha) is favorable, even eliminating each of the items in the two scales (Eustress α=.87; Distress α=.85; PHQ-9 α=.91) (Moraguez, Espinosa & Morales, 2017).

To identify the factorial validity of the measurement instruments, the data were subjected to an exploratory factor analysis (EFA) considering the following statistical tests: Kaiser-Meyer-Olkin (KMO) test: Eustress=.89; Distress=.90; PHQ-9=.93 and Bartlett's sphericity statistic: Eustress [1787.179 (Df=21; p=.000)]; Distress [2169.952 (Df=21; p=.000)]; and PHQ-9 [4410.486 (Df=36; p=.000)] (Pizarro and Martinez, 2020).

Taking into account the ordinal nature of the data recording of the Eustress and and Distress scales (Likert-type responses from 1 to 5) and of the PHQ-9 scale (Likert-type responses from 0 to 3), the extraction of factors was analyzed by means of principal components with varimax rotation (Ferrando et al., 2022).

With respect to the number of factors, the result on the factor structure of the Eustress scale suggests one factor that explained 57% of the variance. The factor structure of the scale on Distress suggests a factor that explained 53% of the variance (Puentes and Diaz, 2019). The scale result on the PHQ-9 suggests a factor that explained 58% of the variance (Ferrando et al., 2022). For each item of the three scales the factor loadings are above .50 (Table 1, Figure 1, 2 and 3).

**Figure 1.**

*Scale sedimentation graph on Eustrés.*



Source: Own elaboration

**Figure 2.**

*Scale sedimentation graph on Dystrés.*



Source: Own elaboration

**Figure 3.**

*Depression scale sedimentation graph.*



Source: Own elaboration

**Table 1.**

*Descriptive statistics and exploratory factor analysis* *exploratory factor analysis of the scales (n=900).*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | M (DT) | K-S | α deleting item | Factor 1 |
| 1 Handling irritating problems | 3.9 (.80) | 7.6\* | .85 | .745 |
| 2 Coping effectively with change | 3.9 (.79) | 7.7\* | .84 | .806 |
| 3 Managing your personal problems | 3.9 (.86) | 7.6\* | .84 | .832 |
| 4 Feeling that things are going well for you | 3.8 (.82) | 7.1\* | .85 | .779 |
| 5 Controlling the difficulties in your life | 3.9 (.78) | 8.1\* | .85 | .771 |
| 6 Feeling that you are in control of everything | 3.3 (.88) | 6.8\* | .87 | .658 |
| 7 Control the way time is organized | 3.7 (.84) | 7.6\* | .86 | .659 |
| Eustress | 3.8 (.62) | 2.3\* | .87 |  |
| 1 Affected by something that has occurred | 3.2 (.97) | 7.0\* | .83 | .719 |
| 2 Unable to control things | 2.9 (1.04) | 6.2\* | .81 | .795 |
| 3 Full of tension | 3.6 (1.01) | 5.9\* | .82 | .747 |
| 4 Not being able to cope with everything | 3.0 (.96) | 6.8\* | .84 | .645 |
| 5 Angry about things | 3.2 (.95) | 7.0\* | .83 | .733 |
| 6 Thinking about things you haven't finished | 3.8 (.94) | 6.2\* | .84 | .608 |
| 7 Failure to overcome difficulties | 2.8 (1.05) | 5.8\* | .81 | .797 |
| Distress | 3.2 (.71) | 1.6\* | .85 |  |
| 1. Have you felt little interest? | 1.03 (.86) | 8.3\* | .90 | .775 |
| 2. Have you ever felt sad? | 1.15 (.95) | 8.3\* | .89 | .834 |
| 3. Did you have trouble falling asleep? | 1.48 (.94) | 6.7\* | .90 | .764 |
| 4. Have you ever felt tired? | 1.45 (.96) | 8.0\* | .89 | .838 |
| 5. Have you been less hungry? | 1.30 (.97) | 6.4\* | .90 | .775 |
| 6. Have you felt that you have failed someone? | .86 (.93) | 7.7\* | .90 | .718 |
| 7. Are you easily distracted? | 1.40(1.04) | 7.2\* | .90 | .778 |
| 8. Have you ever felt slower than usual? | 1.00 (.23) | 6.9\* | .89 | .813 |
| 9. Have you ever thought of taking your own life? | .29 (.66) | 14.2\* | .91 | .517 |
| Major Depressive Disorder (PHQ-9) | 9.96 (6.5) | 3.2\* | .91 |  |

Note: GAD=Generalized Anxiety Disorder. \*p<.01

Source: Own elaboration

***Correlation between age, eustress, distress and depression.***

The association between the items of the scales showed, as expected according to the literature review, positive correlations for the items of the scale on distress with the items of the scale on depression; and negative correlations for the items of the scale on eustress with the items of the scale on depression.

