Estudio psicométrico de las escalas de depresión, ansiedad y funcionalidad familiar en estudiantes de la Universidad Industrial de Santander

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Resumen

Se estudiaron las propiedades psicométricas de los cuestionarios de depresión y ansiedad de Zung y el APGAR familiar, aplicados por la División de Bienestar Universitario (DBU) de la Universidad Industrial de Santander (UIS), como parte de la evaluación integral de los estudiantes admitidos para el diagnóstico temprano de trastornos que puedieran influir en su desempeño académico. Se tomó una muestra de 3614 estudiantes con edades entre 15 y 56 años que ingresaron en las cohortes de 2013 y 2014. Se verificaron las propiedades psicométricas de los instrumentos, y los resultados fueron comparados según sexo y edad. Se observaron niveles de confiabilidad de .85, .842 y .875 para las escalas de ansiedad, depresión y APGAR Familiar, respectivamente, aunque se requirió la modificación de la escala de depresión con la eliminación del ítem 6. La correlación lineal de Spearman entre ansiedad y depresión fue de r = .76, y de r = - .526 entre el APGAR familiar y depresión, lo que indica una adecuada validez convergente y divergente. Al comparar los diagnósticos clínicos realizados en la consulta general de psicología y la consulta especializada de psiquiatría realizada por la Sección Servicios Integrales de Salud de la DBU con los puntajes de las pruebas, se observaron niveles de sensibilidad de 70, 67 y 67 % en ansiedad, depresión y APGAR familiar, respectivamente. Finalmente, se encontró que en promedio las mujeres presentaron mayores puntajes de ansiedad y depresión en comparación con los hombres, y una funcionalidad familiar similar entre ambos sexos, sin diferencias significativas por edad.
Palabras clave: Psicometría, APGAR familiar, ansiedad y depresión de Zung, baremos.

Psychometric Study of the Depression, Anxiety and family Dysfunction Scales in Students at Universidad Industrial de Santander

Abstract

The aim of this research is to study the psychometric properties of Zung´s and Apgar's Questionnaires for Depression and Anxiety, applied by the *División de Bienestar Universitario de la UIS* (DBU, for its Spanish acronym), a division in charge of students' welfare at UIS. The questionnaires were applied as part of a comprehensive assessment of admitted students, oriented to an early diagnosis of risk factors that may influence their academic performance. The sample consisted of a group of 3614 students admitted to the 2013 and 2014 cohorts, ages between 15 and 56 years. The psychometric properties of the instruments were verified and the results were compared by gender and age. Confidential levels of 0,85, 0,842 and 0,875 were observed for anxiety, depression and Family Apgar Scales, respectively. Only the item 6 of the depression test was eliminated since it did not show an adequate discrimination level. Spearman lineal correlation between anxiety and depression was r = 0,76 and, r = 0,526 between Family Apgar and depression. Those values indicate adequate convergent and divergent validity. Once psychometric validity was verified, results were used to establish a comparison with clinical diagnoses obtained from general and specialized psychiatric consultation carried out by DBU. Sensitivity levels of 70% for anxiety and depression and 67% for Family Apgar tests were found. Finally, higher anxiety and depression were found in the women's group compared to the men's, and a similar level of family dysfunction in both groups. No significant differences were observed between students' age groups.
Key words: Zung Anxiety and Depression Tests, Family Apgar terst, Psychometrics.

Estudo psicométrico das escalas de depressão, ansiedade e funcionalidade familiar em estudantes da Universidade Industrial de Santander

