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Transcultural Validation and Adaptation of the Academic Stress Questionnaire (CEA) in Students of Puerto Rico

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Abstract

Background: There are multiple questionnaires to measure academic stress in university students, which have been used in nursing students. In Puerto Rico, a questionnaire valid in content and reliability was required to measure the variable of academic stress in nursing students. **Purpose:** The aim of this study was to adapt transculturally and validate the Academic Stress Questionnaire (CEA) for its use in Puerto Rico. **Materials and Methods:** Used for the first phase of this study consisted in the evaluation of the validity of content and appearance, whereas the second phase was the actual administering of the questionnaire to 20 (twenty) nursing students, to pilot test its internal consistency using the Cronbach's α test. **Results:** Validity of content and appearance allowed for the modification of the questionnaire into one, consisting of 42 items, thus eliminating 34 premises from the original 76 items the questionnaire was composed of. Furthermore, the appearance of the questionnaire was modified by placing the measuring scales in columns, adapting social, demographic, and academic data to the required Puerto Rican reality. The sections meant to measure the *academic stress* variables were left intact, except for the linguistics adaptation, which was accomplished by a team of experts in the Spanish language. With an α global of 0.80 and coefficients larger than 0.7 in the multi-item sub scales, which oscillated between 0.750 and 0.860, the questionnaire provides a high reliability. **Conclusion:** Although the values reported in this study are somewhat lower than previous research, they were comparable the Cronbach's Alpha coefficients reported by Cabanach, in which the numbers reported are considered high ($\alpha > 0.70$) which show acceptable confiability of the subscales included in the study and a high degree of consistency and thus can be relied upon in future research. In synthesis, the *Academic Stress Questionnaire* (*CEA*) modified and adapted, thoroughly fulfills the established criteria of confiability and validity to evaluate academic stress of Puertorrican nursing students.

Keywords

Academic Stress, Transcultural Adaptation, Psychometric Analysis, Academic Stress Questionnaire, Scales, Questionnaire

1. Introduction

Academic stress is conceived as everything that results in or produces environmental and or relational, interelational threat or upset among students in an academic setting in which significant pressure is exerted to compete individually to attain academic success [1]. Therefore, academic stress involves those cognitive and affective processes that a student perceives from academic activities as threats, as challenges or demands to which the student can respond efficiently or not [2]. Those events can cause physiological, cognitive, and behavioral responses such as excess sweating, headaches, lack of concentration, nervousness, aggressiveness, and inability, interact with others. According to Berrio Garcia, alterations in those three response levels negatively affect academic achievement, in some cases, diminishing grades in academic courses and tests, and still in others affecting class and or test attendance [3].

Among college students affected by stressful conditions, are nursing and other health professions students. According to Lindop, these groups turn out to be especially sensible to reacting to the perception of academic stress, given the rigorous demands in clinical and theorical academic nursing plans of study [4]. Salazar [5] and Soto [6], state that being an extremely competitive field of studies, nursing preparation programs in different colleges and universities hope its graduates seccure enough professional skills and competencies to be able to exercise the profession with a certain grade average and the passing of a board examination to begin an effective practice [5] [6]. Therefore, the previous statement is made evident in Nursing Preparation Programs in Puerto Rico. Nursing preparation programs are very competitive. At this moment there is an increase in nursing preparation programs and a job saturation problem, which has brought about an increase in the demands, requirements, and competitiveness of its graduates [7]. Due to the previous statements, these procedures help the screening, selection, and employment process of the best nursing candidates [8]. On the other hand, create stressful demands for them, from the initial course of studies to the board examinations, graduation, job searching interviews and so on, thus the need to further study this phenomenon [9].