It is observed that distress correlates positively with depression (r=.691), which means that the greater the distress perceived by the people in the study sample, the greater the depression.

Eustress is negatively correlated with depression (r=-.514), it is interpreted that the higher the eustress, the lower the depression.

Eustress increases with age (r=.327), distress decreases with age (r=-.196), and depression also decreases with age (r=-.269), these correlations are statistically significant (p<.01), see Table 2.

**Table 2.**

*Association between the items* *of the eustress, distress and depression scales depressionn.*

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Item | 1 of | 2 of | 3 of | 4 of | 5 of | 6 of | 7 of | 8of | 9of | PHQ | Age |
| 1 e | -.256\* | -.280\* | -.179\* | -.219\* | -.183\* | -.255\* | -.255\* | .277\* | -.139\* | -.302\* | .204\* |
| 2 e | -.335\* | -.308\* | -.206\* | -.274\* | -.205\* | -.272\* | -.275\* | .294\* | -.147\* | -.335\* | .236\* |
| 3 e | -.380\* | -.410\* | -.319\* | -.366\* | -.300\* | -.323\* | -.350\* | .393\* | -.270\* | -.451\* | .302\* |
| 4 e | -.442\* | -.438\* | -.380\* | -.397\* | -.353\* | -.349\* | -.388\* | -.404\* | -.271\* | -.504\* | .293\* |
| 5 e | -.373\* | -.341\* | -.247\* | -.308\* | -.248\* | -.325\* | -.311\* | -.354\* | -.219\* | -.389\* | .265\* |
| 6 e | -.299\* | -.366\* | -.252\* | -.286\* | -.221\* | -.283\* | -.306\* | -.299\* | -.141\* | -.358\* | .206\* |
| 7 e | -.377\* | -.322\* | -.247\* | -.306\* | -.217\* | -.285\* | -.331\* | -.316\* | -.198\* | -.375\* | .209\* |
| Eustress | -.466\* | -.465\* | -.346\* | -.410\* | -.328\* | -.392\* | -.423\* | -.439\* | -.261\* | **-.514\*** | **.327\*** |
| 1 d | .395\* | .483\* | .387\* | .412\* | .367\* | .370\* | .424\* | .440\* | .194\* | .518\* | -.059\* |
| 2 d | .451\* | .542\* | .368\* | .441\* | .376\* | .476\* | .463\* | .454\* | .264\* | .560\* | -.156\* |
| 3 d | .424\* | .509\* | .447\* | .491\* | .453\* | .336\* | .490\* | .429\* | .230\* | .575\* | -.187\* |
| 4 d | .346\* | .344\* | .316\* | .367\* | .327\* | .299\* | .354\* | .360\* | .186\* | .429\* | -.099\* |
| 5 d | .356\* | .427\* | .345\* | .366\* | .331\* | .338\* | .406\* | .386\* | .211\* | .473\* | -.124\* |
| 6 d | .273\* | .303\* | .315\* | .288\* | .289\* | .207\* | .334\* | .272\* | .082\* | .356\* | -.182\* |
| 7 d | .482\* | .539\* | .366\* | .481\* | .383\* | .445\* | .490\* | .475\* | .301\* | .580\* | -.181\* |
| Distress | .537\* | .627\* | .502\* | .560\* | .491\* | .492\* | .586\* | .557\* | .299\* | **.691\*** | **-.196\*** |
| Age | -.254\* | -.237 | -.253 | -.197 | -.184 | -.173 | -.239 | -.161 | -.133 | **-.269** | 1 |

Spearman's Rho, \*\*p<.01

Source: Own elaboration

***Findings betwee******n sex of participants with eustress, distress and depression.***

The results of the analysis of eustress by sex were significantly different (p<.01), with a lower median eustress in women (Mdn=3.7) than in men (Mdn=4).

The results of the analysis of distress by sex were significantly different (p<.01), with a higher median of distress in women (Mdn=3.3) than in men (Mdn=3).

Also, the median level of depression is higher in women (Mdn=9) than in men (Mdn=7). The difference is statistically significant (p<.01), Table 3.