Resumo

Estudaram-se as propriedades psicométricas dos questionários de depressão e ansiedade de Zung e o APGAR familiar, aplicados pela Divisão de Bem-estar Universitário (DBU) da Universidade Industrial de Santander (UIS), como parte da avaliação integral dos estudantes admitidos para o diagnóstico precoce de transtornos que pudessem influir em seu desempenho acadêmico. Tomou-se uma amostra de 3614 estudantes com idades entre 15 e 56 anos que ingressaram nas turmas de 2013 e 2014. Verificaram-se as propriedades psicométricas dos instrumentos, e os resultados foram comparados segundo sexo e idade. Observaram-se níveis de fiabilidade de .85, .842 e .875 para as escalas de ansiedade, depressão e APGAR familiar respectivamente, ainda que se tenha solicitado a modificação da escala de depressão com a eliminação do item 6. A correlação linear de Spearman entre ansiedade e depressão foi de r = .76, e de r = - .526 entre o APGAR familiar e depressão, o que indica uma adequada validade convergente e divergente. Ao comparar os diagnósticos clínicos realizados na consulta geral de psicologia e na consulta especializada de psiquiatria realizada pela Seção Serviços Integrais de Saúde da DBU com as pontuações das provas, observaram-se níveis de sensibilidade de 70, 67 e 67 % em ansiedade, depressão e APGAR familiar, respectivamente. Finalmente, constatou-se que em média as mulheres apresentaram maiores pontuações de ansiedade e depressão em comparação com os homens, e uma funcionalidade familiar similar entre ambos os sexos, sem diferenças significativas por idade.

Palavras-chave: ansiedade e depressão de Zung, APGAR familiar, baremas, psicometria.

INTRODUCTION

Pascarella and Terenzini (1991) mentioned four factors to be taken into account in the academic success or failure of university newly admitted students: the prestige and quality of the selected university, the certainty about the chosen career, the economic resources available to study and the social integration achieved within the university campus. The *Universidad Industrial de Santander* (UIS, for its Spanish acronym) does not intervene in the first two aspects, but it does so in the last two, through the *División de Bienestar Universitario* (DBU, for its Spanish acronym), whose main purpose is to promote comprehensive formation and to improve the quality of life of admitted students. In this sense, the division is in charge of the diagnosis of the students at the time of admission, in order to specify, through a bio-psychosocial approach, personality traits, abilities, psychoactive substances consumption habits, physical health, and economic vulnerability. DBU's main objective is to foster self-care and a timely prevention and intervention culture, in the presence of factors that may lead to academic failure.

Previous research has shown that depression and anxiety are factors that negatively influence the student's integration into university life and, consequently, their academic performance (Jaude, 2002). Lack of family support, on the other hand, may lead to suicidal behavior in adolescents (Larraguibel, González, Martínez & Valenzuela, 2000), which clearly impairs their social integration and, consequently, their school performance.

Other authors such as Bermudez and others (2005), Paz and Aymat (2007) and Naranjo Quizhpi, Ñauta Uzhca, and Ñauta Uzhca (2014) found that poor family relationships and lack of family support hinder students' academic success. Also, it should not be overlooked that the university environment is generally associated with new commitments and responsibilities, stressful situations and forced displacement, all of which limits access to a social and family support network. This situation, coupled with precarious economic circumstances, may trigger in some individuals depressive and anxious symptoms that will affect their school performance (Balanza Galiano, Morales Moreno, & Guerrero Muñoz, 2009).

DBU's admission test measures personality traits, among which are anxiety, depression, family functionality, consumption of alcohol and psychoactive substances, among other individual characteristics. This measurement seeks to identify risk factors that can condition the student to failure and to provide early attention, in order to increase the permanence of these students in the university and to mitigate desertion problems.

The psychometric instruments used to determine levels of anxiety and depression were designed by Zung. They were originally written in English and have been translated and applied numerous times in Latin population, and in some Colombian investigations.

De La Ossa, Martínez, Herazo and Campo (2009) carried out an investigation in 221 students of Medicine and Psychology courses, with an average age of 20.5 years (SD = ± 2.6 years), in Cartagena, to verify the psychometric properties of The Zung Anxiety Scale, finding a Cronbach's

alpha $r = 0,77$, with three factors explaining 40,1% of total variability.