On dealing with the *stress* variable, the researcher faces the difficulty of conceptualizing and measuring it. Thus, the need to use existing academic stress measuring instruments such as: Escala Magallanes de Estres (Magellan Stress Scale), Escala de Evaluacion de Estres (Stress Evaluation Scale), Inventario de Estrés Academico (Academic Stress Inventory), Test de Estres General Universitario (General University Stress Test) Test de Estresores Curriculares Univer-

sitarios (University Curricular Stressors Test), and Escala de Percepción de Estrés (Stress Perception Scale) among others [10]. As shown, instrument diversity is not more than a reflexion on the issue regarding different approaches and multiple ways of conceptualizing academic stress. These issues give way to the researcher having to select the most compatible instrument based on the expectations, one of the scope and degree of academic stress being measured, the degree on the validation of the instrument, and the population to which the instrument is administered. After rigorous research in the available literature on instruments designed to measure academic stress, the one selected by the author of this research became the Academic Stress Questionnaire (CEA), originally developed by Cabanach [11]. The questionnaire is made up using 3 (three) subscales: Academic Stressors Subscale (E-CEA) (Subescala de Estresores Academicos—E-CEA), Stress Response Subscale (R-CEA) (Subescala Respuesta al estres—R-CEA), and Coping Strategies (A-CEA) (Subescala Respuesta al estres—A-CEA), designed to measure academic stress in higher education students. The questionnaire has been validated using Spanish speaking students in the field of health by its original authors, and three years later by Casuso Holgado [12]. The questionnaire is a useful one for studying academic stress on nursing students because it has been previously used on nursing students. Given the quality of this instrument, it would prove to be of great interest and use to be administered to students in Puerto Rico. Therefore, for all the reasons stated, the aim of this study is to carry out the transcultural adaptation and psychometric validation of the Academic Stress Questionnaire (CEA) *Cuestionario de Estrés Académico* (*CEA*) for its use in the nursing student population in Puerto Rico.

2. Material and Method

2.1. Design

The study was designed using a quantitative method whose aim was to culturally adapt a questionnaire previously used with nursing students in Spain, to nursing students of a similar population in Puerto Rico.

2.2. Population and Sample

The population of this study was composed of nursing students belonging to a Bachelor's degree program from a private university in Puerto Rico. The selected sample for the pilot study was composed of 20 nursing students from a private university in Puerto Rico. The selection of the twenty participants who were part of this pilot study was carried out following non-probabilistic sampling for convenience, due to their accessibility for the researcher, the ability to consume less time and, as an aid to reduce the loss of the required number of participants. in the pilot test as stated by Polit & Hungler [13].

Inclusion Criteria

1) Students of both genders enrolled in the nursing program.

2) Voluntary participation to take part in the study.

Exclusion Criteria

1) Students not enrolled in the nursing program.

2.3. Description of the Academic Stress Questionnaire (CEA)

The Academic Stress Questionnaire (*CEA*)

The Academic Stress Questionnaire (CEA) is a questionnaire validated in a university population. It is composed of three subscales: academic Stressors (E-CEA); response to stress (R-CEA) and coping strategies (A-CEA). Responses generated from the different items in the questionnaire are categorized based on a five-point Scale that ranges from: "Never" (1) to "Always" (5). This questionnaire was originally designed to be used for Health Sciences Students [11]. After the original creation of the instrument by its authors, the first validation of the questionnaire was done by Casuso Holgado to be used in Spain, with students from the University of Malaga Health Sciences Faculty, where nursing students also were part of the questionnaire population [12]. Written permission was requested from the original authors to use the CEA Questionnaire and its validated and adapted punctuation methods. The section which measured coping strategies (A-CEA) was not included in this phase of adapting the questionnaire for Puerto Rico, since this subscale did not receive any modifications, retaining its original version. This decision became methodologically justified since each subscale has its own psychometric values. Brief descriptions of the two adapted subscales from the CEA Questionnaire as part of the study are shown below:

***Subscale of Academic Stressors* (*E-CEA*)**

Is composed of a total of 54 items that pretend to measure different situations and/or circumstances from the academic context that can somewhat be perceived by the student as a pressure trigger, as a danger or a threat to the wellbeing.

***Subscale of Stress Coping Strategies* (*A-CEA*)**

It is made up of a total of 23 items that coping strategies. It presents some situations and what individuals think and do when faced with a problematic situation that causes anxiety or stress.