**Table 3.**

*Difference in median distress and depression between women and men (n=900).*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sex | Eustress | | | |
| U | Z | P | Median |
| Women n= 293 n=693 | 53858 | -5.19 | .000\*\* | 3.7 |
| Men n=203 | 4 |
| Sex | Distrés | | | |
| U | Z | P | Median |
| Women n=693 | 52633.5 | -5.57 | .000\*\* | 3.3 |
| Men n=203 | 3 |
| Sex | Depression | | | |
| U | Z | P | Median |
| Women n=693 | 54379 | -5.03 | .000\*\* | 9 |
| Men n=203 | 7 |

Mann Whitney "U" Test, \*\*p<.01

Source: Own elaboration

***Analysis between participants' occupation with eustress, distress and depression.***

The analysis of eustress by occupation was significantly different (p<.01), with a lower median eustress in students who only study (Mdn=3.6) compared to the median of students who study and work (Mdn=3.9).

The analysis of distress by occupation was significantly different (p<.05), with a higher median of distress in students who only study (Mdn=3.3) compared to the median of students who study and work (Mdn=3.1).

The median level of depression is higher in students who only study (Mdn=10) than in those students who study and work (Mdn=8). The differences are statistically significant (p<.01), see Table 4.

**Table 4.**

*Difference in median distress and depression between students who study with those who study and work (n=900).*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Eustress | | | |
| U | Z | P | Median |
| Studying n=318 | 67394 | -7.76 | .000\* | 3.6 |
| Working n=582 | 3.9 |
| Activity | Distress | | | |
| U | Z | P | Median |
| Studying n=318 | 85123 | -1.99 | .046\* | 3.3 |
| Working n=582 | 3.1 |
| Sex | Depression | | | |
| U | Z | P | Median |
| Studying n=318 | 79742.5 | -3.44 | .001\*\* | 10 |
| Working n=582 | 8 |

Mann Whitney "U" test, \*p<.05, \*\*p<.01

Source: Own elaboration

**Measurement and structural modeling between eustress, distress and depression.**

The fit indices of the measurement model and of the structural model composed of eustress, distress and depression, were found to be at a good level: the normed Chi-squared Chi2/gl index less than 5; the root mean squared error of approximation, RMSEA, with value less than .08; the goodness-of-fit index, GFI, greater than .80; the non-normed fit index, NNF; the normed fit index, NFI; the comparative goodness-of-fit index, CFI; the incremental fit index, IFI; and the relative fit index, RFI, with values greater than .90 (Table 5).

**Table 5.**

*Indices for the measurement model and the structural model between the PSS-14 and the PHQ-9 (n=414).*

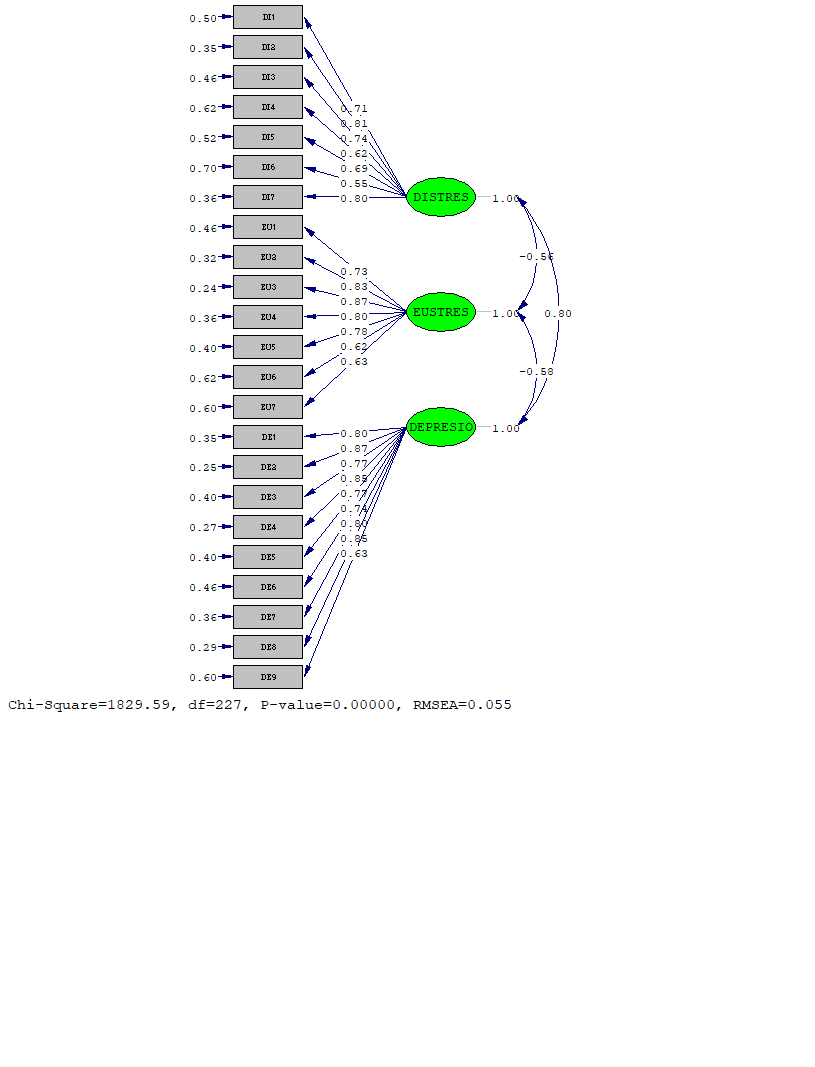
|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Chi2 | gl | P | Chi2/gl | RMSEA | GFI | NNFI | NFI | IFC | IFI | RFI |
| Measure | 832.08 | 227 | .000 | 3.67 | .06 | .85 | .99 | .98 | .99 | .99 | .99 |
| Structural | 877.21 | 228 | .000 | 3.85 | .06 | .85 | .98 | .98 | .99 | .99 | .98 |