The Zung Depression Scale has been used for a large number of studies in Colombian population. Cogollo, Díaz and Campo (2006) reported the psychometric properties of the scale in 408 adolescents between 13 and 17 years old in the city of Cartagena. They found an internal consistency of $r = 0,689$ and with a two-dimensional factorial structure that explain 24,9% of the total variability. Likewise, Campo et al. (2005) applied the instrument to a group of 110 university students in the city of Bucaramanga, with an average age of 22,1 years (SD = ± 3.4 years). The instrument showed a Cronbach's alpha of $r = 0,85$. Test results were compared with the depression clinical diagnosis, finding a sensitivity of 94.7% and specificity of 67%, PPV = 37.5% and NPV = 98.4%.

The instrument for measuring family functionality employed by BU has been applied by several researchers in Colombian samples (Forero Ariza, Avendaño Durán, Duarte Cubillos, & Campos Arias, 2006; Gómez Bustamante, Castillo Ávila, & Cogollo, 2013). They have found very similar internal consistency values, around 0.78.

About the diagnostic process of students admitted to the *Universidad Industrial de Santander*, questions arise such as: do the questionnaires have appropriate psychometric properties for the target population? Are the anxiety, depression, and family functionality scores similar between sex groups? And finally, are the levels of anxiety, depression, and family functionality in newly admitted students different across age ranges? To answer these questions the following objectives were proposed: 1) to study the psychometric properties of the Zung Anxiety, Depression and Family Functionality Questionnaires, applied by DBU during the diagnostic entrance test. And 2) to compare the anxiety, depression and family functionality scores between students' sex and age range, in order to optimize the chances of success in the students, ensuring that the measurements are accurate and adjusted to the characteristics of the population under study.

METHOD

The research was carried out through a non-experimental, instrumental type study (Carretero Dios & Pérez, 2005), since there was no manipulation on the measured variables.

Participants

The sample consisted of 3614 UIS students. Of these, 1110 students (30.7%) had been admitted to the university in the second period of 2013; 1459 (40,4%) had been admitted in the first period of 2014, and 1045 (28,9%) in the second period of 2014. Of the 3614 admitted in the three periods, 43,4% were female and 56,6% were male, aged between 15 and 56 years. In total, 55,2% were 17 years old or younger; 31% were between 18 and 19 years old and 13,9% with ages of 20 years or more. The average age was 18,01 years (SD = ± 2,34).

Instruments

Family Apgar: it is an instrument designed by Gabriel Smilkstein, neurologist, in 1978. It consists of five affirmations with a Likert response scale that ranges from never (0) to always (4). The instrument measures the degree of family functionality (or dysfunctionality) that the family member is supposed to be able to perceive (Suárez Cuba & Alcalá Espinoza, 2014). In a validation made in a Colombian sample of 91 students, a Cronbach alpha $r = ,793$ was found, with a unifactorial structure that explains 55,6% of the total variability of the scale (Forero Ariza, Avendaño Durán, Duarte Cubillos, & Campos Arias, 2006).

The Zung Depression Scale: The scale was created by Zung in 1965, based on affective, physiological and psychological aspects that usually characterize depression. The scale consists of 20 Likert type reagents ranging from never (1) to always (4), where items 2, 5, 6, 11, 12, 14, 16, 17, 18 and 20 are written in inverse sense. In Colombia, a study was carried out to determine the psychometric properties of the scale in a sample of 4407 youngsters between 12 and 18 years old, finding a Cronbach's alpha $r = 0,548$, and a four-dimensional factorial structure: affective symptoms, physical symptoms, cognitive symptoms and psychological symptoms that explain 13,55%, 11,61%, 9,72% and 8,68% respectively (Lezama Meneses, 2012).

The Zung Anxiety Scale: The instrument was designed by William WK Zung in 1971, originally written in English and later translated into Spanish. The scale is structured into 20 affirmations with a Likert-type response scale ranging from never (1) to always (4), where questions 5, 9, 13, 17 and 19 are written in inverse sense. A high score indicates a high disposition to anxiety, which according to Hernández, Macías, Callejos, Cerezo and Chauvet (2008) is defined as "a tendency to present a diffuse and vague feeling of apprehension or concern" (p.20). The scale was validated with a Mexican sample of 920 people aged between 14 and 60 years. A Cronbach's alpha $r = 0,77$, and a four-dimensional factorial structure explaining 45,5% of total variability were found (Hernández et al., 2008).

