Open Access

STRESS AND PSYCHOLOGICAL DISTRESS IN STUDENTS OF TECHNOLOGICAL INSTITUTES IN THE SOUTHERN BORDER AREA OF ECUADOR

KARLA GABRIELA MORA ALVARADO
UNIVERSIDAD ESTATAL DE MILAGRO, ECUADOR
EMAIL: kmoraa@unemi.edu.ec; ORCID ID: 0000-0003-1265-0716

DENISSE IVONNE LEÓN MEDRANO
UNIVERSIDAD ESTATAL DE MILAGRO ECUADOR
EMAIL:dleonm4@unemi.edu.ec; ORCID ID: https://orcid.org/ 0009-0009-1163-2349

MARCIA MARIBEL AGUIRRE OCHOA
UNIVERSIDAD TÉCNICA DE MACHALA
EMAIL: maguirre1@utmachala.edu.ec; ORCID ID: 0000-0002-8799-249X

KERLY ÁNGELA ÁLVAREZ CADENA,
UNIVERSIDAD ESTATAL DE MILAGRO ECUADOR
EMAIL: kalvarezc@unemi.edu.ec; ORCID ID: https://orcid.org/0000-0003-0971-1178

Abstract

In the southern border area of Ecuador, comprising the provinces of Loja, Zamora Chinchipe and El Oro, technological institute students face considerable socio-economic challenges and violence that negatively affect their psychological well-being. This study aims to analyze the levels of perceived stress and psychological discomfort in these students, and to explore how various individual, family and environmental factors contribute to these conditions. A non-experimental quantitative approach was adopted, applying questionnaires to a sample of third-level students. The sample was selected for convenience due to the accessibility of the students. To measure perceived stress and psychological discomfort, two validated scales were used: the Perceived Stress Scale (PSS-4) and the Kessler Psychological Discomfort Scale. (K10). Statistical analyses included internal consistency tests and sample suitability assessments to ensure the validity of the results. The findings revealed a high prevalence of stress and psychological discomfort among students, significantly correlated with adverse socio-economic factors. Students high levels of anxiety, depression, and low self-esteem, intensified by insecurity and lack of opportunities in their surroundings. This study highlights the urgent need to implement interventions aimed at reducing stress and psychological discomfort in students at technological institutes in the southern border area of Ecuador. It is essential to develop psychological support programmes, improve socio-economic conditions and create more educational and employment opportunities to ease the burden on these young people and improve their overall well-being. Educational institutions, in collaboration with the government and the community, must work together to create a more favourable environment that promotes mental health and the integral development of students in this region.

Keywords: Psychological stress; psychological discomfort; technological; border zone; mental health

INTRODUCTION

Currently, academic pressure and workload are important factors contributing to stress and psychological distress among students of technological institutes in the southern border area of Ecuador. The demanding academic curriculum, coupled with high performance expectations, often results in students feeling overwhelmed and stressed. Research focused on higher education students has highlighted the detrimental effects of academic stress on mental health, including increased anxiety and reduced overall well-being. The pressure to excel academically, meet deadlines, and perform well on exams can create a constant state of stress for students, affecting their psychological health and contributing to feelings of discomfort and restlessness.(Armenta Zazueta, Quiroz Campas, Abundis De Leon, & Zea Verdin, 2020)(Berrío García & Mazo Zea, 2024)

In the context of Ecuador's southern border area, characterized by poverty, violence, and lack of opportunities, stress and psychological distress become urgent challenges that significantly affect the student population of the region's technological institutes. This introduction seeks to deepen the understanding of this phenomenon, exploring its causes, consequences and possible solutions. Ecuador's southern border area, which encompasses the provinces of Loja, Zamora Chinchipe and El Oro, is characterized by a series of socioeconomic and political challenges that directly impact the mental health of its inhabitants, including students from the region's technological institutes. (Barraza Macías, 2020) (Álvarez Silva , Gallegos Luna, & Herrera López , 2018)

RISK FACTORS

Risk factors for stress and psychological distress in students of technological institutes in the southern border area of Ecuador can be classified into three categories:

- Individual factors: These factors include age, gender, marital status, economic status, academic performance, and physical and mental health.
- Family factors: These factors include family structure, domestic violence, substance abuse, and social support.
- Environmental factors: These factors include poverty, insecurity, social violence, and lack of opportunities.(UNICEF , 2023)

Poverty stands as one of the main risk factors for stress and psychological distress in students. Precarious living conditions, lack of access to basic services and difficulties in meeting basic needs generate an environment of constant uncertainty and frustration, which can trigger anxiety, depression and low self-esteem.

