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The Psychometric Properties of English and Spanish Versions of the Life Orientation Test-Revised in Hispanic Americans

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Abstract The Life Orientation Test-Revised (LOT-R) is a widely used measure of optimism and pessimism, with three positively worded and three negatively worded content items. This study examined the structural validity and invariance, internal consistency reliability, and convergent and divergent validity of the English and Spanish versions of the LOT-R among Hispanic Americans. A community sample of Hispanic Americans (N = 422) completed self-report measures, including the LOT-R, Patient Health Questionnaire-9, and Generalized Anxiety Disorder-7, in their preferred language of English or Spanish. Based on the literature, four structural models were tested: *one-factor*, *oblique two-factor*, *orthogonal two-factor method effects with positive specific factor*, and *orthogonal two-factor method effects with negative specific factor*. Baseline support for both of the English and Spanish versions was not achieved for any model; in all models, the negatively worded items in Spanish had non-significant factor loadings. Therefore, the positively worded three-item optimism subscale of the LOT-R was examined separately and fit the data, with factor loadings equivalent across language-preference groups. Coefficient alphas for the optimism subscale were consistent across both language-preference groups (αs = .61 [English] and .66 [Spanish]). In contrast, the six-item total score and three-item pessimism subscale demonstrated extremely low or inconsistent alphas. Convergent and divergent validity were established for the optimism subscale in both languages. In sum, the optimism subscale of the LOT-R demonstrated minimally acceptable to good psychometric properties across English and Spanish language-preference groups. However, neither the total score nor the pessimism subscale showed adequate psychometric properties for Spanish-speaking Hispanic Americans, likely due to translation and cultural adaptation issues, and thus are not supported for use with this population.

Keywords Psychometrics · Measurement · Hispanic Americans · Life Orientation Test-Revised (LOT-R) · Optimism · Pessimism

Dispositional optimism is a personality trait characterized by expectation of positive outcomes (Carver et al. 2010). Conversely, dispositional pessimism is the inherent worldview that, more often than not, negative outcomes will be encountered (Carver et al. 2010). Dispositional optimism and pessimism have been associated with better and worse psychological and physical health, respectively (for recent reviews, see Carver and Scheier 2014; Carver et al. 2010; Rasmussen et al. 2009). The Life Orientation Test-Revised (LOT-R; Scheier et al. 1994) is the most widely used measure of dispositional optimism and pessimism (Herzberg et al. 2006).

The LOT-R is a revision of the original 12-item Life Orientation Test (LOT), which consisted of eight content items designed to measure dispositional optimism and four filler items (Scheier and Carver 1985). The original LOT,

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although widely used, was criticized due to a "third variable problem" (Scheier et al. 1994, p. 1064); i.e., the effects attributable to optimism as captured by the LOT were actually in part due to variance that optimism shared with another variable, such as positive reinterpretation or self-mastery. Therefore, the LOT was revised to reduce this problem, with two of the positively worded and one of the negatively worded content items eliminated and one positively worded content item added (Scheier et al. 1994). The 10-item LOT-R (Scheier et al. 1994) contains five of the eight original content items, one new positively worded content item, plus the original four filler items. There are three negatively worded content items that are reverse-scored, and then summed with the three positively worded content items to provide one total score. The filler items are not scored.

The LOT-R was psychometrically evaluated with data from a large sample of college undergraduate students ($N = 2055$), 67.8% of whom were men (Scheier et al. 1994). An exploratory factor analysis of the six content items provided evidence for a one-factor structure. Cronbach's alpha for the six items was .78, and test-retest reliability was high at 4, 12, 24, and 28 months. The LOT-R was moderately correlated with measures of self-mastery, trait anxiety, self-esteem, neuroticism-temperament, and neuroticism-personality in the expected directions, supporting convergent validity. A small community sample of patients waiting to undergo coronary artery bypass surgery ($N = 159$) also completed the LOT-R (Scheier et al. 1994). Sample means and standard deviations for the college and pre-coronary bypass surgery samples were provided as preliminary norms for the LOT-R.

Since the LOT-R was created, it has been widely used, but its dimensionality has been a heavily debated topic. Dispositional optimism was originally conceptualized as a bipolar construct, with optimism on one end of the spectrum and pessimism on the other. Thus, the LOT-R was considered a uni-dimensional measure of optimism/pessimism (Scheier et al. 1994). However, some evidence suggests that optimism and pessimism are two relatively independent constructs, and that the LOT-R is a bi-dimensional measure with two subscales separately evaluating optimism and pessimism (Glaesmer et al. 2012; Herzberg et al. 2006; Marshall et al. 1992; Zenger et al. 2013). To further complicate the debate, others have argued that the statistically derived two factors of the LOT-R are artifacts of method effects; i.e., the two-factor structure of the LOT-R is a direct result of having equally positively and negatively worded items, not a result of actually being a bi-dimensional construct (Rauch et al. 2007). Consequently, orthogonal two-factor method effects models have been used to statistically assess for method effects. These method effects models consist of a three-item specific factor (one consisting of the positively worded items in one model and one consisting of the negatively worded items in a separate model) to capture the artifact two-factor variance of having positively and negatively worded items and a six-item general factor to capture the variance of the construct, optimism/pessimism. Using a large nationwide sample of Italians ($N = 11{,}028$), Vecchione et al. (2014) found support for the method effects model with a positive specific factor over four other models tested. To date, the debate over the dimensionality of the LOT-R remains unresolved (see Carver and Scheier 2014, for a discussion).