Data Analysis

The information was collected by the *Universidad Industrial de Santander*, through the SIMSIS software of

the *Sección de Servicios Integrales de Salud* [Integral Health Services Section] of *Bienestar Universitario*, through a self-administered digital questionnaire, which was part of the university entrance health examination process. Data related to the scores obtained in the entrance examination of the students of the selected cohorts were provided by the *División de Bienestar Universitario* for the development of this research.

To answer the research questions, the psychometric properties of the scales used were verified through a study of their internal consistency, through Cronbach's Alpha, followed by an exploratory factor analysis.

The discrimination power of the items that make up each of the scales was calculated using the area under the Receiver Operational Characteristic (ROC) curve, using the non-parametric adjustment due to the large volume of data. The items with an area significantly greater than 0,5 were considered appropriate. The Pearson Chi-square test for contingency tables was used to measure the independence between clinical diagnoses and their incidence per year.

Spearman's linear correlation index was used to study the convergent validity and divergence between the scales and dimensions considered. Student's *t*- test was used to compare medians between two independent groups and one factor ANOVA in the case of more than two independent groups, with *a posteriori* comparisons of Least Significant Difference (LSD). Statistical processing was performed with the help of IBM SPSS Statistics 22 and Stata 12,0. The maximum significance level for the contrast of the statistical hypotheses was 0,05.

Ethical Considerations

The information provided by DBU was obtained through the application of the tests in the Entrance Examination of the students admitted to the UIS. This was received in Excel files without personal data, with the exemption of student codes to facilitate the crossing between data matrices supplied by different units of the university. Data collection did not pose any medical or psychological risk to students, nor these were invasive procedures or of clinical intervention (Article 11: risk-free research, Resolution 008430 of

1993, Ministry of Health, Colombia), since it was answered online from a computer awarded in the computer rooms of the Information Services Division. Research results were presented to the team of the UIS' *Sistema de Excelencia Académica* (SEA, for its Spanish acronym) [Academic Excellence System].

RESULTS

The results of the research are presented below in the order they were obtained. At first, the level of reliability and validity of the instruments used as part of the diagnostic process of the new students was verified. The scores that characterize the students in anxiety, depression and family Apgar are shown later, taking into account the results of the comparisons by age and sex.

Reliability analysis of the scales

The three scales described show an adequate internal consistency (> ,8), with total element correlations varying between ,63 and ,72 in the case of the Apgar Scale, which indicates a high relationship between the items that make up the scale (See Table 1).

For Zung's Anxiety Scale, the total-element correlation was low on items 13, 17 and 18 (r <0.3) and for The Zung's Depression Scale, item 6 showed a negative correlation with the total scale, while questions 7 and 8 showed total element correlations less than 0,3.

The factor structure of Zung's Anxiety Scale showed a KMO Sample Adequacy Index = 0,919, with a sphericity test adequate to continue the factor analysis ($X^2_{(190)}$ = 13068,14; *p* = .000). The variance percentage retained for four factors was 42,64%. Although adequate factor loads are shown in the factor analysis, the Cronbach's Alpha between the dimensions was 0,733, 0,731, 0,511 and 0,265, which indicates that the resulting dimensions do not present an adequate internal consistency, thus maintaining the unifactorial structure originally proposed (without item 6). When the scale is considered as one-dimensional, the variance that explains its only factor is 27,25%.