Financial stress and economic constraints also play a crucial role in the well-being of students at technological institutes in Ecuador's southern border area. Many students face challenges related to financial instability, limited resources, and the need to balance work-study commitments. The burden of financial stress can lead to increased levels of anxiety, worry, and psychological distress among students. Research on the social-emotional experiences of college students transitioning to remote education during the pandemic highlighted the impact of economic constraints on mental health and well-being. A lack of financial security can exacerbate feelings of stress and discomfort, further contributing to the psychological challenges students face.(Vargas Armas, 2017)(Badillo Hernández, Castro Hernández , Cruz Arteaga, Díaz Ávila , & Gómez Hernández, 2022)

Social isolation and lack of support systems present additional obstacles to the mental health and well-being of students at technological institutes in Ecuador's southern border area. According to , the transition to remote learning, limited social interactions, and reduced access to traditional support networks have increased feelings of loneliness and isolation among students. The absence of personal connections with peers, educators, and mental health professionals can hinder students' ability to cope with stress and psychological distress effectively. Building strong social connections and support systems is essential to promoting resilience, improving mental health, and providing students with the resources they need to meet the challenges of academic life in a healthy and sustainable way.(Suarez Montenegro, 2021)(Calderon Martinez, 2020)

The communities that inhabit the southern border area of Ecuador are immersed in a context of social violence that permeates every aspect of their daily lives. Armed conflicts, criminal activities associated with drug trafficking and smuggling, and domestic violence create a bleak panorama that exposes the population, particularly students, to traumatic situations with a great emotional impact.(Velez Guadamud, 2020)

Omnipresent violence generates a climate of insecurity and permanent fear, affecting the ability of students to function calmly in their daily environments, both inside and outside educational institutions. Distrust is rooted in communities, leading students to perceive constant threats in their environment, which prevents them from developing healthy social relationships and fully enjoying their childhood and adolescence. Exposure to violent situations can trigger post-traumatic stress disorder in students, affecting their mental health and their ability to learn and develop properly.(Ponce Pardo, Hernández Guerra, Jalixto Erazo, & Chiri Saravia, 2023)

Finally, we have that the absence of job and educational opportunities in the southern border area of Ecuador configures a discouraging panorama for young people in the region, who see their future prospects limited and face a horizon plagued by uncertainty. This situation, characterized by the scarcity of decent jobs and pathways to higher education, generates deep feelings of helplessness, hopelessness and frustration, significantly affecting their academic motivation, self-esteem and overall mental health.(Alfonso Águila, 2015)(Velázquez Castro & Testón Franco, 2022)

METHODOLOGY

RESEARCH FOCUS

During the research, a quantitative approach was used with non-experimental methods (without treatment/treatment or manipulation of the research variables), which is a study in which the variables to be measured are inherent to the respondents, with data collection techniques that can be carried out through interviews, questionnaires and observations. Malhotra describes it as an unplanned, investigative research methodology that generates concepts and understandings of the scope of the problem. (2001, p. 155)

Therefore, we start from a study carried out through questionnaire research which is applied when data collection affects a large population and requires a sample of individuals.   (Hair et al., 2014) Similarly, Malhotra et al., mention that questionnaires are ideal instruments when you want to acquire a large set of information from a population and, for this, they should contain easy-to-answer questions. (2017)

By adopting quantitative methods of data collection and analysis, the aim is to identify patterns, trends or correlations that provide useful information on perceived stress and psychological distress in university students. The design of the questionnaire was cross-sectional, because the use of the questionnaires took place at a single time and to guarantee an empathic and rigorous understanding of this complex and multifaceted phenomenon, the approach of the methodology details the procedures carried out.

PARTICIPANTS

To ensure adequate and rigorous representativeness, a sample of third-level students (n = 151) was selected through a non-probabilistic sampling for convenience, due to the access and proximity that was had with the students to participate in the research. Similarly, the sample is made up of 82% men (n = 124) and 18% (n = 27) women, and a classification was assigned to the ages of the participants, which were defined by the following aspects: Young Adults (18-24 years), Emerging Adults (25-29 years) and Young Adults (30-35 years). (Otzen & Manterola, 2017)

INSTRUMENT

According to Niño, the instruments "are the elements or materials that allow the execution or application of the techniques, such as the questionnaire in the survey technique." Therefore, two different scales were applied to measure perceived stress and psychological distress in third-level students. (2011, p. 29)

The Perceived Stress Scale (PSS) designed by Cohen et al. (1983), however, in this study a short version (4-item PSS (PSS-4)) was used for studies that required a very short scale demonstrating adequate reliability with a α coefficient of 0.60 (Cohen & Williamson, 1988). The four items it includes are associated with a unique latent characteristic with the intention of measuring the global magnitudes of stress. Each of the items in the PSS-4 is measured on a four-point Likert scale ranging from 1 (never) to 4 (always). PSS-4 has two negative response items and two positive response items, so half of the items have reverse code; which were recoded during the analysis (items 2 and 3). The total possible score ranges from 4 to 16. Higher scores indicate a greater perception of stress. (Ingram et al., 2016)   (Abdulameer et al., 2019)

The Kessler Psychological Distress Scale - K10 consists of 10 items designed to assess signs of psychological distress, such as depressive and anxious symptoms, in the past 30 days. This evaluation is carried out using a 5-point Likert scale, where 1 represents "never" and 5 "always". Generally, the K10 is interpreted through a total score and assesses the risk of presenting non-specific psychological distress (symptoms of anxiety or depression) in the last month. They indicate that it is also possible to analyze the results according to the severity of the symptoms, scores from 10 to 15 present mild discomfort, from 16 to 21 moderate discomfort, from 22 to 29 elevated discomfort, and from 30 to 50 very high discomfort. (KESSLER et al., 2002)   Andrews & Slade (2001)

