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The Positive Thinking Skills Scale: Validity and Reliability Evidence among Spanish Speaking College Students in Costa Rica

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Abstract

Identifying depressive cognitions in Spanish speaking college students can be vital to prevent the development of clinical depression. This study examines the cross-cultural equivalence as well as the reliability and the validity of the Spanish version of the Positive Thinking Skills Scale (S-PTSS) among 286 Spanish speaking college students. The data analysis was done using Structural Equation Modeling, with the R package lavaan. The results provide solid support for the scale's reliability and validity among Spanish speaking college students as demonstrated by high ordinal α of 0.904 and McDonald ω of 0.859. The findings of the study provide evidence of the construct validity of the (S-PTSS) as indicated by a negative correlation with both Anxiety (r = -0.384) and Loneliness (r = -0.508). The S-PTSS is a useful screening tool for depressive cognition among Spanish speaking college students.

Keywords: College students; Positive thinking; Scale validity; Spanish

Introduction

Positive thinking is a cognitive process that seems to have either a protective or a treatment role against several negative mental health outcomes, such as suicidal ideation [1], depressive symptoms [2,3], anxiety [3,4], stress and loneliness [4]. Positive thinking includes an optimistic perception that helps in problem solving and assists individuals to have a future positive outlook on life [2].

Upon arrival to the US, statistics and researchers found out that despite their low income, Hispanics immigrants are healthier than whites and other US population. With the growing population of Hispanics in the US, this paradox continues to gain much interest [5,6]. However, within years of arrival and prolonged length of US residence, research shows that their physical and mental health start to deteriorate [7].

College students may suffer from a wide range of negative mental health outcomes such as depression, stress, anxiety, loneliness, and suicidal ideation [8-11]. Reports suggest that negative mental health conditions have been increasing through the years in college students [12]. Moreover, mental health in younger ages seem to relate to mental health outcomes at older ages [13]. Researchers have shown that Latino students are more likely to exhibit a persistent discrepancy between the apparent need for treatment and actual treatment utilization [14] and report significantly greater academic and family adjustment stressors compared to white students [15].

Thus, it seems that this population may benefit from the measurement and interventions on positive thinking skills. Surveys on positive thinking may shed some light on where to better concentrate preventive care and treatment efforts. To conduct these surveys, adequate measurement tools are needed. Fortunately, such a valid and reliable measure has already been developed: the Positive Thinking Scale (PTSS) [2]. It has been reported to be one-dimensional in studies with diverse samples, such as caregivers [2], Arabic speaking immigrants [16], and college students [1]. Its reliability has also been found acceptable [2,16,18], and evidence of construct validity was demonstrated by associations with positive cognitions, resourcefulness, depression, and general well-being in the expected directions [2]. However, psychometric properties of this scale among Spanish speaking Latino students have not yet been reported.

Spanish is an international language which has the second largest number of native speakers in the world, second only to Mandarin Chinese [18]. It is the language mostly spoken in Latin America, and the second spoken language in the US [18]. Spanish speaking people would greatly benefit from the availability of a positive thinking measure in their language, which is useful for studies on mental health among them. In particular, there is a need for more and better studies on college health in Spanish speaking students across the world, and positive thinking might be one key variable to be measured. Its availability may be useful to better understand the Hispanic paradox among college students in the US and college mental health globally. The purpose of this study is to examine psychometric properties of a Spanish version of the Positive Thinking Skills Scale (S-PTSS) in a sample of college students in Costa Rica.

Methods

Participants and Procedures

A cross-sectional observational study was conducted. This study was not preregistered. First, students were invited to participate in a study on health and health behavior at a University in Costa Rica. Those who were interested signed an informed consent. After agreeing to participate they were given the study's questionnaire. This study was approved by a local ethics committee (approval number: VI-9228-2017), as required by Costa Rican Law. Sampling was by convenience.