2.4. Procedure

Once the questionnaire was selected, the researcher proceeded to improve the appearance of the questionnaire, according to Ruiz Morales [14]. This process consisted of evaluating the way the assumptions were placed and the organization of the questionnaire scales in a manner that minimized confusion between participants upon responding or using the established scales. The adjustment in the appearance of the questionnaire was done according to recommendations from Soria Moncada [15].

Once changes in the appearance of the questionnaire were achieved, the second phase of the study begins by performing a cultural adaptation of the study by means of using a board of experts in the Spanish language. Cultural

adaptation by a team of experts deals with judging if the different questions included in the instrument to ensure adequate linguistic expressions adapt to the regional slang and idioms of the country or region where the instrument will be used, without distancing itself from the domains or concepts to be measured, without generating ambiguity nor partiality [15] [16]. The original premises were adapted to equivalent idiomatic expressions that could be easily understood by Puertorrican students to: prevent issues of bias due to lack of comprehension, and to prevent the original measurements from being altered in the questionnaire, since this part is one of the most important phases of the study. It was not necessary to apply the *forward-backward-translation* procedure, since the language is the same in the original Spanish version of the questionnaire; but the questionnaire required adjustments be made in the use of the Spanish language according to its local and regional traits [17] [18].

The panel of Experts used, as a principle, what Lauffera stated in 2013, that evaluation of semantic equivalencies is important, especially as idiomatic, and cultural equivalencies are when dealing with idioms, phrases, or words peculiar to certain cultures [19]. Taking into consideration the principles stated, the Spanish language expert proceeded to adapt the premises that, to whose understanding, differed in idiomatic or regional expressions that could confuse and therefore cause the participant to create data errors. A process report in which the cultural adaptation of the questionnaire for use in Puerto Rico appeared in its synthesized final version of the Spanish language to be used was produced.

Finally, once the recommendations of the Spanish language experts were made, the researcher proceeded to verify the reliability and sensitivity of the questionnaire to be used with Puerto Rican students. As exposed in Lauffera, the validation process in a questionnaire should follow very rigorously defined stages to verify its usefulness, reliability, and applicability through following the measuring of the so called "psychometric properties", since different psychometric properties requirements, such as trustworthiness and validity must be met in the process of linguistic validation [19]. Trustworthiness can be evaluated by internal consistency, by its ability to replicate and by discriminating validity. Validity, in turn, can be evaluated by content value, by factorial analysis, criteria and construct analysis.

For study purposes factorial structure and trustworthiness, two of the subscales adopted from the measure instrument (E-CEA y R-CEA, and A-CEA) were analyzed, as was item uniformity. To achieve it, a pilot test with 20 students from a nursing program at a private University in Puerto Rico was conducted. Participant rights were protected according to the Belmont Report, and the Common Rule 45 *CFR 46*, which are used in research to protect human rights in the United States of America [13]. To comply with these requirements, the researcher made use of the Institutional Review Board (IRB), known in Spanish as *Junta de Revision Institucional*, at the institution where the research was conducted. Participant identity was protected as was confidentiality and privacy of their answers, while participating in the pilot test adapted to Puertorrican stu-

dents. An informative form was used to guarantee voluntary participation, and to obtain informed consent, and participation to minimize bias and coercion from other students, since the researcher is part of the faculty where the study took place. Participating students were not required to sign any documents since that could be used to identify them. Recruitment was done by means of a verbal announcement in the selected course section of the university. Once the subjects were chosen and the sample was created, they were informed of the purpose of the study and their rights. The questionnaire was administered and once completed, participants turned it in to the researcher inside a sealed envelope to maintain data confidentiality. Once the questionnaires were collected, the researcher proceeded to tabulate and analyze data to obtain the results.

2.5. Statistical Analysis

To analyze the validity of the construct in the different subscales, a factorial analysis of the different main components was performed including Varimax posterior rotation. To analyze data adequacy, the Kaiser-Meyer-Olkin (KMO) sampling adequacy measure was used, obtaining scores higher than 0.90, considered excellent [13]. To evaluate internal consistency of the different dimensions that compose the scale, its Cronbach α fiability coefficient was measured [20] [21].