The LOT-R has been translated into several languages, including Spanish (Perczek et al. 2000). In an attempt to ensure that diverse Latino groups would readily understand the Spanish translation of the LOT-R, Perczek et al. employed translators from several Latino populations (described as "Colombian, Argentinean, Peruvian, and Cuban American," p. 69) to collaborate on the translation. Mexican American translators were not included in the translation process, most likely because there is a limited population of Mexican Americans in Miami, where the Spanish translation was completed. The validation sample for the Spanish LOT-R consisted of 142 English-Spanish bilingual undergraduate students. A four-point (versus the original five-point) response scale was used. Alpha coefficients for the total score were acceptable (English $\alpha = .84$, Spanish $\alpha = .79$). The authors combined the English and Spanish responses to run an exploratory factor analysis, which provided support for a one-factor structure; a multi-group confirmatory factor analysis (CFA) was not conducted to test for structural invariance across language groups.

Community-based studies of the psychometric properties of the LOT-R are lacking (Glaesmer et al. 2012), and there are very few studies examining the psychometric properties of the LOT-R among Hispanic Americans. As part of a larger study, D'Orazio et al. (2011) examined the reliability and factor structure of the Spanish version of the LOT-R in a small sample ($N = 54$) of Spanish-speaking Hispanic American women with cervical cancer. The six-item LOT-R demonstrated poor internal consistency (Cronbach's $\alpha = .15$). The authors reported that "there was not a clear factor structure" (p. 521), but did not present the results of the factor analysis, which would have been inconclusive due to the study's small sample size. The authors decided to use the sum of two of the positively worded items as their measure of optimism and did not derive a score for pessimism. In a predominately female sample (68.9%) of majority Spanish-speaking Hispanic Americans ($N = 236$), Howarter and Bennett (2013) found a Cronbach's alpha = .65 for the six-item LOT-R; no other psychometric information was reported. In another study of 251 English- or Spanish-speaking Latino men and women, Efuni et al. (2014) found that the six-item LOT-R demonstrated inadequate internal consistency (Cronbach's $\alpha = .59$; combined English and Spanish). To date, there are no studies examining psychometric invariance across the English and Spanish versions of the LOT-R in American samples.

The purpose of the present study was to examine the structural validity and invariance, internal consistency reliability, and convergent and divergent validity of the English and Spanish versions of the LOT-R for English- and Spanish-speaking Hispanic Americans in the United States (U.S.). Based on the literature, *one-factor*, *oblique two-factor*, *orthogonal method effects two-factor with positive specific factor*, and *orthogonal method effects two-factor with negative specific factor* LOT-R models were tested using data from Hispanic American adults, who completed the questionnaire in their preferred language of English or Spanish. Convergent and divergent validity for both language versions of the LOT-R were evaluated. Convergent validity was evaluated by examining the associations between the LOT-R and symptoms of depression and anxiety, as demonstrated in the original LOT-R development study (Scheier et al. 1994). Based on previous findings (Howarter and Bennett 2013; Perczek et al. 2000) LOT-R total scores were expected to be moderately and negatively associated with scores on measures of depression and anxiety. Three-item LOT-R optimism subscale scores were also expected to be moderately and negatively associated with scores on measures of depression and anxiety (Glaesmer et al. 2012). Three-item LOT-R pessimism subscale scores were expected to be moderately and positively associated with scores on these measures (Glaesmer et al. 2012; Zenger et al. 2011). Divergent validity was evaluated by examining the associations between the LOT-R scores and gender. The LOT-R total score, and optimism and pessimism subscale scores were expected to be unrelated to gender (Glaesmer et al. 2012; Herzberg et al. 2006; Huan et al. 2006; Zenger et al. 2013).

Method

Participants

Participants were a community sample of 422 self-identified Hispanic American men and women (English language-preference n = 205, Spanish language-preference n = 217). Eligibly criteria included self-identifying as Hispanic American, being at least 21 years old, currently residing in the U.S., and being sufficiently literate in either English or Spanish to complete the survey packet in their preferred language.

Measures

Life Orientation Test-Revised (LOT-R; Perczek et al. 2000; Scheier et al. 1994). The LOT–R is a six-item self-report measure assessing dispositional optimism and pessimism. The English and Spanish versions used in this study used a four-point response scale (from 1 = *I agree a lot* to 4 = *I disagree a lot*), and did not include the four filler items. A total score was calculated by reverse-scoring the three negatively worded items and summing them with the three positively worded items. Total scores can range from 6 to 24, with higher scores representing higher levels of dispositional optimism. Optimism subscale scores were calculated by summing the three positively worded items, and pessimism subscale scores were calculated by summing the three negatively worded items. The two subscale scores can range from 3 to 12, with higher scores representing higher levels of the dispositional construct reflected (i.e., more optimism or pessimism).