The sample consisted of 286 participants, with a mean age of 21.5 years (S. D. = 4.69). 67% were women, 94% were identified as middle-class, and 47.9% reported to live in the central province of San Jose. There was no missing data in this sample. This sample is adequate, as with sample sizes higher than 200 tend to represent well populations and are able to detect smaller effect sizes.

Measures

Positive Thinking Skills Scale (PTSS). The original English version of this measure was developed and psychometrically tested by Bekhet & Zauszniewski [2]. It consists of 8 items ranging from 0 "never" to 3 "always." The final scores range from the lowest score of 0 and the highest score of 24 [2]. It has been found one-dimensional, with an internal consistency of $\alpha = .90$. The skills measured in the scale reflect cognitive activities to increase positive thoughts and eliminate or modify negative ones. Higher scores on the PTSS indicate more positive thinking skills used by respondents [18]. A sample item is "Transform negative thoughts into positive thoughts".

Content/Face Validity of the Spanish version of the Positive Thinking Skills Scale

The process of translation starts with a fluent bilingual individual who translated the English version of the PTSS into the Spanish version (S-PTSS) and made recommendations for making the items more meaningful in the Spanish language [2]. Following the translation of the Spanish measure, a blind back- translation was completed, during which two other bilingual experts converted the translated Spanish instrument into the original English language without having seen the original instrument. Discrepancies between the original and translated instruments were then examined, and decisions were made about the equivalence of the two forms. Revisions were made in the translated Hispanic version until the two forms appeared to be equivalent, which is the most reliable method in determining cultural equivalence of an instrument. Literature demonstrates when both language versions of an instrument are identical in meaning (in this case the English and the Hispanic versions), they are more likely to be equivalent. A panel of two Hispanic bilingual professors reviewed the consistency of the translations, grammar, and structure of the Spanish language. This panel compared the English and the Spanish versions, examining item by item. After reaching a consensus in relation to the consistency of the translations and back-translations of the scale, as well as corrections of the Spanish language grammar and structure, a Spanish version of the PTSS (S-PTSS) was produced. The Spanish version of the scale that the Hispanic panel members agreed as the one with best semantic equivalence was further reviewed and edited to meet the requirements of Spanish grammar and structure.

The study questionnaire included measures on positive thinking, anxiety symptomatology, and loneliness experiences, as well as on sociodemographic information. Below, a brief description of each of the measures included. Beck Anxiety Index (BAI). Developed by Beck, et al. [19], this measure consists of 21 items, each describing a common symptom of anxiety. The respondent is asked to rate how much he or she has been bothered by each symptom over the past week on a 4-point scale. The BAI has showed high internal consistency ($\alpha = .92$) and test-retest reliability over 1 week, $r = .75$. It has discriminated anxious diagnostic groups (panic disorder, generalized anxiety disorder, etc.) from non-anxious diagnostic groups (major depression, dysthymic disorder, etc). In addition, a moderate correlation ($r = .51$) of the BAI with the revised Hamilton Anxiety Rating Scale has been found [19]. In this study we used a Spanish version of this measure [20].

UCLA Loneliness Scale (LON). This is a self-report measure of 20 items, developed by Russell, et al. [21] and revised by Russell, et al. [22]. Some reports support the one-dimensionality of this scale, with an internal consistency of $\alpha = .89$ [23]. In this measure subjects are asked to indicate how often they felt the way each statement suggested. The response options were: "often feel this way" (coded as 4), "sometimes" (3), "rarely" (2), and "never" (1). In this study a Spanish version of this measure was used [24].

Data Analysis

The data analysis was done in R [25]. The data analysis approach was using Structural Equation Modeling (SEM), with the R package lavaan [26]. This framework allows us to reduce measurement error of the instruments and to estimate a more precise measure of the latent factor underlying the scale items [27,28]. As presented by Raykov [29], the SEM framework presents beneficial conditions to develop and test scales, such as evaluation of multidimensional structures, correlations between constructs, evaluation of multiple reliability measures, and correction for measurement error.