3. Results

The results found in the study, stated below, are divided by results in appearance, results in idiomatic adaptation and validation results.

1) Results in appearance

During the study analysis on the appearance of the questionnaire; the first section, related to the socio-demographic data required in the original questionnaire, was modified, because the information compiled in the version made for Spain, did not adjust to the Puertorrican reality, especially in the way the academic semesters are divided, and the difference in course schedules, among others. In the second section, which measured the variable of the study, specifically, the premises and scales related were placed in columns to make them easy to be answered. In Puerto Rico, the use of premises where the participants make a mark on the correct, pre-determined answers is a very common method used by researchers, and if such scales are to be used, they are placed in columns, so the participant makes a mark on the premise that best describes his or her answer, according to the scale provided. Finally, the questionnaire was improved, in terms of aesthetic appearance, and as a result, it became a lighter, organized, easier to answer, more esthetically appealing questionnaire to the Puertorrican participant population.

2) Results of idiomatic adaptation

In the idiomatic and cultural adaptation of the questionnaire, the panel of experts suggested the modification of 42 premises of the original questionnaire

used by Cabanach [11]. Only one premise that measured methodological deficiencies in the faculty was eliminated, since the premise could be measured by another premise in the questionnaire, thus reducing the questionnaire from 76 to 75. Fifty-six percent of the analyzed and assessed premises received adjustments or linguistic modifications, to achieve full comprehension from nursing students in Puerto Rico, so they could better understand what the original author meant in each premise. The remaining 33 premises or the 44% of the questionnaire was not modified, since according to the experts the terminology used was appropriate and not difficult to be understood by Puertorrican students. Comparisons were established on the synthesized version of the questionnaire accomplished, completed, and compared by the experts. Discrepancies between adapted versions were identified and discussed until a consensus was reached, according to what Ramada-Rodilla, recommend [22].

3) Results of trustworthiness

Once the questionnaire was adapted to the idiomatic expressions of the Puertorrican culture, it was ready to be validated, following the recommendations of Lauffera [19]. Therefore, the researcher proceeded to calculate internal consistency, and each dimension of the questionnaire was measured by means of using Cronbach (α) coefficient, as were content analysis using factorial analysis of the items. The expected values in the Cronbach (α) coefficient oscillated between 0 and 1. Nunnally in 1978, cited in Morales Vallejo, proposed a minimum of 0.70 as a parameter to grant acceptable fiability in a measuring instrument [23] [24]. Once the formula is applied, the value of Cronbach (α) coefficient for the total subscale that measures academic stressors of the Academic Stress Questionnaire (E-CEA) was 0.969, which signaled an optimal level and a high degree of reliability. The appraisal of coefficients registered for each of the separate nine dimensions included in the academic stressors subscale ranged from 0.703 to 0.932 of Cronbach (α) coefficient. As can be seen in **Table 1** (E-CEA), even though practically half of the dimensions showed values somewhat lesser than those shown in two previous studies, the values obtained, remained within parameters shown in literature to be acceptable in confiability dimensions, by exceeding the established minimal value ($\alpha > 0.70$).

In terms of the subscale total of responses to stress contained in the Academic Stress Questionnaire (R-CEA), the value of the Cronbach's α coefficient value was 0.924. This coefficient value shows an optimal high level of reliability. This subscale contains five dimensions, and as shown in **Table 2**, the values of coefficient reliability for each, measured with Cronbach's α, oscillated between 0.750 y 0.860. Although somewhat lower than the preceding values in previous studies, they are considered high acceptable values of ($\alpha > 0.70$), showing more similarity with Alpha coefficients in Cabanach, which indicate an acceptable level of reliability on this subscale [11].

The coping strategies subscale of the Academic Stress Questionnaire (A-CEA), in its entirety, reached a Cronbach's alpha coefficient of 0.968. This coefficient points to a high level of reliability. This subscale contains three dimensions and

as outlined in Table 3, the values of the reliability coefficients for each one was greater than 0.900 when their Cronbach's alpha coefficient was measured [11]. In fact, the values of coefficient reliability for each, measured with Cronbach's α, oscillated between 0.907 y 0.928.