Source: Own elaboration

Figure 4 shows the measurement model of the confirmatory factor analysis of the three study variables, in which an adequate construct validity of the measurement instruments is verified.

**Figure 4.**

*Measurement model of the study variables: eustress, distress and depression.*

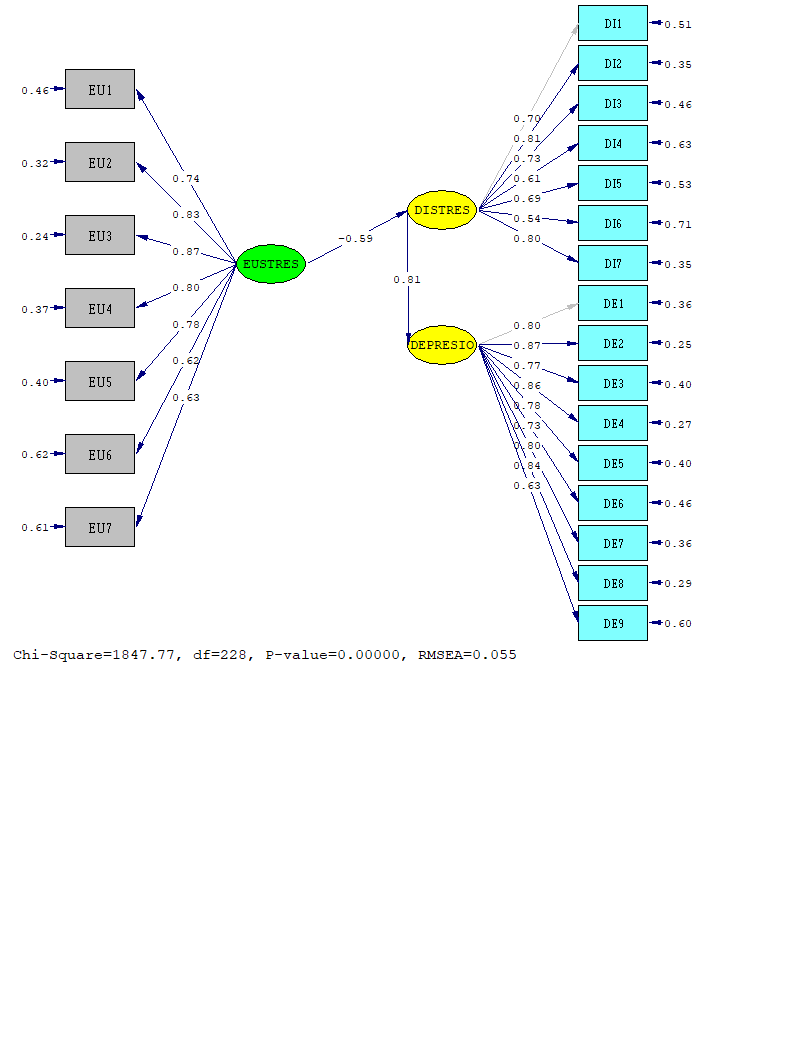
****

Source: Own elaboration

Figure 5 shows the structural model composed of eustress, distress and depression, it is assumed that a person with a high level of eustress will score low in distress (r=-.59); while a person with a high level of distress will score high in depressive symptoms (r=.81).