STATISTICAL ANALYSIS

The characteristics of the PSS-4 and Kessler-K10 were explored, including mean and standard deviations of items, asymmetry, and kurtosis. Similarly, a descriptive analysis was performed using frequencies (n) and percentages (%), for categorical variables. The internal consistency of the instruments and their items measured through Cronbach's alpha was evaluated and reliability was applied with a minimum acceptable criterion >0.5 . (Cronbach, 1951) **See Table 3**

Therefore, we recognize the effectiveness of questionnaires in identifying appropriate factors for confirmatory factor analysis and expressing their structural model. The suitability of the sample was assessed using the Kaiser-Meyer-Olkin (KMO) test, which confirmed the presence of variability. In addition, the correlation between variables was examined and the Bartlett sphericity test was performed to test the null hypothesis that the correlation matrix is an identity matrix. It was found that the significance value must be less than 0.05 for factor analysis to be considered adequate. (Shrestha, 2021) (Truong et al., 2016) **See Table 4**

To assess an acceptable fit of the model, the following indicators were considered appropriate: A Comparative Fit Index (CFI) greater than or equal to 0.90 proposed by Hu & Bentler; a Tucker-Lewis Index (TLI) greater than 0.95 according to Hu & Bentler; a Goodness of Fit Index (GFI) greater than 0.95 recommended by Miles & Shevlin; and an approximation index of mean square error (RMSEA) between 0.05 and 0.08; as indicated . (1999) (1998) (1998) (Fabrigar et al., 1999) **See Table 6**

The method used is canonical correlation analysis, a kind of multivariate linear statistical analysis first introduced by Hotelling in 1935. It allows you to combine two data matrices and has been described as a very powerful tool that has found applications in completely different areas. The purpose of canonical correlation is to measure how well the relationship between the two sets of variables (those that are dependent on each other or not) can be summarized, as they discussed. (Klami et al., 2013; Sun et al., 2008) Badii & Castillo (2017)

The connection between different variables can be greatly clarified by correlating specific linear combinations of responses within each set of variables. When a symmetrical situation arises – where neither of the two sets of variables is favored to explain the other and a general relationship between the two is sought – then the problem arises of finding two canonical variables that show the greatest possible correlation (Johnson, 1998) (Peña, 2002) .

By involving the concept of maximization, canonical correlation analysis attempts to summarize the relationships between two sets of variables into a few composite pairs, which is multidimensional. The assessment of the validity of the CCA was based on multivariate tests of normality and significance, such as the Bartlett test, according to . (R. A. Johnson & Wichern, 2007) Peña (2002)

RESULTS

DESCRIPTIVE ANALYSIS

The sample has a total of 151 students from a technological institute who were classified by sex and age group. Of the total number of participants, 27 are female, which is equivalent to the number of people participating in the sample, while 124 are male, which is equivalent to the sum of people participating in the sample. Students are categorized into different peer groups: young adults (5,298%), emerging adults (21,192%), and young adults (73,510%).

BOARD 1 CONTINGENCY TABLE

Sex		Participants			
		Emerging Adults	Young Adults	Young Adults	Total
Female	Counts	8.000	3.000	16.000	27.000
	% of total	5.298 %	1.987 %	10.596 %	17.881 %
Male	Counts	24.000	5.000	95.000	124.000
	% of total	15.894 %	3.311 %	62.914 %	82.119 %
Total	Counts	32.000	8.000	111.000	151.000
	% of total	21.192 %	5.298 %	73.510 %	100.000 %

Descriptive analysis involves calculating statistics from responses to PSS-4 and K10 survey items to gain a detailed understanding of the level of psychological stress and distress in a sample of college students. The mean of the PSS-4 items ranges from 2.192 to 2.371, while its standard deviations range from 0.709 to 0.869; These results show that students have moderate stress levels.

For the K10 questionnaire, the mean items are between 2.424 and 3.232, while their standard deviations range from 0.934 to 1.303, suggesting moderate levels of psychological distress among the students in this sample. The PSS-4 items exhibit coefficients of variation ranging from 0.324 to 0.368, indicating moderate variability in how students

responded. On the other hand, the coefficients of variation of the K10 items are between 0.339 and 0.493, which denotes a greater diversity in the specific responses to the indicators of psychological distress.

BOARD 2 DESCRIPTIVE VALUES OF THE ITEMS

	Media	Standard deviation	Coefficient of variation	Variance	Asymmetry	Curtosis
EP1	2.192	0.709	0.324	0.503	0.388	0.242
EP2	2.205	0.811	0.368	0.658	0.063	-0.690
EP3	2.291	0.829	0.362	0.688	0.261	-0.412
EP4	2.371	0.869	0.366	0.755	0.251	-0.557
MPK1	2.828	1.031	0.365	1.063	-0.128	-0.624
MPK2	2.868	0.971	0.339	0.942	0.092	-0.688
MPK3	2.424	1.122	0.463	1.259	0.480	-0.621
MPK4	2.570	1.017	0.396	1.033	0.329	-0.425
MPK5	2.715	0.934	0.344	0.872	0.251	-0.826
MPK6	2.583	1.079	0.418	1.165	0.315	-0.771
MPK7	2.821	1.120	0.397	1.254	-0.073	-0.989
MPK8	3.232	1.104	0.342	1.219	-0.352	-0.575
MPK9	2.609	1.149	0.440	1.320	0.383	-0.755
MPK10	2.642	1.303	0.493	1.698	0.306	-1.060

The range of responses is shown by the variation of items PSS-4 and K10. The highest value belongs to the item MPK10 (1.698), while the lowest is observed in EP1 (0.503). Most items exhibit skewness values close to zero, suggesting a relatively symmetrical distribution around the mean. However, MPK3 (0.480) and MPK9 (0.383) show a slight positive bias, while MPK1 (-0.128) and MPK8 (-0.352) show a slight negative bias, indicating an asymmetric distribution on both sides of the mean for these specific items.