Table 1. Fiability study E-CEA, academic stressors. *Subscale of Academic Stressors* (*E-CEA*).

Dimensions	N° items	Cronbach Alpha Cabanach [2]	Cronbach Alpha Casuso Holgado [13]	Cronbach Alpha Study sample
Faculty Methodological deficiencies	12	0.931	0.961	0.889
Student academic overload	10	0.919	0.919	0.899
Public interventions	5	0.924	0.923	0.932
Deficiencies in social relations within the academic context	6	0.846	0.866	0.860
Lack of control over academic self-performance	5	0.892	0.900	0.764
Lack of academic content value	4	0.861	0.868	0.800
Low academic self esteem	5	0.881	0.847	0.914
Exams	4	0.887	0.903	0.703
Inability to participate in academic decisions	3	0.797	0.903	0.835
Total	54			

Table 2. Reliability study R-CEA, response to stress.

Dimensions	N° ítems	Cronbach Alpha Cabanach [2]	Cronbach Alpha Casuso Holgado [13]	Cronbach Alpha Study sample
Physical exhaustion	5	0.885	0.914	0.805
Sleeping difficulties	5	0.853	0.884	0.750
Irritability	4	0.883	0.937	0.860
Negative thoughts	4	0.836	0.886	0.829
Physical anxiety	4	0.804	0.835	0.765
Total	22			

Table 3. Fiability study CEA. *Subscale Coping Strategies* (*A-CEA*).

Dimensions	N° ítems	Cronbach Alfa Cabanach [2]	Cronbach Alpha Casuso Holgado [13]	Cronbach Alfa Study sample
Positive reassessment	9	0.864	0.933	0.928
Seeking support	7	0.906	0.876	0.907
Planification	7	0.837	0.845	0.922
Total	23			

The minimum acceptable results obtained from the instrument were shaped by traits in the Puertorrican Student population, which somewhat differs from their counterparts in Spain in their idiosyncrasy and in ways of reasoning and interpreting issues according to their own perspective. According to Lang Silveira, the coefficient of reliability is affected by the heterogeneity of the individuals that answer the test; the more heterogeneous is the group; the more heterogeneous is the coefficient of reliability [25]. Therefore, the given coefficient is not an exclusive trait of the document, but from the instrument to a specifical group of people in each situation. The coefficient of reliability represents the fraction of variability observed between the individual, which is true, non ascribable to errors of measure. The minimal acceptable value of the coefficient of reliability depends upon the use the instrument will be given. In the case of scores generated by instruments to establish comparisons in groups through differences in median measures, 0.7 is taken as acceptable minimum value, as was done in this made for Puerto Rico study.

Factorial Analysis

With the finality of assessing the scope in which the subscale of academic stressors (E-CEA) measured multidimensional constructs (**Table 4**), compiled data was submitted in research to be processed through a factorial analysis whose method of extraction was analysis of the main components and the Varimax Method to measure rotation. In the first place, the value of the measure of sampling adequacy of Kaiser-Meyer-Olkin (KMO) was employed to assess measure value [13]; the resulting value was 0.909; the Bartlett Esphericity test was also used, reaching a significant level of 0.000, which pointed to variable factorization as a desirable step [13]. These results are attuned with results described in Cabanach, whose KMO was 0.949 and its level of significance was 0.000 in the Barlett Esphericity test [11].

Factorial analysis was used next, following the preceding method whose outcome resulted in a nine-dimension structure, which explained 73.98% of the total variance. These dimensions are faculty methodological deficiencies, student academic overload, public interventions, deficiencies in social relations within the academic context, lack of control over academic performance, lack of academic content value, low academic self esteem, exams, inhability to participate in academic decisions (**Table 4**).

Table 4. Classification of the premises E-CEA, academic stressors.