Table 1
Reliability analysis of the Zung Anxiety, Zung Depression and Family Apgar Scales

Scales	Items	Cronbach's Alpha	r Total-Element	*r* < .30
The Zung Anxiety	20	.85	.28 - .586	13, 17 y 18.
The Zung Depression	20	.822	.172 - .595	6*, 7 y 8.
Family Apgar	5	.875	.630 - .728	-

Note. 2014 first cohort; N = 1459; "1" the total element correlation was -0,145

Table 2
Item Discrimination on the Zung Anxiety Scale

Zung Anxiety Scale Items	Area	95 % asymptotic CI	
		LI	UL
1. I feel more nervous and anxious than usual.	.859**	.834	.884
2. I feel afraid for no reason at all.	.811**	.781	.841
3. I get upset easily or feel panicky.	.836**	.808	.864
4. I feel like I'm falling apart and going to pieces.	.780**	.749	.812
5. I feel that everything is all right and nothing bad will happen.	.786**	.756	.816
6. My arms and legs shake and tremble.	.769**	.737	.801
7. I am bothered by headaches, neck and back pain.	.851**	.827	.876
8. I feel weak and get tired easily.	.884**	.861	.908
9. I feel calm and can sit still easily.	.854**	.829	.880
10. I can feel my heart beating fast.	.691**	.655	.726
11. I am bothered by dizzy spells.	.772**	.740	.804
12. I have fainting spells or feel like it.	.636**	.600	.673
13. I can breathe in and out easily.	.700**	.665	.736
14. I get numbness and tingling in my fingers and toes.	.743**	.710	.777
15. I am bothered by stomach aches or indigestion.	.844**	.817	.871
16. I have to empty my bladder often.	.744**	.711	.778
17. My hands are usually dry and warm.	.675**	.639	.711
18. My face gets hot and blushes.	.721**	.687	.755
19. I fall asleep easily and get a good night's rest.	.837**	.810	.864
20. I have nightmares.	.762**	.730	.793

Note. CI = confidence interval; LL = lower limit; UL = upper limit; ** p <0,01

Table 3
Item Discrimination of the Zung Depression Scale

Zung Depression Scale Items	Area	95 % asymptotic CI	
		LI	UL
1. I feel down hearted and blue.	.819**	.789	.848
2. Morning is when I feel the best.	.729**	.695	.764
3. I have crying spells or feel like it.	.786**	.755	.817
4. I have trouble sleeping at night.	.763**	.731	.795
5. I eat as much as I used to.	.800**	.770	.830
6. I still enjoy sex.	.473	.434	.511
7. I notice that I am losing weight.	.689**	.654	.724
8. I have trouble with constipation.	.674**	.638	.710
9. My heart beats faster than usual.	.710**	.676	.745
10. I get tired for no reason.	.820**	.792	.849
11. My mind is as clear as it used to be.	.904**	.882	.925
12. I find it easy to do the things I used to.	.860**	.835	.886
13. I am restless and can't keep still.	.803**	.773	.833
14. I feel hopeful about the future.	.859**	.834	.885
15. I am more irritable than usual.	.796**	.765	.826
16. I find it easy to make decisions.	.829**	.802	.856
17. I feel that I am useful and needed.	.859**	.833	.884
18. My life is pretty full.	.697**	.662	.732
19. I feel that others would be better off if I were dead.	.662**	.626	.698
20. I still enjoy the things I used to do.	.877**	.853	.901

Note. CI = confidence interval; LL = lower limit; UL = upper limit; ** p <0,01.

Table 4
Item Discrimination on the Family Apgar scale

Ítems de la escala de Apgar Familiar	Area	95 % asymptotic CI	
		LI	UL
1. I am satisfied that I can turn to my family for help when something is troubling me.	.954**	.938	.970
2. I am satisfied with the way my family talks over things with me and shares problems with me.	.974**	.964	.985
3. I am satisfied that my family accepts and supports my wishes to take on new activities or directions.	.906**	.884	.929
4. I am satisfied with the way my family expresses affection and responds to my emotions, such as anger, sorrow, and love.	.971**	.959	.982
5. I am satisfied with the way my family and I share time together.	.962**	.949	.976

Note. CI = confidence interval; LL = lower limit; UL = upper limit; ** $p < 0.01$.