There is variation in the kurtosis of the items, with a mixture of positive and negative values. Most items show negative kurtosis values, implying a flatter than normal distribution. The lowest kurtosis value is presented by the article MPK10 with -1.060; This indicates a greater dispersion towards the extremes. Despite being centered around the mean, the values of asymmetry and kurtosis show remarkable variability in both shape and extension, emphasizing that there is a considerable deviation.

INSTRUMENT RELIABILITY

The internal consistency results measured by Cronbach's alpha ranged from 0.507 to 0.862 for the PSS-4 and Kessler (K10) scales, which were within the recommended acceptable outcome for reliability.   (Cronbach, 1951)

BOARD 3 RELIABILITY

Factors	Cronbach's Alfa (α)
PSS-4	0.507
Kessler (K10)	0.862
Alpha General	0.863

DATA ADEQUACY

The KMO measure is an index that varies between 0 and 1, indicating how adequate the observed correlations are for factor analysis. Values close to 1 indicate excellent adequacy, while values below 0.6 suggest that the data may not be adequate. In our study, we got a KMO measurement of 0.86, which is a good result. This suggests that the partial correlations between the items are small, and that the variables have sufficient cohesion for factor analysis. Put another way, our data is well-suited for this type of analysis, implying that the variables are well-correlated with each other, and the underlying factors can be extracted with confidence.

BOARD 4 KMO AND BARTLETT TEST

Kaiser-Meyer-Olkin measure of sampling adequacy.		0.956
Bartlett's sphericity test	Approximate Chi-square	14098.372
	df	351
	p	p < 0.001

On the other hand, Bartlett's sphericity test assesses whether the correlations between variables are significantly different from zero, which is a necessary condition for performing a factor analysis. A significant value ($p < 0.05$) indicates that there are sufficient correlations between the variables. In our study, Bartlett's test yielded an approximate Chi-square value of 14098.372 with 351 degrees of freedom and a p-value of $p < 0.001$. This result is highly significant, confirming that the correlations between the items are large enough to warrant factor analysis. In other words, the variables are interrelated in a way that makes it feasible and useful to perform a factor analysis.

CONFIRMATORY FACTOR ANALYSIS

LOAD FACTOR IN CFA

It was identified that the factor loads were greater than 0.4 for the items considered, which implies that there is a significant correlation within each . In the perceived stress factor, the factor loads for EP1 to EP4 are moderate, ranging from 0.401 to 0.517; this suggests that these items have a moderate relationship with the latent perceived stressor, with EP3 exhibiting the lowest burden with 0.401, indicating its lower relationship with the perceived stressor compared to other items. In general, all observed variables contribute to the stress factor, although they differ in the magnitude of their contribution.   (Sánchez Hernández & Andrade Palos, 2019)

BOARD 5 ITEM LOAD FACTORS

Factor	Indicator	Estimate
Factor 1	EP1	0.516
	EP2	0.499
	EP3	0.401
	EP4	0.517
Factor 2	MPK1	0.544
	MPK2	0.629
	MPK3	0.792
	MPK4	0.799
	MPK5	0.638
	MPK6	0.685
	MPK7	0.692
	MPK8	0.280
	MPK9	0.783
	MPK10	0.689

The factor load from MPK1 to MPK10 mainly implies high values for the elements of the psychological distress factor (Distress), ranging from 0.280 (MPK8) to 0.799 (MPK4). This denotes that most of the items have a powerful connection with the factor of unobservable psychological distress. The smallest factor load value belongs to MPK8

with 0.280, indicating its relatively weak relationship with the psychological distress factor. On the contrary, the important factor loads in other items suggest their efficacy as indicators of psychological distress, which implies relevance and validity of the items despite the different loads.

The values of the adjustment indices are provided in the table above. They clearly demonstrate that all the predetermined requirements for a good fit of the model were successfully met. The Chi-square value reached 88.989 with 76 degrees of freedom, suggesting a reasonable fit for our model. Both the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) reached an optimal high of 0.992 and 0.993 respectively, while the RMSEA held firm at 0.034, comfortably within what is normally expected from a well-tuned model.