Dimensions E-CEA	N˚ items Casuso	N˚ items cuestionario adaptado para Puerto Rico	Items
Faculty Methodological deficiencies	12	11*	10 11 12 13 14 15 16 17 18 19 20
Student academic overload	10	10	26 28 30 31 32 33 35 37 38 39
Public interventions	5	5	1 2 3 4 9
Deficiencies in social relations within academic context	6	6	48 49 50 51 52 53
Lack of control over academic performance	5	5	25 27 29 42 43

Continued

Lack of academic control value	4	4	21 22 23 24
Low academic self esteem	5	5	34 36 40 41 45
Exams	4	4	5 6 7 8
Inability to participate in academic decisions	3	3	44 46 47
Total	54	53*	

*A premise from the questionnaire was eliminated: it was the dimension relating to Methodological deficiencies in the Faculty, since the premise is used in another questionnaire item. This action is supported by the literature which states that of the 54 items that originally compose the subscale, one is to be eliminated due to its low factorial weight, thus the remaining 53 items, distributed in the nine remaining Dimensions [41].

A replicate analysis was used to test the subscale of responses to stress (R-CEA), which rendered a KMO value of 0.932, with a significance level of 0.000 in the Bartlett Esphericity test [13]. The resulting factorial structure from the R-CEA analysis suggested five dimensions that explained 78.28% of the total variance (Table 5).

Table 5. Classification of the premises R-CEA response to stress.

Dimensions R-CEA	N° items Casuso	N° items Adapted questionnaire for Puerto Rico	Items
Physical exhaustion	5	5	3 5 6 7 8
Sleeping difficulties	5	5	1 2 9 10 22
Irritability	4	4	12 13 15 16
Negative thoughts	4	4	17 18 19 20
Physical anxiety	4	4	4 11 14 21
Total	22	22	

Likewise, the factor analysis in the classification of A-CEA premises, following the previous method, resulted in a three-dimensional structure, which explained 79.77% of the total variance. These dimensions are positive reassessment, seeking support, and planning (Table 6).

Table 6. Classification of A-CEA premises, Coping strategies.

Dimensions A-CEA	N° ítems Casuso	N° ítems Adapted questionnaire for Puerto Rico	Items
Confrontational Coping	5	5	68 70 71 72 73
Distancing, Escape-avoidance	5	5	66 67 74 75 87
Self-control, acceptance of responsibility	5	5	77 78 80 81 88
Search for social support	4	4	82 83 84 85
Planning problem solution, positive reappraisal	4	4	69 76 79 86
Total	23	23	

Index of item homogeneity

Besides factorial analysis, homogeneity index was also computed [13]. The homogeneity index analysis disclosed that items under each scale were significantly homogeneous (score being close to 1) and indicated coherence and a high correlation among them. In terms of the affinity of the dimensions of the subscales, the Alpha coefficients examined the Alpha coefficients of the pilot testing and the administration of the adapted instrument. The differences between both coefficients in each dimension of the subscales scored less than 0.15, which points to similar coefficients. Trustworthiness of the instrument was also determined by the method of mathematical computation of the coefficient of intra-class correlation (CIC), which determined a correlation of 70%, showing an acceptable trustworthiness margin [26]. Results in Table 7, show correlations between 85% and 98%, which point to temporal stability in the subscales; in other words, when dealing with values higher than 0.80, they become adequate, trustworthy subscales, able to be used in Puerto Rico.

Table 7. Cronbach Alpha coefficients of CEA subscales adapted to Puerto Rico and coefficients of intra-class correlation by dimensions.