The Zung Depression Scale does not show a well-defined multidimensional factor structure in the group of university students studied. Like the anxiety scale, they are retained by the criterion of the *eigenvalue* greater than 1, in four dimensions, but the factor loads between the dimensions are ambiguous, so only one factor that explains the 26,16% of the total variability is retained.

The Family Apgar instrument showed a one-dimensional structure, with a percentage of explained variance of 67,01%, with commonalities between 57,3% and 73,7% (KMO = 0,879).

Discrimination of items within a measuring instrument is assessed by considering that if an individual scores high on the test, he / she also has high chances of obtaining high scores on the items that make up the test. In the absence of differences in the item score regarding the total test, it is affirmed that the item does not have power of discrimination, a reason why it must be eliminated. Extreme groups with high scores (above the 72nd percentile) and low scores (below the 28th percentile) are used to compare the total test. This is suggested by some authors (Backhoff, Larrazolo, & Rosa, 2000). Scores are compared through the ROC Curve methodology.

Following, the values of the area under the ROC curve with their interval estimation for the Zung Anxiety scale are presented (see Table 2).

The items on the scale show an adequate level of discrimination regarding the high and low scores of the scale, except for items 10, 12 and 17, which show areas under the curve lower than 0,7, but significantly different from 0,5. It is not suggested to modify the questionnaire proposed by Zung to measure anxiety, to be applied in Colombian population with the characteristics described above.

As shown in Table 3, item 6 of the Zung Depression Scale does not show discrimination between the high or low scores of the total scale and, additionally, the total-element correlation coefficient for that item was negative. For this reason, this question is eliminated from the Zung Depression Scale for applications in Colombian samples. It was finally constituted by 19 items with a Cronbach Alpha reliability of, 0,842.

Family Apgar items show an excellent discrimination level with respect to the total score, with areas under the ROC curve significantly higher than 0,5, at a significance level of 0,01 (See Table 4).

Validity Analysis of Zung's Anxiety and Depression and Family Apgar Scales

In order to establish the construct validity of the measuring instruments implemented by UIS through *Bienestar Universitario* for the preventive diagnosis of personality disorders in the newly admitted students, the convergent, divergent and criterion validation of the scales was carried out through the establishment of relationships between the scores obtained in the previously studied instruments, regarding the incidence of disorders such as depression, anxiety, lack of family support, and academic problems.

For convergent and divergent validity, Spearman's linear correlation (n = 1459) was used among the different psychosocial variables studied. For the construct validation of the variables under study, the scores of $|r| > 0,4$, which are highlighted in Table 5, were considered high, positive or negative correlations.

Table 5
Spearman's Matrix of Correlations between the Psychosocial Characteristics Evaluated.

	Anxiety	Depression	Apgar
Depression	.760**		
Family Apgar	- .471**	- .526**	

Note. * $p < .05$; ** $p < .01$.

Anxiety and depression are disorders that affect the individual in a negative way, and positive correlations are expected between the scores of both tests. This would indicate that if a person presents high anxiety scores he will also show high scores of depression; if, on the contrary, an individual shows low depression scores, he / she is expected to show no symptoms or strong traits of anxiety. In this case, the correlation between these variables was 0,760 (p <0,01), confirming a convergent validity between both tests.

On the other hand, negative correlations between anxiety and depression are expected with respect to family support, which is corroborated by negative correlation coefficients and below *r* = -0,4.

The total scores on the different psychosocial scales were compared with the consultation reasons registered by the DBU, especially psychiatric and psychological consultation, with diagnoses such as "generalized anxiety disorder", "mental and behavioral disorders due to the use of *cannabinoids*: dependency syndrome", "mixed anxiety and depressive disorder" and "mild depressive episode", among others. These diagnoses were classified and grouped into anxiety (yes or no), levels of depression (generalized,

mild, moderate, severe and absence), and family support problems (yes or no). The results are presented below (See Table 6).