Patient Health Questionnaire-9 (PHQ-9; Spitzer et al. 1999**;** *Spanish Personal Health Questionnaire [PHQ-8] Depression* n.d.). The PHQ-9 is a widely used self-report measure assessing depression-related symptoms as defined by the *DSM-IV-TR* (American Psychiatric Association 2000). Total scores range from 0 to 27, with higher scores indicating greater endorsement of depressive symptoms over the prior two weeks. For the present study, internal consistency reliability was strong for the total sample (α = 0.90) and for the two language-preference groups (English: α = 0.90; Spanish: α = 0.90; Mills et al. 2014).

Generalized Anxiety Disorder-7 scale (GAD-7; García-Campayo et al. 2010; Spitzer et al. 2006). The GAD-7 is a widely used seven-item self-report measure assessing anxiety-related symptoms as defined by the *Diagnostic and Statistical Manual of Mental Disorders-IV-TR* (DSM-IV-TR; American Psychiatric Association 2000). The GAD-7 was originally created in English (Spitzer et al. 2006) and then translated into Spanish (García-Campayo et al. 2010). Response options are on a four-point scale (from 0 = *not at all* to 3 = *nearly every day*), and symptoms are evaluated as they have occurred over the prior two weeks. Total scores range from 0 to 21, with scores $\geq$ 5, $\geq$ 10, and $\geq$ 15 reflecting mild, moderate, and severe anxiety levels, respectively. For the present study, internal consistency reliability was strong for the total sample (α = 0.93) and for the two language-preference groups (English: α = 0.91; Spanish: α = 0.94; Mills et al. 2014).

Procedure

The present data were collected from a community-based sample of Hispanic Americans during a cross-sectional study. The sponsoring universities' Institutional Review Boards approved all study procedures and materials prior to subject recruitment. Recruitment was done via flyer distribution, word-of-mouth, and meetings at community sites, churches, and health fairs. Informed consent was obtained from all individual participants included in the study. Eligible participants completed survey packets in their preferred language of English or Spanish. Participants received $75 as a token of appreciation for their participation in the study.

Data Analysis

Descriptive statistics were calculated for the full sample and English and Spanish language-preference groups, separately. Independent samples *t*-tests and chi-square tests were used to compare demographic statistics across language-preference groups. LOT-R total, optimism subscale, and pessimism subscale scores were also compared across language groups using independent samples *t*-tests.

Multiple-group confirmatory factor analysis (CFA) was used to examine the goodness of fit of the *one-factor*, *oblique two-factor*, *orthogonal method effects two-factor with positive specific factor*, and *orthogonal method effects two-factor with negative specific factor* of the LOT-R, and to evaluate structural invariance across English- and Spanish-language-preference groups. For the *one-factor* model, the negatively worded items were reverse scored and all six observed variables were indicated to one latent variable (Optimism/Pessimism). For the *oblique two-factor* model, separate Optimism and Pessimism latent variables were each indicated by 3 observed variables and an interfactor correlation was specified between the two latent variables. For the *orthogonal method effects two-factor with positive specific factor,* the negatively worded observed variables were reverse scored, all six observed variables were indicated to one general latent variable (Optimism/Pessimism), and the three positively worded observed variables were indicated to a latent specific factor (to capture the artifact two-factor variance of having positively and negatively worded items); these two latent variables were constrained to independence (i.e., they were orthogonal). Finally, for the *orthogonal method effects two-factor with negative specific factor,* the negatively worded observed variables were reverse scored, all six observed variables were indicated to one general latent variable (Optimism/Pessimism), and the three negatively worded observed variables were indicated to a latent specific factor (to capture the artifact two-factor variance of having positively and negatively worded items); these two latent variables were constrained to independence (i.e., they were orthogonal). Three increasingly restrictive models were examined using the sequential constraint composition approach: 1) configural invariance, 2) metric invariance, and 3) factor variance invariance.

Model fit was assessed using the recommendations of Bentler (2007). Three indicators of model fit were examined: (1) Root Mean Square Error of Approximation (RMSEA; Steiger 1990), an absolute index of overall model fit; (2) Standardized Root Mean Residual (SRMR; Hu and Bentler 1999), also an absolute index of overall model fit; and (3) Comparative Fit Index (CFI; Bentler 1990), a relative index of model fit compared to the null model. CFI descriptive index values > .90 were indicative of acceptable model fit and values > .95 were indicative of good model fit. SRMR and RMSEA fit index values < .08 were indicative of acceptable model fit and values < .05 were indicative of good model fit. The data were multivarately non-normal; therefore, the maximum likelihood robust (MLR) estimator was used when estimating model parameters in MPlus version 7.2 (Muthén and Muthén 1998). The Satorra-Bentler χ^2 ($S\text{-}B\chi^2$; Satorra and Bentler 2001) test statistic was calculated using the scaling correction factor for MLR. This statistic was reported for completeness, but was not used to assess model fit due to its lack of robustness to sample size (Kelloway 1995).