Dimensions by subscales	No. items	Cronbach Alpha Pilot	Cronbach Alpha Administration	Difference	M	CCI
E-CEA: Academic stressors						
Faculty methodological deficiencies	11	0.889	0.916	0.027	0.903	0.979
Student academic overload	10	0.899	0.938	0.039	0.919	0.971
Public interventions	5	0.932	0.872	−0.060	0.902	0.972
Deficiencies in social relations within academic context	6	0.860	0.929	0.069	0.895	0.978
Lack of control over academic performance	5	0.764	0.842	0.078	0.803	0.960
Lack of academic control value	4	0.800	0.798	−0.002	0.799	0.935
Low academic self esteem	5	0.914	0.898	−0.016	0.906	0.963
Exams	4	0.703	0.844	0.141	0.774	0.878
Inhability to participate in academic decisions	3	0.835	0.894	0.059	0.865	0.906
R-CEA: Respuestas al estrés						
Physical exhaustion	5	0.805	0.899	0.094	0.852	0.856
Sleeping dificulties	5	0.750	0.879	0.129	0.815	0.888
Irritability	4	0.860	0.926	0.066	0.893	0.919
Negative thoughts	4	0.829	0.904	0.075	0.867	0.929
Physical anxiety	4	0.765	0.841	0.076	0.803	0.890
A-CEA: Coping with stress						
Positive reassessment	9	0.864	0.928	0.090	0.850	0.852
Seeking support	7	0.906	0.907	0.130	0.817	0.886
Planification	7	0.837	0.922	0.060	0.895	0.910

4. Discussion

Today, on the 21st. century, human beings face a historic moment marked by a continuously dynamic process of cultural diversification and recognition of the different identities that constitute present societies. Moreover, multicentric research projects are increasing due to the need to produce research on health measures adapted to different contexts from their origin to carry out comparisons between different international environments [27]. In view of this reality and, adding to that the problem stress generates in postmodern student population, it is necessary to employ the essential tools that can be used to properly study this phenomenon. Academic stress is a challenge for students and a risk to their academic performance and retention; it is a risk to surpass, fail, or not to keep on in what is supposed to be one, if not the most important goals in the life of a young student [1]-[3].

Thus, the importance to make sure academic authorities count with the proper measuring instruments that can adapt to cultural and linguistic traits in any given country. This, in turn, ensures the reduction of any possible bias due to poor interpretation of a given premise or scale. According to Carvajal, one of the principal biases encountered in this field of action, is precisely the lack of conceptual equivalencies when confronting different instruments, due to the use of non-culturally adapted instruments [28]. Therefore, it is necessary to use a unique transcultural adaptation process which is clearly defined, and rigorous, aimed at achieving conceptual equivalencies in its different semantic, conceptual, idiomatic, and experiential versions.

The validation pilot test for the questionnaire: *Cuestionario de Estrés Académico* (R-CEA), or *Academic Stress Questionnaire* (*ASQ*) aimed on being adapted to Puerto Rico, is the clearest evidence that these processes of cultural and linguistic adaptation are necessary so that outcomes on future studies become scientifically valid. During the validation process, it is evident that through this pilot test the dimensions of the questionnaire could be validated. Based on the results of acculturation, adjustments were made to the Classification of the E-CEA-Academic Stressors items (**Table 4**) Classification of the R-CEA-Stress Response premises (**Table 5**), and the Classification of the A-CEA-Coping strategies (**Table 6**). These actions constitute processes the same as other studies related to the validation process of a questionnaire [12] [29] [30]. Therefore, it is recognized that, the instruments to be applied to different cultures not only should be correctly translated linguistically when required, but also adapted culturally to achieve equivalency, or what has been called "transcultural adaptation", to achieve an objective and rigorous process, which would accomplish scientific community approval [29] [30].

In fact, the contribution of this pilot study to nursing is to have a valid questionnaire, culturally adapted to measure the academic stress variable in a Puerto Rican context. It can be used by different university programs in Puerto Rico and Latin America since it provides a valid and reliable instrument to measure