Family conflicts occurred in approximately 4% of students admitted in 2013, while for those admitted in 2014, the prevalence was 1,7%, showing significant differences between these proportions.

Of the students admitted in 2013, 5,5% presented anxiety and, although in 2014 3,2% were clinically diagnosed with this disorder, the proportions showed significant differences. Moderate depression occurred in a smaller proportion in 2014, as did severe depression, since 4,6% had depression in 2013 and in 2014 it decreased to 3,6%. These differences ,were significant at the 0,05 level.

It is worth mentioning that 51.9% of the students attending the DBU with presence of depression also showed anxiety, which is expected due to the positive and significant correlation shown in Table 5.

For the criterion validation, the total scores of the instruments administered by BU were compared with the presence of the associated diagnoses, that is, Zung's depression in patients who were diagnosed with depression in consultation,

Table 6

Prevalence of Psychological Disorders in 2013 and 2014, Registered by Bienestar Universitario at Universidad Industrial de Santander

Reasons for Consultation		Year of Admission				Pearson's Chi-Square[1]	
		2013		2014		X^2	p
		N°	%	N°	%		
Family problems		44[a]	4.0%	43[b]	1.7 %	15.58	.000**
Anxiety (Yes)		61[a]	5.5%	79[b]	3.2 %	10.69	.001**
Depression	Generalized	2[a]	.2%	2[a]	0.1 %		
	Mild	32[a]	2.9%	62[a]	2.5 %		
	Moderate	13[a]	1.2%	13[b]	0.5 %		
	Severe	4[a]	.4%	1[b]	0.0 %		
	Yes / No[c]	51[a]	4.6%	78[b]	3.6 %	4.68	.030*
Total		1110	100%	2504	100%		

Note. [1] Chi-square corrected for continuity; * P <0.05; ** p <0.01; C. Presence / absence of depression.

Table 7

Discrimination Capacity of Zung Anxiety and Depression Scales and Family Apgar in UIS Students, Years 2013 and 2014

Test	Cut-Off Point	Area Under the Curve	95% CI for the Area		S_e	S_p
			LL	UL		
Apgar	19	.672**	.616	.728	67 %	57 %
Anxiety	32	.6697**	.623	.716	70 %	54.30 %
Depression	30	.665**	.614	.716	70.54 %	51.48 %

Note. S_e = Sensitivity; S_p = Specificity; LL = Lower Limit; UL = Upper Limit; ** p <0.01.

Zung's anxiety with the presence or absence of anxiety of the students taken care of, and Family Apgar among students diagnosed with family problems (See Table 7).

The discrimination power of the Anxiety, Depression and Family Apgar Scales was evidenced through the area under the ROC curve, which were significantly higher than 0,5. Additionally, the levels of sensitivity and specificity for the suggested cut-off points are higher than 50% in all cases. The previous results allow concluding that the mentioned tests measure characteristics coherent with their theoretical definition within the Colombian student population. The observed sensitivity and specificity are acceptable, but it should be noted that not all the admitted students were clinically diagnosed, only those who requested DBU services.

Comparison of Anxiety, Depression and Family Functionality Scores between Sex and Age

To determine if the test scores in the study showed significant differences between the two genders, Student's *t*-test was used for independent groups. Because each compared group (women and men) has very large sample sizes, asymptotic normality in Student's *t*-statistic was assumed, thanks to the application of the Limit Central Theorem proposed by Lindeberg-Lévy (Mayorga Álvarez, 2004), finding the following results:

Table 8 compares the averages between genders of the psychological tests applied by DBU, reflecting differences for anxiety and depression. In cases where there are significant differences, the average scores are higher for women, which are affirmed with a confidence of 99%.

In the table above (see Table 9), the psychological variables anxiety, depression and family Apgar are compared among students aged 17 years or less, between 18 and 19 years and 20 or more years, for which the one-factor ANOVA factor (age groups), women and men were considered separately. Again, the application of the statistical technique is appropriate because of the sample size which ensures that the statistic test (Snedecor's F) follows an asymptotically normal distribution (Mayorga Álvarez, 2004). No statistically significant average differences were found in the variables of anxiety, depression and family Apgar between the age groups both in women and men, which is affirmed with a level of significance of 0,05.