A model was determined to fit acceptably well if at least two of the three descriptive fit indices met acceptable model fit criteria. When more restrictive nested models were compared statistically (e.g., metric invariance to factor variance invariance models), ΔS-Bχ2 and ΔCFI were examined. Using criteria previously established (Chen 2007; Cheung and Rensvold 2002), a non-statistically significant ($p > .05$) change in S-Bχ2 value, or a change in CFI $\leq .01$, were indicative of no difference between nested models.

After determining the factor structure, internal consistency reliability coefficients for the LOT-R total score and optimism and pessimism subscale scores were calculated as Cronbach's alpha. Convergent validity was evaluated by examining Pearson product-moment correlations between the LOT-R scores (total score, optimism and pessimism subscales) and the PHQ-9 and GAD-7 total scores. Divergent validity was evaluated by examining independent samples *t*-tests between the LOT-R scores (total score, optimism and pessimism subscales) and gender.

Results

Descriptive Statistics

Sample characteristics and descriptive statistics for the LOT-R, PHQ-9, and GAD-7 can be found in Table 1. As expected, language-preference groups significantly differed on many socioeconomic and demographic variables. Participants in the English language-preference group were younger, had a higher level of education, had a higher level of income, were more frequently employed, and were more frequently born in the United States (versus Mexico, most commonly) in comparison to the Spanish language-preference group. Mean English-language six-item total scores, three-item optimism subscale scores, and three-item pessimism subscale scores did not significantly differ from mean Spanish-language total scores ($t_{(410)} = 0.26$, $p = 0.80$), optimism subscale scores ($t_{(410)} = 1.26$, $p = 0.21$), or pessimism subscale scores ($t_{(415)} = 1.02$, $p = 0.31$).

Table 1 Sample characteristics and descriptive statistics ($N = 422$)

	Total Sample ($N = 422$)	English ($n = 205$)	Spanish ($n = 217$)
Age*[a]	42.2 (14.0)	38.1 (13.6)	46.1 (13.2)
Missing	1	0	1
Gender[b]			
Women	210 (49.8%)	105 (51.2%)	105 (48.4%)
Men	212 (50.2%)	100 (48.8%)	112 (51.6%)
Education*[b]			
Less than high school	113 (26.8%)	12 (5.9%)	101 (46.5%)
High school/ trade school	85 (20.1%)	38 (18.5%)	47 (21.7%)
Some college/associates degree	121 (28.7%)	80 (39.0%)	41 (18.9%)
Bachelor's degree	73 (17.3%)	56 (27.3%)	17 (7.8%)
Postgraduate	24 (5.7%)	17 (8.3%)	7 (3.2%)
Missing/don't know	6 (1.4%)	2 (1.0%)	4 (1.9%)
Annual income*[b]			
Less than $25,000	176 (41.7%)	59 (28.8%)	117 (53.9%)
$25,00 - $34,999	49 (11.6%)	19 (9.3%)	30 (13.8%)
$35,000 - $49,999	68 (16.1%)	39 (19.0%)	29 (13.4%)
$50,000 - $74,999	49 (11.6%)	39 (19.0%)	10 (4.6%)
$75,000 or more	43 (10.2%)	34 (16.6%)	9 (4.1%)
Missing/don't know	37 (8.8%)	15 (7.3%)	22 (10.2%)
Employment status*[b]			
Employed	240 (56.9%)	138 (67.3%)	102 (47.0%)
Not Employed for Wages			
Unemployed	70 (16.6%)	29 (14.2%)	41 (18.9%)
Homemaker	33 (7.8%)	6 (2.9%)	27 (12.4%)
Student/retired/disabled	48 (11.4%)	18 (8.8%)	30 (13.8%)
Social Security/SSI	13 (3.1%)	4 (2.0%)	9 (4.1%)
Missing/don't know	18 (4.3%)	10 (4.9%)	8 (3.7%)
Marital status[b]			
Married	206 (48.8%)	93 (45.4%)	113 (52.1%)
Not married			
Never been married	121 (28.7%)	64 (31.2%)	57 (26.3%)
Living with partner	28 (6.6%)	15 (7.3%)	13 (6.0%)
Divorced/separated	55 (13.0%)	30 (14.6%)	25 (11.6%)
Widowed	11 (2.6%)	3 (1.5%)	8 (3.7%)
Missing	1 (0.2%)	0 (0.0%)	1 (0.5%)
Country of birth*[b]			
United States	160 (37.9%)	129 (62.9%)	31 (14.3%)
Mexico	182 (43.1%)	52 (25.4%)	130 (59.9%)
Other	11 (2.6%)	8 (3.9%)	3 (1.4%)
Missing	69 (16.4%)	16 (7.8%)	53 (24.4%)
Children[b]			
Yes	252 (59.7%)	116 (56.6%)	136 (62.7%)
No	164 (38.9%)	88 (42.9%)	76 (35.0%)
Missing	6 (1.4%)	1 (0.5%)	5 (2.3%)
LOT-R Total[a]	18.0 (3.0)	18.0 (3.1)	17.9 (2.9)
Missing[b]	10 (2.4%)	2 (1.0%)	8 (3.7%)
LOT-R Optimism[a]	9.2 (2.0)	9.3 (1.8)	9.0 (2.1)
Missing[b]	10 (2.4%)	2 (1.0%)	8 (3.7%)
LOT-R Pessimism[a]	6.2 (2.0)	6.3 (2.0)	6.1 (1.9)