BOARD 6 MEASURES OF ADJUSTMENT INDICES

Index	Value
Comparative Adjustment Index (CFI)	0.993
Tucker-Lewis Index (TLI)	0.992
Bentler-Bonett Non-Normalized Fit Index (NNFI)	0.992
Bentler-Bonett Normalized Fit Index (NFI)	0.955
Normalized Parsimony Adjustment Index (PNFI)	0.797
Bollen Relative Fit Index (RFI)	0.946
Mean Square Error of Approximation (RMSEA)	0.088
Root Standardized Mean Squared Error (SRMR)	0.063

In addition, other goodness-of-fit indices that can be used to assess how well the model fits the data include: a goodness-of-fit index (GFI) of 0.992, a standardized mean squared residual (SRMR) of 0.075, a Bentler goodness-of-fit index-Bonett's normalized fit index (NFI) at 0.955. A non-normalized Bentler-Bonett adjustment index (NNFI), also known as the Tucker-Lewis adjustment index, of 0.992; a relative Bollen adjustment index (RFI) at 0.946; and, finally, a value of the parsimonious normalized adjustment index (PNFI) calculated at 0.797.

FIGURE 1 TFA STRUCTURAL MODEL
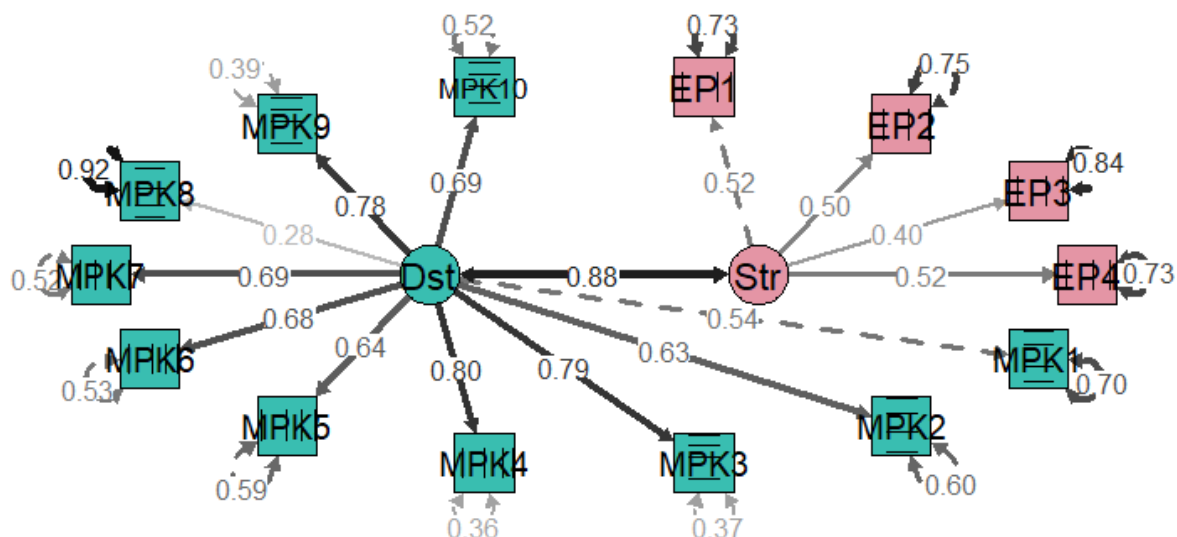
The graph showing the relationship between perceived stress and psychological distress as two latent variables in university students shows us a picture of how these constructs are interrelated, with an overall correlation value set at 0.88. In the same way, the burden of the factorial is present, which indicates the magnitude in which each of the parameters explains the behavior of the parameter contained in each questionnaire, following the general rule that the sum of the figures of each of the items must be at least 0.70. In addition, the external part of the structure in each of the reagents is observed for measurement accuracy.

CANONICAL CORRELATION ANALYSIS

Canonical Correlation Analysis has been used to determine the relationship between the two questionnaires: PSS-4 (perceived stress scale) and K10 (mental health questionnaire). The aim of using this technique was to assess both the magnitude and nature of any linear association between variables measuring perceived stress and those measuring mental health.

TABLE 7 CANONICAL CORRELATIONS IN X

Canonical Components in X1	Canonical Components in X2
0.67651404	-0.5401509
0.60419891	0.19500653
0.60694931	0.67766677
0.63238066	-0.16045815

The correlation coefficient between the first pairs of canonical components (which represent the strength of the linear relationship between sets of variables) is 0.688; Therefore, the first two components are adequate to capture much of the relationship between perceived stress and mental health. The second pair has a weak correlation: -0.540 and -0.158, indicating that the second pair is not very effective at representing its relationship.

TABLE 8 CANONICAL CORRELATIONS IN Y

Canonical Y1 Components	Canonical Y2 Components
0.68750898	-0.15777191
0.56376181	-0.08447416
0.76064345	-0.2001497
0.80933063	0.04090328
0.4871478	-0.080489
0.61372624	-0.29525648
0.54000238	-0.32150295
0.10763108	-0.1875123
0.71145404	0.38595676
0.55567838	-0.07475489