**Figure 5.**

*Structural equation model of the variables: eustress, distress and depression.*



Source: Own elaboration

**Discussion and Conclusions**

The aim of the study was to analyze the relationship between distress and symptoms of major depressive disorder in nursing students in Baja California, Mexico. To meet the objective, we first identified the psychometric quality of the measurement instruments to be used in the Mexican population, specifically in university-level nursing students. The instrument to measure Psychological Stress presented adequate reliability (Cronbach's alpha Eustress=.87; Distress=.85), a result similar to that identified by Brito and Collaborators in 2019 in Mexico (Cronbach's alpha=.86).

The Patient Health Questionnaire (PHQ-9), also presented adequate reliability (Cronbach's alpha=.91), a result equivalent to that of Cassiani-Miranda et al. in 2017 in Colombia (Cronbach's alpha=.86).

The results of the present research project showed evidence of the correlation between negative stress and the symptomatology of Major Depressive Disorder in nursing students; such evidence is still scarce in Mexico, the present research project aimed to contribute to such empirical evidence.

A previous antecedent in the Country of Argentina was that of Medrano-Hernández and collaborators in 2017, they indicated that negative stress correlated with symptoms of depression (r=.573), said correlation was positive and statistically significant (p<.01), as was the correlation identified in the present study (r=.691; p<.01).

A relevant fact is that women in the present research project perceived more distress (Md=3.3) than men (Md=3.0), this difference was statistically significant (p<.01), this result was similar to that of Pawlak et al. in Warsaw, Poland, where it was identified by stepwise linear regression analysis that sex was a significant predictor of the level of psychological stress or distress (p<.01), levels of distress in women were on average 3.07 points higher than in men (Pawlak et al., 2022).

Age was another risk factor for distress, a statistically significant negative correlation (r=-.234; p<.01) was identified in the sample of nursing students, a result similar to that found by Kamali et al. 2023 (r=-.28; p<.05) in 235 Iranian nursing students (Kamali et al., 2023).

A third sociodemographic factor that was identified as associated with distress was economic income, nursing students who worked while studying perceived less distress than students who did not work (r=.234, p<.01), in Brazil, in a group of 353 nursing students it was identified that students with lower monthly income perceived more distress, compared to students with higher income (p<.01).

The present research project showed evidence of the relationship between eustress with distress, with the symptomatology of Major Depressive Disorder and with sociodemographic factors of nursing students (sex, age and economic level when studying and working); such evidence is still scarce in Mexico, the present research project aimed to contribute to such empirical evidence. The statistical analysis of the aforementioned variables is recorded.

The findings found coincide with those presented by the authors consulted in the research process, with the peculiarities and specifications found in the selected sample.

In conclusion, the results of this study suggest that the study hypotheses were accepted:

H1 depression increases with distress;

H2 depression decreases with eustress;

H3 eustress increases with age;

H4 distress and depression decreases with age among nursing students;

H5 the level of eustress is lower in students who only study compared to those who study and work;

H6 the level of distress is higher in students who only study compared to those who study and work;

H7 the symptomatology of depression is greater in students who only study than in those who study and work;

H8 eustress is lower in women than in men;

H9 distress is greater in women than in men;

H10 symptomatology of major depressive disorder is higher in women than in men;

Considering the above, the following guidelines are proposed to the academic institution of the students that made up our study population:

* To provide mental health promotion services directed from a gender perspective, paying greater attention to younger female students with fewer economic resources.
* Promote intersectoral coordination for the strengthening of mental health and psychosocial support for nursing students.
* Continue with periodic measurements of eustress, distress and depression.
* Apply availability and accessibility surveys to mental health support systems and referral and counter-referral systems.
* Make school decisions that provide ongoing monitoring of students' mental well-being.

One of the main barriers to identifying cases of depression is the stigma surrounding mental illness, so the time elapsed between the first depressive event and seeking care is critical (Cerecero-García et al., 2020). The age of college students is the period where several mental health problems begin or become evident, so strategies of three types should be articulated:

Universal, aimed at the entire population; Selective, aimed at vulnerable groups or those with a family history of mental health problems; Indicated, for people with early signs of suicidal risk and discharged from a psychiatric institution (Rivera-Rivera *et al.,* 2020).

It is necessary to design guidelines under an initial diagnosis to address mental health problems in nursing students, for which there must be a sufficient budget, in addition to investing in campaigns to reduce prejudices and biases around the evaluation of mental health in students and the search for psychological support. Faculty who are on the front line of mental health care for students should be trained to diagnose and refer to medical personnel for prompt attention (PAHO, 2017).

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