academic stress. The reliability of the questionnaire in the pilot study reached 0.909 for the E-CEA section and 0.932 for the R-CEA section of the questionnaire, this being a high reliability and sensitivity to measure the variable of interest. This compares with other studies that have used the same questionnaire in Spain, where the reliability of the scale measured using Cronbach's Alpha reached 0.96. carried out with students at the University of Cartuna [31]. Likewise, the internal consistency values obtained with the data from the study carried out by González Cabanach were also excellent, with a value equal to 0.92 [32]. Similarly, in Peru, Chafloque Mejia applied this same questionnaire in which a very high reliability of Cronbach's Alpha 0.968 was obtained [33]. The above implies that the questionnaire culturally adapted to Puerto Rico has proven to be useful in other academic contexts and Latin American countries, so it is more relevant to have demonstrated its reliability in the Puerto Rican context. The psychometric properties, such as adequate reliability to measure students' academic stress, reveal that the questionnaire items are correlated and have a multidimensional structure, which is why they are grouped according to the taxonomy proposed by Maslach [13] [34] [35]. Consequently, this questionnaire allows us to identify the academic stress construct in the Puerto Rican context and allows us to investigate relationships of the construct with other sociodemographic and economic dimensions and adaptation of students in university context.

To respond to the needs of the university context, the appearance of the Questionnaire of Academic Stress (ASQ) *Cuestionario de Estrés Académico* (*CEA*) was improved in a similar way as have done other researchers like Ruiz Morales to their questionnaires [14]. This demonstrates that a modification in appearance in a questionnaire is a legitimate process, along with culture adaptation processes to participants. Once the appearance of the questionnaire was improved, the questionnaire went through the acculturation and adaptation process to be applied from Spain to Puerto Rico. These processes were undertaken by a panel of two experts in the Spanish language that live in Puerto Rico and are familiar with the culture and idiosyncrasy of the Puertorrican student [36]. The researcher, just like Lauffera believes that even though the document is in the Spanish language, it is necessary to go with it through a process of acculturation, since the document was designed and prepared for the original Spanish population [19]. According to Ciconelli [37] and Reichenheim [18], there are other aspects of equivalence, mainly idiomatic equivalence, and experimental or cultural equivalence which need to be assessed in the questionnaire, since they involve phrases, slang and/or peculiar language that belong to determined cultures. Gaite [38] and Ospina García [39] sustain that this adaptation process is essential to future data outcomes that can be better compared to other studies by means of a measuring instrument comparable and equivalent to others that have been done already in other Spanish speaking countries with the same language, but different idioms. This empowers the research process with substantial strength when facing scientific validity or implications of the analysis presented by means

of validated and culturally adapted instruments that play a part in scientific processes.

The mentioned process was performed properly to construct the instrument adapted to Puerto Rico. The instrument underwent a pilot test where trustworthiness of the instrument was validated. Data presented disclosed an α global of 0.80 and coefficients larger than 0.7 in the multi-item subscales, which oscillated between 0.750 y 0.860, equivalent to a valid instrument to measure the variable of interest in the population of Puertorrican students. According to Ramada-Rodilla [22], there is broad consensus on recommending two stages for the process of validating a questionnaire that uses one language but is used in different cultural contexts: 1) cultural adaptation where it is necessary to consider idiomatic nuances and cultural context and: 2) the validation of acculturation in the target language, to assess the degree of preservation of the psychometric properties. These aspects were considered in the validation process, to act and comply with the requirements of the international scientific community [40].

5. Limitations

The limitations of this pilot study are, firstly, that it was only carried out at a university in Puerto Rico, with a limited sample of 20 students, who agreed to participate in said study. Because it is a specific student community, the validation results are not representative of all students at the institution under study or other existing nursing programs in Puerto Rico. Secondly, the population was fundamentally local, with a low rate of immigrants, that is, only Puerto Rican students, when there are foreign students in the program under study. Finally, it is necessary to validate the questionnaire with other cohorts to demonstrate its reproducibility, since this process was not executed.

6. Conclusion

Study researchers considered the current setting where the study was prepared, and steps were taken to follow the appropriate scientific principles to go through the cultural adaptation process of the questionnaire on academic stress. The chosen questionnaire showed, during the pilot testing process that it is a valid, trustworthy instrument to measure the principal variable of the study, which guarantees the diminishing of the common error possibility observed in this research field when a not validated questionnaire is chosen. In conclusion, the instrument CEA and modified demonstrated it complied with the confiability and validity requirements to be used in assessing the academic stress that suffer nursing students in Puerto Rico.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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