Table 1 (continued)

	Total Sample (*N* = *422)*	English (*n* = 205)	Spanish (*n* = 217)
Missing[b]	5 (1.2%)	2 (1.0%)	3 (1.4%)
PHQ-9 Total[a]	4.7 (5.2)	4.5 (5.1)	4.8 (5.3)
Missing[b]	14 (3.3%)	5 (2.4%)	9 (4.1%)
GAD-7 Total[a]	4.9 (5.3)	4.1 (4.6)	5.7 (5.8)
Missing[b]	10 (2.4%)	3 (1.5%)	7 (3.2%)

*$p < .05$

[a] *M* (*SD*)

[b] *n* (%). Independent sample *t*-tests and Chi-square tests were used to evaluate differences in sample characteristic variables between language-preference groups

Structural Validity and Invariance across Groups

Configural, Metric, and Factor Variance Invariance Configural invariance was examined by fitting *one-factor*, *oblique two-factor*, *orthogonal method effects two-factor with positive specific factor*, and *orthogonal method effects two-factor with negative specific factor* solutions to the data for the English- and Spanish-language-preference groups. Unstandardized and standardized factor loadings for items for the *one-factor*, *oblique two-factor*, *orthogonal method effects two-factor with positive specific factor*, and *orthogonal method effects two-factor with negative specific factor* models can be found in Table 2. The *one-factor* solution did not fit the data well descriptively for either group (see Table 3). The *oblique two-factor*, *orthogonal method effects two-factor with positive specific factor*, and *orthogonal method effects two-factor with negative specific factor* solutions fit the data well descriptively for both groups (see Table 3). For *oblique two-factor* and *orthogonal method effects two-factor with negative specific factor*, unstandardized factor loadings for the English-language-preference group were statistically significant but the unstandardized factor loadings for the Spanish-language-preference group were not statistically significant (the standardized factor loadings were statistically significant for the *oblique two-factor* model but were not practically significant). For the *orthogonal method effects two-factor with positive specific factor*, the unstandardized factor loadings for the general optimism factor were not statistically significant for either the English-language-preference group or the Spanish-language-preference group. Therefore, support for the configural invariance of each of the two-factor models was lacking. Because configural models for the *one-factor*, *oblique two-factor, orthogonal method effects two-factor with positive specific factor*, and *orthogonal method effects two-factor with negative specific factor* models were not fully established in both language-preference groups, neither metric invariance nor factor variance/covariance invariance were tested.

Additional Multigroup CFA Model: Three-Positively-Worded-Item Optimism Scale

For each of the tested models, the lack of fit seemed to be driven by the three-negatively-worded items (i.e., pessimism subscale) in Spanish. Therefore, a one-factor model consisting of the three-positively-worded items (i.e., optimism subscale) was also explored to evaluate if model fit could be established.

Configural Invariance Configural invariance was examined by fitting the one-factor, three-item solution to the data for the English- and Spanish-language-preference groups. The model was just identified (i.e., the parameters to be estimated equaled the amount of information available and there were no degrees of freedom); therefore, model fit information was unavailable. Unstandardized and standardized factor loadings were statistically significant (see Table 4). Thus, configural invariance was established.

Metric Invariance A one-factor (three-item) metric invariance model was examined by constraining all factor loadings to be equivalent across English- and Spanish-language-preference groups. This constrained model could not be compared to the less restrictive configural invariance model because model fit information was unavailable. This one-factor model fit well descriptively (see Table 5). Thus, structural invariance was established.

Factor Variance Invariance In addition to factor loadings, the factor variances were constrained to equivalence in the factor variance invariance model. This model fit the data well descriptively (see Table 5). Model fit was neither compromised statistically (ΔS-B$\chi 2$ = 2.40, df = 1,

Table 2 Unstandardized and standardized factor loadings for the one-factor, oblique two-factor, and orthogonal two-factor method effects with positive and negative specific factors configural models for English- and Spanish-language versions of the LOT-R