The distribution of the data is illustrated in **Figure 2**, which shows the relationships present between the canonical components. There appears to be a moderate association between Canonical X1 and Canonical Y1, where the information is grouped by participant type and shows different responses between the groups.
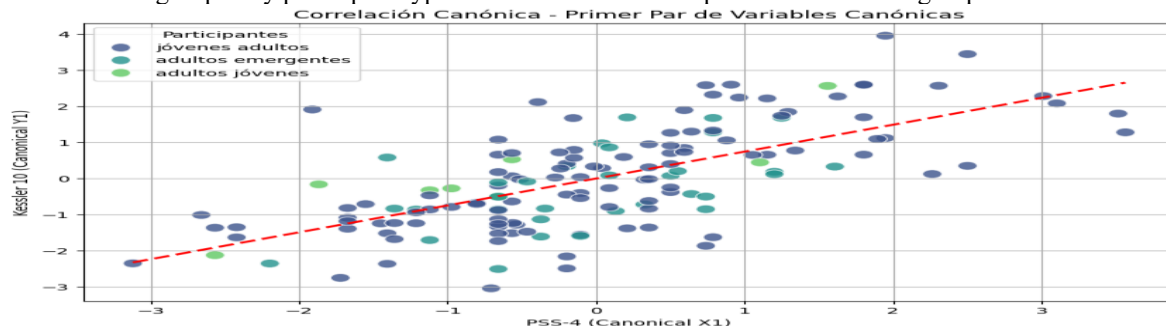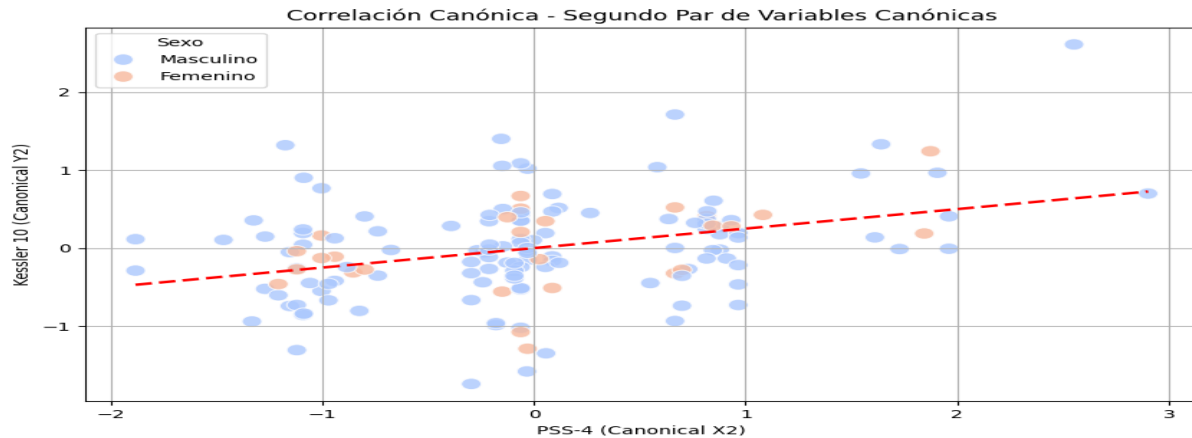

FIGURE 3 FOR THE SECOND PAIR OF CANONICAL COMPONENTS (CANONICAL X2 AND CANONICAL Y2) INDICATES A WEAKER RELATIONSHIP WITH THE DATA NOW GROUPED BY

SEX. THIS HIGHLIGHTS DIFFERENT RESPONSE PATTERNS EXHIBITED BY MEN AND WOMEN WITHIN THE DATASET.

The weights that are known as canonical weights show the importance of variables for the formation of canonical components. The indicators revealed that EP1 and EP4 contribute more to the first component (CC1) with weights of 0.530 and 0.607 respectively. Within the output variables (Y), MPK4 and MPK9 have substantial contributions to the first canonical component; their weights are 0.503 and 0.332, implying that these variables are remarkably important in the construction of canonical components for this case.
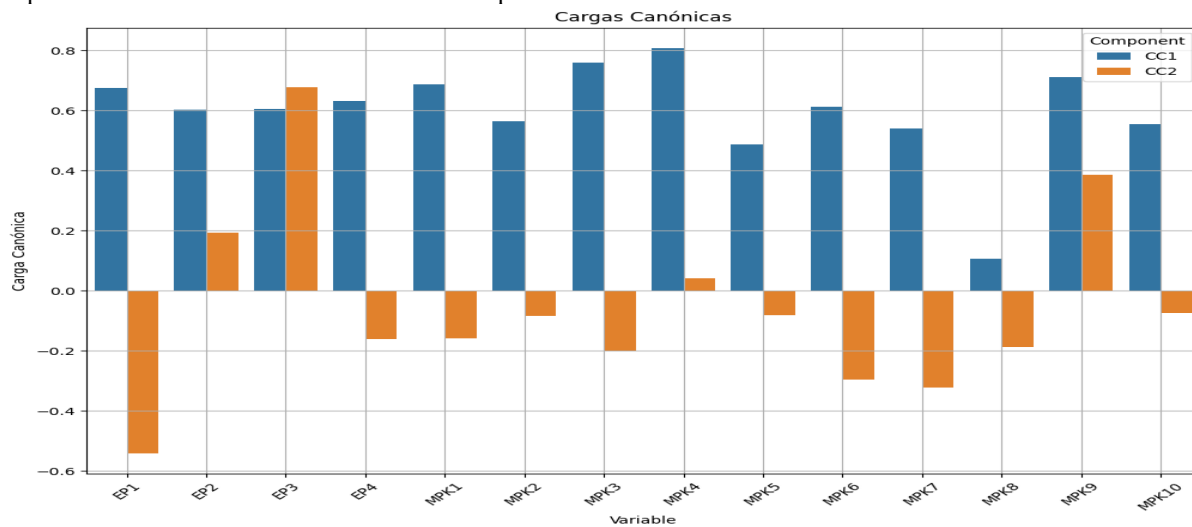
Canonical redundancy is an index of variance in a set of variables that can be explained by canonical components of another set. It was revealed that the first canonical component explains more variance in both X (0.8467) and Y (0.5913) than the second canonical component which has a lower value for both sets (X: 0.1511, Y: 0.4334). This implies that the first canonical component plays an important role in capturing the relationship between perceived stress and mental health, underscoring the interdependence between these two constructs and their relevance in the context of student mental health.