Since all the items from scales are answered in an ordered Likert scale, we are treating the items as ordered categorical instead of continuous, treating them as continuous would represent a misspecification of the model. We follow the categorical Confirmatory Factor Analysis (CFA) approach that analyzes the data in function of the polychoric correlation between ordered items. This correlation assumes that there is an unobserved underlining variable that accounts for the ordered response [30]. For the CFA, data were analyzed with the Diagonal Weighted Least Square (DWLS) estimator, with mean and variance adjusted standard errors and chi-square statistic; this approach has shown to present reliable parameter estimates and model fit without the requirement of extremely large samples [30].

Reliability was evaluated with multiple indices, including the most common estimate of Cronbach's coefficient alpha [31], as the items are treated as categorical, we will report Zumbo's ordinal α [32]. This has shown disadvantages in underestimating or overestimating, which makes it a mis-estimator. This is due to how α approximates reliability in function of inter item correlation [29,33]. Due to the known limitations of α, we present an improved estimate of reliability. McDonald's ω [34,35] which is a conservative estimate of factor reliability, accounting for model characteristics such as factor loadings and residual covariances. Lastly, these estimates of construct reliability are presented with their respective ordinal α, and ω, are estimated with the R package semTools [36].

Measurement Model

The first step is to test of the theoretical factorial structure for the scale as a plausible model with this sample. We test this structure with the CFA, the model will be evaluated with the multiple approximate fit indices Comparative Fit Index (CFI), Standardized Root Mean Square Residual (SRMR), and gamma-hat [27,37,38]. These fit indices look at the overall model fit, while the model might have local fit issues. To evaluate local fit, we use residual correlations and modification indices [2,39]. The model was modified in function of local fit when the change represented a meaningful improvement, and it can be deemed theoretically relevant.

The theoretical structure is as follows, one factor for the Positive Thinking scale (PT), one factor for the Beck Anxiety Inventory (BAI), and one factor for the UCLA Loneliness scale (LON). For a total of three correlated factors. This setup allow us to evaluate the scales validity, (1) construct validity will be assessed by examining the factor structure and correlations based on the hypothesized relationships between factors and their indicators; (2) convergent validity will be determined by assessing if all the indicators for a given construct load onto a single factor and if theoretically distinct items on each scale do not load on the same factor; and (3) discriminant validity will be demonstrated by showing that indicators that are theoretically distinct do not load onto identical factors and do not indicate a high degree of correlation [33,40]

Results

As the focus of this research is the Positive Thinking (PT) scale, the first CFA was for the PT factor alone, to evaluate its construct validity by itself before including the other factors, this model presents good overall model fit $\chi^2(20) = 65.738$, $p < 0.001$, CFI = 0.984, SRMR = 0.038, gamma-hat = 0.962, with no suggested modification indices that would meaningfully improve the model, and all residual correlations lower than $r < |0.11|$. This indicates good overall and local model fit. Following this, all the factors' loadings were greater than 0.57, meaning that across items at least 32% of their information is due to the underlying PT factor.

To evaluate further the scale validity in relation to the Anxiety and Loneliness factors, we estimated the CFA that includes the three factors. Items 1, 5, 6, 9, 10, 15, 16, 19, and 20 from the Loneliness scale were reverse coded. The initial model presents good overall fit indices $\chi^2(1124) = 1999.117$, $p < 0.001$, CFI = 0.932, SRMR = 0.082, gamma-hat = 0.889, but did presented issues of local misfit. When looking at modification indices, we made three changes to the model, added a second factor loading for the items 17 and 18 from the Loneliness scale loading into the Anxiety factor as well, and finally added the residual correlation between the Anxiety items 10 and 14. It's worth noting that no relevant change was needed for the Positive Thinking scale items. Once these changes were made, the overall and local fit are good, $\chi^2(1121) = 1813.033$, $p < 0.001$, CFI = 0.946, SRMR = 0.075, gamma-hat = 0.910.