LOT-R item	Unstandardized factor loadings		Standardized factor loadings	
	English (n = 205)	Spanish (n = 217)	English (n = 205)	Spanish (n = 217)
One-factor				
1. In uncertain times, I usually expect the best.	1.00	1.00	.26	.63
2. If something can go wrong for me, it will.	2.27*	0.14	.57	.10
3. I'm always optimistic about my future.	1.17*	0.85*	.32	.70
4. I hardly expect things to go my way.	2.56*	−0.04	.66	−.03
5. I rarely count on good things happening to me.	2.46*	0.22	.58	.14
6. Overall, I expect more good things to happen to me than bad.	2.20*	0.93*	.59	.58
Oblique two-factor				
Optimism				
1. In uncertain times, I usually expect the best.	1.00	1.00	.38	.65
3. I'm always optimistic about my future.	1.15*	0.80*	.46	.68
6. Overall, I expect more good things to happen to me than bad.	2.15*	0.90*	.86	.58
Pessimism				
2. If something can go wrong for me, it will.	1.00	1.00	.60	.25
4. I hardly expect things to go my way.	1.10*	1.54	.68	.36
5. I rarely count on good things happening to me.	1.12*	2.84	.65	.66
Orthogonal method effects two-factor – positive specific factor				
Positive specific factor				
1. In uncertain times, I usually expect the best.	1.00	1.00	.52	.67
3. I'm always optimistic about my future.	1.14*	0.77*	.62	.66
6. Overall, I expect more good things to happen to me than bad.	0.92*	0.85*	.50	.56
Optimism General Factor				
1. In uncertain times, I usually expect the best.	1.00	1.00	.12	.05
2. If something can go wrong for me, it will.	5.45	4.22	.61	.22
3. I'm always optimistic about my future.	1.33	1.73	.16	.10
4. I hardly expect things to go my way.	5.97	6.42	.68	.31
5. I rarely count on good things happening to me.	6.07	15.66	.64	.76
6. Overall, I expect more good things to happen to me than bad.	4.10	3.75	.49	.17
Orthogonal method effects two-factor – negative specific factor				
Negative Specific Factor				
2. If something can go wrong for me, it will.	1.00	1.00	.50	.27
4. I hardly expect things to go my way.	0.93*	1.92	.48	.47
5. I rarely count on good things happening to me.	1.38*	2.12	.66	.53
Optimism General Factor				
1. In uncertain times, I usually expect the best.	1.00	1.00	.38	.63
2. If something can go wrong for me, it will.	0.90*	0.13	.33	.09
3. I'm always optimistic about my future.	1.16*	0.87*	.46	.70
4. I hardly expect things to go my way.	1.13*	−0.08	.42	−.05
5. I rarely count on good things happening to me.	0.83*	0.21	.29	.14
6. Overall, I expect more good things to happen to me than bad.	2.20*	0.94*	.87	.58

The factor loading for the first item was fixed to 1 to set the metric for the latent variable. *P*-values are only presented for the unstandardized factor loadings

*$p < .05$

p = 0.12) nor descriptively (ΔCFI $\leq$0.01) when factor loadings were constrained to equivalence, indicating that the more parsimonious model, i.e., the factor variance invariance model, was a superior fit to the data.

Table 3 Fit statistics for the one-factor, oblique two-factor, orthogonal method effects two-factor with positive specific factor, and orthogonal method effects two-factor with negative specific factor configural invariance models of the LOT-R

Model	S-Bχ^2	*df*	*p*	CFI[a]	SRMR[b]	RMSEA[b]
One-factor						
English	42.47	9	<.01	0.72	0.09	0.14
Spanish	28.71	9	<.01	0.79	0.07	0.10
Oblique two-factor						
English	15.71	8	0.047	0.94	0.05	0.07
Spanish	13.95	8	0.083	0.94	0.04	0.06
Orthogonal method effects two-factor – positive specific factor						
English	4.69	6	0.585	1.00	0.02	0.00
Spanish	12.00	6	0.062	0.94	0.04	0.07
Orthogonal method effects two-factor – negative specific factor						
English	12.00	6	0.062	0.95	0.04	0.07
Spanish	11.18	6	0.083	0.95	0.03	0.06

S-B Satorra-Bentler, *CFI* robust comparative fit index, *SRMR* standardized root mean square residual, *RMSEA* root mean square error of approximation

[a] Acceptable fit > .90, Good fit >.95

[b] Acceptable fit < .08, Good fit < .05

Model Fit in English-Language-Preference Group Only

For the English-language-preference group, both the *oblique two-factor* and *orthogonal method effects two-factor with negative specific factor* models yielded satisfactory fit indices and significant factor loadings. For the *oblique two-factor* model the interfactor correlation was medium and statistically significant (r = .54, p < .05). To determine the best fitting factor structure between these two models, the Akaike information criteria (AIC; Akaike 1974) and the sample size-adjusted Bayesian information criteria (sBIC; Gerbing and Anderson 1993) were evaluated. For these descriptive fit indices, smaller values indicate better model fit. The AIC and sBIC values were very similar for the *oblique two-factor* and *orthogonal method effects two-factor with negative specific factor* models (AIC = 2881.332 vs. 2881.655; sBIC = 2884.27 vs. 2884.903), indicating that both models represent plausible factor structures.

Reliability

Cronbach's alpha values for the six-item total scores were: .57 for the total sample, .67 for the English-language-preference group, and .48 for the Spanish-language-preference group. Alpha coefficient values for the three-item optimism subscale scores were: .64 for the total sample, .61 for the English-language-preference group, and .66 for the Spanish-language-preference group. Alpha coefficient values for the three-item pessimism subscale scores were: .53 for the total sample, .68 for the English-language-preference group, and .39 for the Spanish-language-preference group.