DISCUSSION

This study has shown that students from technological institutes in the southern border area of Ecuador experience significant levels of stress and psychological distress. The results are consistent with previous research that has pointed to academic pressure and workload as determining factors in the mental health of higher education students (Armenta et al., 2020; Berrío García & Mazo Zea, 2024). However, our study highlights the influence of additional region-specific factors, such as poverty, violence, and lack of opportunities, that compound these negative effects. One of the most relevant findings is the high prevalence of financial stress among students. Economic insecurity not only affects their ability to meet basic needs, but also generates an additional emotional burden that translates

into higher levels of anxiety and worry (Vargas Armas, 2017). This financial aspect is necessary to understand psychological distress, as many students must balance work and study, which increases their vulnerability to stress. In addition, the transition to remote learning during the pandemic has exacerbated feelings of social isolation and lack of support, factors that strongly correlate with psychological distress (Suarez Montenegro, 2021). The decrease in personal interactions and limited access to support networks traditionally present in face-to-face educational settings have intensified feelings of loneliness and hopelessness.

Another significant aspect is the influence of social violence in the southern border area of Ecuador. Exposure to armed conflicts, criminal activities, and domestic violence creates an environment of constant fear and insecurity, negatively impacting students' mental health (Velez Guadamud, 2020). This pervasive violence not only affects the immediate psychological well-being of students, but also has long-term repercussions on their emotional and academic development.

Finally, the lack of job and educational opportunities in the region limits young people's future prospects, generating feelings of helplessness and hopelessness that affect their academic motivation and self-esteem (Alfonso Águila, 2015; Velázquez Castro & Testón Franco, 2022). This unfavorable socioeconomic context underscores the need for comprehensive interventions that not only address academic stress, but also consider students' economic and social circumstances.

CONCLUSIONS

The present study highlights the complexity of stress and psychological distress in students from technological institutes in the southern border area of Ecuador, where academic, financial, social, and violent factors combine to create a highly challenging environment. The main conclusions of the study are as follows:

Financial precariousness is a determining factor in the high levels of stress and psychological distress among students. It is essential to implement policies of economic support and scholarships to alleviate this burden.

The transition to remote learning has increased feelings of loneliness and isolation, underscoring the need to strengthen social and emotional support networks for students.

- Exposure to violence in the region significantly affects students' mental health. It is essential to promote safe environments both inside and outside educational institutions.
- The scarcity of job and educational prospects in the region contributes to students' hopelessness and low self-esteem. Fostering professional development programs and access to higher education is vital to improving their future prospects.
- Academic pressure, including workload and high expectations, exacerbates students' psychological distress. Academic policies need to be reviewed and adjusted to balance educational demands with student well-being.
- The lack of accessible and adequate mental health resources in educational institutions limits students' ability to manage stress and other psychological problems. Implementing mental health services and counseling programs is critical to supporting their well-being.

This study provides a comprehensive view of the challenges faced by students in the southern border area of Ecuador and underscores the need for multidimensional strategies to improve their psychological and academic well-being. Educational institutions, along with government and community support, must work together to create a more supportive and sustainable environment for student development.

Future lines of research could focus on the long-term evaluation of the effectiveness of the economic support policies and mental health programs implemented. It would also be relevant to investigate the impact of community violence on student mental health with a differential gender approach, and to explore the role of social and family support networks in students' resilience to these challenges. In addition, the influence of the quality of remote education on psychological well-being and academic performance could be analyzed.

BIBLIOGRAPHY

1. Abdulameer, S., Mohammed, W., & Sahib, M. (2019). Psychological health status and salivary IgA among pharmacy students in Iraq: Validation of PSS-4 and WHO-5 well-being (Arabic version).
2. Alfonso Águila, B. C. (2015). Academic stress. EDUMECENTRO, 163-178.
3. Álvarez Silva , L. A., Gallegos Luna, R. M., & Herrera López , P. S. (2018). Academic stress in higher technology students. Salesian Polytechnic University, 193-209.

4. Andrews, G., & Slade, T. (2001). Interpreting scores on the Kessler Psychological Distress Scale (K10). Australian and New Zealand Journal of Public Health, 25(6), 494–497. https://doi.org/10.1111/j.1467-842X.2001.tb00310.x

5. Armenta Zazueta, L., Quiroz Campas, C., Abundis De Leon, F., & Zea Verdin, A. (2020). Influence of stress on the academic performance of university students. Revista Espacios, 402-415.

6. Badillo Hernández, A., Castro Hernández, A., Cruz Arteaga, S., Díaz Ávila, D., & Gómez Hernández, A. (2022). Academic stress: HAPPYSTUDY. Ciencia Latina Revista Científica Multidisciplinar, 9001-9016.