In (Table 1), we present the factor reliability estimates, we see that the three factors present high inter-item correlation in the ordinal α, and with the McDonald ω. Focusing on the Positive thinking factor, we see an the ordinal α of 0.904 and McDonald ω of 0.859, indicating high inter-item correlation, and a conservative estimate of factor reliability of 0.859, when accounting for the factor structure and weights, when the estimate does not assumes tau-equivalence. In any of these scenarios we find high factor reliability.

	Ordinal α	ω
Positive Thinking	0.904	0.859
Anxiety	0.957	0.934
Loneliness	0.929	0.903

Table 1: Factor Reliability Estimates.

When looking at the factor loadings (Table 2) we reject the null hypothesis of the factor loadings being equal to 0 for each one. For the Positive Thinking factor, we see the factor loadings ranging from 0.465 to 0.869, meaning that the proportion of item variance that is related to the underlying factors (R^2) ranges from 0.216 to 0.754. This is evidence of factor validity. For the Anxiety factor, the factor loadings range from 0.517 to 0.917, indicating that the proportion of item variance related to the anxiety factor range from 0.267 to 0.841. Lastly, for the Loneliness factor the factor loadings range from 0.190 to 0.902, indicating that the proportion of item variance related to the loneliness factor range from 0.194 to 0.813. The last model modification, residual correlation between anxiety items, we reject the null hypothesis of this correlation being equal to 0, with a correlation $r = 0.673$, $p < 0.001$.

	Factor/item	Estimate (SE)	p-value	R^2
Positive Thinking	PT1	0.858 (0.026)	< 0.001	0.736
	PT2	0.843 (0.031)	< 0.001	0.71
	PT3	0.607 (0.049)	< 0.001	0.369
	PT4	0.465 (0.057)	< 0.001	0.216
	PT5	0.663 (0.049)	< 0.001	0.439
	PT6	0.783 (0.033)	< 0.001	0.614
	PT7	0.768 (0.031)	< 0.001	0.589
	PT8	0.869 (0.025)	< 0.001	0.754
Anxiety	BAI1	0.644 (0.042)	< 0.001	0.415
	BAI2	0.613 (0.044)	< 0.001	0.376
	BAI3	0.799 (0.028)	< 0.001	0.638
	BAI4	0.838 (0.023)	< 0.001	0.702
	BAI5	0.717 (0.042)	< 0.001	0.513
	BAI6	0.802 (0.026)	< 0.001	0.643
	BAI7	0.839 (0.023)	< 0.001	0.704
	BAI8	0.917 (0.015)	< 0.001	0.841
	BAI9	0.850 (0.020)	< 0.001	0.722
	BAI10	0.747 (0.034)	< 0.001	0.558
	BAI11	0.762 (0.032)	< 0.001	0.58
	BAI12	0.857 (0.031)	< 0.001	0.734
	BAI13	0.821 (0.026)	< 0.001	0.675
	BAI14	0.714 (0.037)	< 0.001	0.51
	BAI15	0.649 (0.047)	< 0.001	0.421
	BAI16	0.784 (0.029)	< 0.001	0.614
	BAI17	0.684 (0.038)	< 0.001	0.468
	BAI18	0.673 (0.054)	< 0.001	0.453
	BAI19	0.517 (0.054)	< 0.001	0.267
	BAI20	0.610 (0.043)	< 0.001	0.372
	BAI21	0.631 (0.042)	< 0.001	0.398
	LON17	0.331 (0.059)	< 0.001	
	LON18	0.257 (0.050)	< 0.001	
Loneliness	LON2	0.549 (0.048)	< 0.001	0.302
	LON3	0.767 (0.032)	< 0.001	0.589
	LON4	-0.454 (0.058)	< 0.001	0.206
	LON7	0.764 (0.030)	< 0.001	0.583
	LON8	0.542 (0.047)	< 0.001	0.294
	LON11	0.791 (0.027)	< 0.001	0.626
	LON12	0.682 (0.036)	< 0.001	0.465
	LON13	0.755 (0.031)	< 0.001	0.57
	LON14	0.861 (0.020)	< 0.001	0.742
	LON17	0.190 (0.059)	< 0.001	0.194
	LON18	0.611 (0.040)	< 0.001	0.559
	LON1	0.671 (0.044)	< 0.001	0.451
	LON5	0.674 (0.041)	< 0.001	0.454
	LON6	0.681 (0.038)	< 0.001	0.464
	LON9	0.372 (0.056)	< 0.001	0.139
	LON10	0.803 (0.028)	< 0.001	0.644
	LON15	0.800 (0.028)	< 0.001	0.64
	LON16	0.770 (0.028)	< 0.001	0.593
	LON19	0.867 (0.025)	< 0.001	0.752
	LON20	0.902 (0.019)	< 0.001	0.813