When the reliability of the anxiety and depression scales was analyzed between groups of women and men, almost identical results were found in the anxiety scale, with 0,848 in each sex group. In contrast, for women, the internal consistency of the depression scale was 0,854 while in men it was 0,83. In all of the above groups, Cronbach's alpha indices indicate very good internal consistency.

Table 8

Average Comparisons of Psychosocial Variables according to Gender

	Medians		T Test for the Median Equality		
	Women (n=1569)	Men (n=2045)	t	gl	Sig. (bilateral)
Anxiety^2	33.06	30.95	9.87	3110.16	.000**
Depression^2	31.50	29.57	8.343	3088.59	.000**
Family Apgar^2	19.43	19.52	- .593	3253.3	.554
n	1568	2046			

Note. ** p <0,01; 2. different variances are assumed.

Table 9

Comparison of Anxiety, Depression and Family Apgar between Age Groups and Sex

			Age						ANOVA	
			<= 17 (n = 1994)		18-19 (n = 1120)		>= 20(n = 502)			
			Media	±DE	Media	±DE	Media	±DE	F	p
Sex	Female	Family Apgar	19.20	4.73	19.73	4.54	19.75	4.48	**2.52**	**.080**
		Anxiety	33.27	6.62	32.86	7.01	32.54	6.88	**1.16**	**.315**
		Depression	31.60	7.21	31.65	7.48	30.53	7.43	**1.67**	**.188**
	Male	Family Apgar	19.47	4.20	19.68	4.32	19.35	4.88	**.78**	**.458**
		Anxiety	31.11	5.54	30.86	6.18	30.57	6.41	**1.17**	**.311**
		Depression	29.73	6.00	29.43	6.36	29.32	7.12	**.78**	.459

DISCUSSION

De La Ossa Martínez, Herazo and Campo (2009) found a reliability of $r = 0,77$ for the anxiety scale, with 221 students of medicine and psychology, reporting 3 factors that explained 40.1% of total variability. In this investigation an internal consistency of $r = 0,85$ was observed, with a one-dimensional structure.

In 2005, Campos and collaborators and Cogollo, Días and Campo (2006) found coefficients of Cronbach's alpha for the depression scale of $r = 0,85$ and $r = 0,689$, respectively. The internal consistency of the depression scale was $r = 0,822$ with the elimination of item 6 in this study, being finally constituted by 19 items in a one-dimensional structure.

The family functionality was measured with Apgar, finding a consistency of $r = 0,875$ with a unifactorial structure, which agrees with what was found by Forero, Avendaño, Dugarte and Campo (2006), and Gómez, Castillo and Cogollo (2011).

In general, the Anxiety, Depression and Family Apgar scales functioned adequately in UIS students, with the only variation of the Depression scale that finally consisted of 19 items. The total-element correlation and discrimination levels of the items were adequate. The correlations between the scales showed the right direction, confirming the convergent and divergent validity of the anxiety, depression and family functionality scales. Anxiety levels were significantly higher in women, and no significant average variation was observed between age ranges for each gender.

When reviewing the internal consistency of the anxiety and depression scales between male and female groups, no significant differences were observed, which leads to the conclusion that scales can be used reliably in men and women.

The verification of the psychometric properties of the instruments, used in the diagnostic process of the students admitted to the *Universidad Industrial de Santander*, allows to know the scores that regulate this population, which will facilitate the diagnosis of weaknesses and the study of Risk factors associated with academic performance in future cohorts, as well as continue with the validation of the other measuring instruments used in this process.

It is suggested to continue with the validation of the measuring instruments that are being used in the UIS Entrance Examination, and then carry out the study of the risk factors associated with the dropout and low academic performance problems of the students, with the purpose of proposing early correctives that promote their permanence in the university and the success in their careers.

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