7. Badii, M., & Castillo, J. (2017). Canonical correlation analysis (ACC) and scientific research. Business Innovations Magazine, 4. https://doi.org/10.29105/rinn4.8-9

8. Barraza Macías, A. (2020). INFORMATION STRESS IN TIMES OF PANDEMIC. Dialnet, 64-78.

9. Berrío García, N., & Mazo Zea, R. (2024). Academic stress. Revista de Psicología Universidad de Antioquia, 65-82.

10. Calderón Martínez, R. (2020). Stress and psychological distress in students of universities and colleges. Journal of the University of Guayaquil, 201-216.

11. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3), 297–334. https://doi.org/10.1007/BF02310555

12. Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. Psychological Methods, 4(3), 272–299. https://doi.org/10.1037/1082-989X.4.3.272

13. Hair, J., Black, W., Babin, B., & Anderson, R. (2014). Multivariate Data Analysis (7th Edition). Pearson Education, Upper Saddle River.

14. Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. Psychological Methods, 3(4), 424–453. https://doi.org/10.1037/1082-989X.3.4.424

15. Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6(1), 1–55. https://doi.org/10.1080/10705519909540118

16. Ingram, P. B., Clarke, E., & Lichtenberg, J. W. (2016). Confirmatory Factor Analysis of the Perceived Stress Scale-4 in a Community Sample. Stress and Health, 32(2), 173–176. https://doi.org/10.1002/smi.2592

17. Johnson, D. E. (1998). Applied Multivariate Methods for Data Analysts. Duxbury Press. https://books.google.com.ec/books?id=qizvAAAAMAAJ

18. Johnson, R. A., & Wichern, D. W. (2007). Applied Multivariate Statistical Analysis. Pearson Prentice Hall. https://books.google.com.ec/books?id=gFWcQgAACAAJ

19. KESSLER, R. C., ANDREWS, G., COLPE, L. J., HIRIPI, E., MROCZEK, D. K., NORMAND, S.-L. T., WALTERS, E. E., & ZASLAVSKY, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. Psychological Medicine, 32(6), 959–976. https://doi.org/10.1017/S0033291702006074

20. Klami, A., Virtanen, S., & Kaski, S. (2013). Bayesian Canonical correlation analysis. The Journal of Machine Learning Research, 14, 965–1003.

21. Malhotra, N. (2001). Research in marketing: an applied orientation. Bookman.

22. Malhotra, N., Nunan, D., & Birks, D. (2017). Marketing Research: An Applied Approach.

23. Otzen, T., & Manterola, C. (2017). Sampling Techniques on a Study Population. International Journal of Morphology, 35(1), 227–232. https://doi.org/10.4067/S0717-95022017000100037

24. Peña, D. (2002). Multivariate Data Analysis.

25. Ponce Pardo, J., Hernández Guerra, R., Jalixto Erazo, H., & Chiri Saravia, P. (2023). Technostress in academic performance in students. Journal of Research in Education Sciences, 852 – 861.

26. Rojas Niño. (2011). Research methodology. Ediciones de la U.

27. Sánchez Hernández, M. E., & Andrade Palos, P. (2019). Confirmatory factor analysis of the School Involvement Scale for Adolescents (EIE-A). Actualidad Investigativas En Educación, 20(1), 18. https://doi.org/10.15517/aie.v20i1.40020

28. Shevlin, M., & Miles, J. N. V. (1998). Effects of sample size, model specification and factor loadings on the GFI in confirmatory factor analysis. Personality and Individual Differences, 25(1), 85–90. https://doi.org/10.1016/S0191-8869(98)00055-5

29. Shrestha, N. (2021). Factor Analysis as a Tool for Survey Analysis. American Journal of Applied Mathematics and Statistics, 9(1), 4–11. https://doi.org/10.12691/ajams-9-1-2

30. Suárez Montenegro, S. (2021). Academic stress within Ecuador's higher education institutions. Dialnet, 134-150.

31. Sun, L., Ji, S., & Ye, J. (2008). A least squares formulation for canonical correlation analysis. Proceedings of the 25th International Conference on Machine Learning - ICML '08, 1024–1031. https://doi.org/10.1145/1390156.1390285

32. Truong, H. Van, Pham, C. H., & Vo, N. H. (2016). Service Quality and Students Level of Satisfaction in Private Colleges in Vietnam. International Journal of Financial Research, 7(3). https://doi.org/10.5430/ijfr.v7n3p121

33. UNICEF. (2023). Promotion and prevention of the mental health of adolescents, young people, caregivers and teachers as a strategy for the prevention of violence against children. UNICEF , 204-219.

34. Vargas Armas, G. J. (2017). Academic stress and its correlation with psychological symptomatology in students of the Faculty of Administrative Sciences of the Technical University of Cotopaxi. Journal of the Catholic University of Ecuador, 124-138.

35. Velázquez Castro , J., & Testón Franco, N. (2022). Academic stress and emotional effects in higher level students. Innova Education Magazine, 132-146.

36. Velez Guadamud, G. (2020). Psychological alterations in students of the Higher Technician in Nursing career during Covid-19. Revista Cuatrimestral "Conecta Libertad", 69-84.