Table 2: Factor Loadings.

Lastly, when we look at factor correlations (Table 3). We reject the null hypothesis of the correlation being equal to 0 for all of the factor correlations ($p < 0.001$). We find that as theoretically expected, Positive Thinking has a negative correlation with both Anxiety ($r = -0.384$) and Loneliness ($r = -0.508$), while Anxiety and Loneliness have a positive correlation ($r = 0.381$). These results present evidence of construct, convergent, and discriminant validity.

	Positive Thinking	Anxiety	Loneliness
Positive Thinking	1		
Anxiety	-0.384*	1	
Loneliness	-0.508*	0.381*	1
* = p < 0.001			

Table 3: Factor Correlations.

Discussion

This study represents the first attempt to examine the reliability and the validity of the Spanish version of the Positive Thinking Skills Scale (S-PTSS) among Spanish speaking college students in Costa Rica. The results provide solid support for the scale's reliability and validity among Spanish speaking college students. Reliability was demonstrated by high ordinal α of 0.904 and McDonald ω of 0.859. The finding of this study is consistent with findings of similar studies. For example, in a study of 100 First generation middle Eastern immigrants, the Arabic version of Positive Thinking Skills Scale (A-PTSS) reported an alpha of .89 [16]. Another study with American caregivers of persons with Autism Spectrum Disorders (ASD) reported an alpha reliability of .90 [2]. Also, an alpha of .86 was reported for the Turkish version of the PTSS in a sample of 295 Turkish university students. In addition, studies reported alphas of .87, and .89, respectively, for the PTSS in American acute care nurses and among American college students [18].

The findings of the study indicated that Positive Thinking has a negative correlation with both Anxiety ($r = -0.384$) and Loneliness ($r = -0.508$). These results present evidence of construct validity and are consistent with the results of the previous studies. For example, previous research show that the Arabic version of the PTSS has significant correlations in the expected direction with measures of positive cognitions, resourcefulness, and generalized anxiety disorder ($r = .42$, .39, and -.42; $p < .001$, respectively). The findings are also similar to previous research findings with caregivers of persons with autism, which found significant correlations with positive cognitions, resourcefulness, depression, and general well-being ($r = .53$, .63, -.45, and .40; $p < .01$, respectively) [2].

In addition, the results of this study showed that factor loadings ranging from 0.465 to 0.869, meaning that the proportion of item variance that is related to the underlying factors (R^2) ranges from 0.216 to 0.754. This is evidence of factor validity. The results of this study are similar to previous study findings that found that the Arabic version of the PTSS consists of a single dimension and supports the construct validity of the A-PTSS [2].

The findings of this study of the psychometric properties of the S-PTSS in Spanish speaking college students in Costa Rica indícate promising evidence that the 8-item S-PTSS has acceptable reliability and validity. Also, the findings showed that the S-PTSS is potentially useful for assessing depressive thoughts that are necessary to be identified before the development of clinical depression in Spanish speaking college students in Costa Rica. Early detection and intervention is important to protect the young generation. Further psychometric testing of the S-PTSS is recommended.

Supplemental Materials

R code and de-identified data can be found in the online supplemental OSF site <https://osf.io/6ucys/>

Declaration of Interest

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