Convergent and Divergent Validity

Because configural models were not established for the *one-factor* model, convergent and divergent validity were not examined for the six-item total score. See Table 6 for convergent validity results for the optimism and pessimism subscales. The three-item optimism subscale scores were weakly, negatively, and significantly correlated with scores on the PHQ-9 and GAD-7 for the total sample (PHQ-9 r = −.226, p < .01; GAD-7 r = −.195, p < .01), and for the English- and Spanish-language-preference groups separately (PHQ-$9_{English}$ r = −.274, p < .01; PHQ-$9_{Spanish}$ r = −.185, p = .01; GAD-$7_{English}$ r = −.253, p < .01; GAD-$7_{Spanish}$ − .149, p = .04). Three-item pessimism subscale scores were weakly to moderately, positively, and significantly correlated with scores on the PHQ-9 and GAD-7 for the total sample (PHQ-9 r = .254, p < .01; GAD-7 r = .222, p < .01) and for the English-language-preference group (PHQ-$9_{English}$ r = .366, p < .01; GAD-$7_{English}$ r = .396, p < .01). For the Spanish-language-preference group, however, the three-item pessimism subscale scores were weakly, positively, and

Table 4 Unstandardized and standardized factor loadings for the one-factor, three-positively-worded-item optimism configural models for English- and Spanish-language versions of the LOT-R

LOT-R item	Unstandardized factor loadings		Standardized factor loadings	
	English (n = 204)	Spanish (n = 214)	English (n = 204)	Spanish (n = 214)
1. In uncertain times, I usually expect the best.	1.00	1.00	.52	.66
3. I'm always optimistic about my future.	1.18*	0.79*	.65	.67
6. Overall, I expect more good things to happen to me than bad.	1.10*	0.89*	.60	.57

The factor loading for the first item was fixed to 1 to set the metric for the latent variable. *P*-values are only presented for the unstandardized factor loadings

*p < .05

Table 5 Fit statistics for the one-factor three-positively-worded-item optimism configural invariance, metric invariance, and factor variance invariance models of the LOT-R

Model	S-Bχ^2	*df*	*p*	CFI[a]	SRMR[b]	RMSEA[b]	Reference Model #	ΔS-Bχ2	Δdf	Δp	ΔCFI
1. Configural*											
2. Metric	1.76	2	0.42	1.00	0.03	0.00					
3. Factor	4.37	3	0.22	0.99	0.08	0.05	2	2.40	1	0.20	0.01

S-B Satorra-Bentler, *CFI* robust comparative fit index, *SRMR* standardized root mean square residual, *RMSEA* root mean square error of approximation

*Model is just identified; information is unavailable

[a] Acceptable fit > .90, Good fit >.95

[b] Acceptable fit < .08, Good fit < .05

significantly correlated with the PHQ-9 (r = .145, p = .04) but not significantly correlated with the GAD-7 (r = .102, p = .15).

Regarding divergent validity, as expected, three-item optimism scores did not differ by gender for the total sample ($t_{(412)} = -1.48$, $p = 0.61$), English-language-preference group ($t_{(203)} = 0.48$, $p = 0.69$), or Spanish-language-preference group ($t_{(209)} = -2.32$, $p = 0.29$). Similarly, three-item pessimism subscale scores also did not differ by gender for the total sample ($t_{(417)} = 1.16$, $p = 0.63$), English-language-preference group ($t_{(203)} = 0.87$, $p = 0.40$), or Spanish-language-preference group ($t_{(214)} = .82$, $p = 0.63$).

Discussion

The purpose of the present study was to examine the structural validity and invariance, internal consistency reliability, and convergent and divergent validity of the English and Spanish versions of the LOT-R for use with English- and Spanish-speaking Hispanic Americans. This is the first known study to psychometrically evaluate the LOT-R in a community sample of English- and Spanish-speaking Hispanic Americans.

The *one-factor* configural models for English and Spanish language-preference groups were not supported. Configural models representing *oblique two-factor*, *orthogonal method effects two-factor with positive specific factor*, and *orthogonal method effects two-factor with negative specific factor* for English and Spanish language-preference groups were supported (i.e., the data fit the model well descriptively), but the factor loadings for the Spanish three-item pessimism subscale and the factor loadings for the six-item general optimism factor were not significant. These findings suggest that the six-item LOT-R in English and Spanish, and the three-item pessimism subscale in Spanish, did not work equivalently across groups. A reduced one-factor model consisting of only the three-positively-worded items (i.e., the optimism subscale) was considered, and factor variance invariance was achieved for this model. Thus, structural invariance across English- and Spanish-language-preference groups was only established for the three-positively-worded-item optimism subscale, and this is the only LOT-R scale or subscale to have structural support for use across both groups.

Coefficient alphas for the LOT-R three-item optimism subscale were consistent and minimally adequate across both language-preference groups. Conversely, the six-item total score and three-item pessimism subscale demonstrated extremely low or inconsistent alphas. Because each of the subscales only contains three items, lower alpha coefficients are to be expected; however, the alpha value obtained for the pessimism subscale in the Spanish language-preference group was extremely low (α = .39). Furthermore, adequate to good alpha values (i.e., αs = .74 to .82) have been reported for the LOT-R total scale and subscales in English, and total scale in Spanish, in other studies despite the brevity of the measure and its subscales (Marshall et al. 1992; Perczek et al. 2010;

Table 6 Pearson product-moment correlations between LOT-R optimism and pessimism scores and GAD-7 and PHQ-9 total scores

	LOT-R: Optimism			LOT-R: Pessimism		
	Total Sample	English Language (n = 204)	Spanish Language (n = 214)	Total Sample	English Language (n = 204)	Spanish Language (n = 214)
GAD-7	−.195, $p < .01$	−.253, $p < .01$	−.149, $p = .04$	.222, $p < .01$	.396, $p < .01$	.102, $p = .15$
PHQ-9	−.226, $p < .01$	−.274, $p < .01$	−.185, $p = .01$	.254, $p < .01$	.366, $p < .01$	.145, $p = .04$

Values are presented as r

Scheier et al. 1994). Therefore, adequate alpha values can be achieved for the LOT-R, providing further evidence that the LOT-R six-item total score and three-item pessimism scale did not work well in the present community sample, particularly in Spanish. Convergent and divergent validity further supported the three-positively-worded optimism subscale. Specifically, for combined total sample and both language-preference groups, more optimism was associated with fewer symptoms of anxiety and depression, albeit these associations were weaker than expected. Optimism was unrelated to gender. In sum, the three-item optimism subscale of the LOT-R was the only model to demonstrate minimally acceptable to good psychometric properties across groups. Therefore, the six-item LOT-R should be used with caution among English-and Spanish-speaking Hispanic Americans, and if it is used, only the three-positively-worded-item optimism subscale is supported for cross-cultural comparisons.

The poor psychometric properties of the negatively worded items in Spanish can likely be explained by translation issues, included ensuring that the measure is conceptually, technically, and linguistically appropriate; and culturally competent (Allen and Walsh 2000; Davidov and Beuchelaer 2010; Geisinger 1994). The current sample was primarily Mexican American, but the translation used was not specifically developed for Mexican Americans. To our knowledge, a translation tailored to Spanish-speaking Mexican Americans does not currently exist. Limited research has explored the construct of pessimism among Spanish-speaking Hispanic Americans, and this is the first study to report the Cronbach's alpha for the Spanish three-item pessimism subscale of the LOT-R. The other studies that have reported Cronbach's alpha for the Spanish six-item total score after the original translation study (i.e., D'Orazio et al. 2011; Efuni et al. 2014; Howarter and Bennett 2013) found a wide range of alpha values (i.e., αs = .15, .59, and .65, respectively). Furthermore, D'Orazio et al. was the only study to report the Cronbach's alpha for a predominantly Mexican-American sample, and they reported the lowest alpha (i.e., α = .15). Thus, it is evident that the construct of pessimism is not being well captured by these three negatively worded items in Spanish among Mexican Americans. Future efforts to measure pessimism in this population should consider following the detailed steps required to create a culturally adapted measure (see Bravo 2003; Ercikan and Lyons-Thomas 2013). Yet, it should be noted that introduction of multiple versions of linguistic translations can be problematic, creating logistical and analytic challenges for studies with diverse samples, and for cross-study comparisons.

Although the aim of the present study was to evaluate the measurement invariance of the English and Spanish versions of LOT-R among Hispanic Americans, we found support for two models – *oblique two-factor* and *orthogonal method effects two-factor with negative specific factor* – for the English version only. Unsurprisingly, given what the method effect model implies, these two models were equally plausible based on fit indices. Yet, interestingly, the *orthogonal method effects two-factor with positive specific factor* model did not fit the data well. This is the first study to find support for an orthogonal method effects two-factor model with a *negative specific* factor. Evaluations of translated versions of the LOT-R (i.e., German and Italian) have found support for an orthogonal method effects two-factor model with a *positive* specific factor (Rauch et al. 2007; Vecchione et al. 2014). Rauch et al., however, postulated that this method effect factor could be more than an artifact of wording; support was found for an association between the latent positive specific factor and impression management. Further research is needed to elucidate the cause and meaning of these method effects models, and ultimately, a better measure of optimism/pessimism is necessary, especially in order to make cross-cultural comparisons.

This study had limitations, which should be considered when interpreting its findings. The study participants represented a broad range of income and education levels, but predominantly lived in a metropolitan border city, limiting the generalizability of study findings. Despite these limitations, this is the first study to examine the structural validity and invariance, internal consistency reliability, and convergent and divergent validity of the English and Spanish versions of the LOT-R among English- and Spanish-speaking Hispanic Americans in the U.S., and it offers important psychometric information on the English and Spanish versions of this widely used measure in a Hispanic American community sample. Furthermore, these results caution against making cross cultural comparisons using the six-item LOT-R and call for future research exploring the construct and measurement of pessimism in Spanish among Hispanic Americans.

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Compliance with Ethical Standards

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Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Experiment Participants Informed consent was obtained from all individual participants included in the study.

Conflict of Interest Tonya M. Pan was supported by the UC San Diego San Diego Fellowship. Sarah D. Mills was supported by the UC San Diego Cota Robles Fellowship. Rina S. Fox declares that she has no conflict of interest. Sharon H. Baik was supported by the UC San Diego San Diego Fellowship. Kadie M. Harry declares that she has no conflict of interest. Scott C. Roesch declares that he has no conflict of interest. Georgia Robins Sadler and Vanessa L. Malcarne have received the following grants: National Cancer Institute (NCI) grant R25CA130869, with additional support from NCI P30 CA023100; NCI R25CA132699; and California Breast Cancer Research Program (CBCRP) 13AB-3501 and 14BB-2601.

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