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Validation of Interpersonal Support Evaluation List-12 (ISEL-12) scores among English- and Spanish-Speaking Hispanics/Latinos from the HCHS/SOL Sociocultural Ancillary Study

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Abstract

The Interpersonal Support Evaluation List-12 (ISEL-12; Cohen, Mermelstein, Kamarck, & Hoberman, 1985) is broadly employed as a short-form measure of the traditional ISEL, which measures functional (i.e., perceived) social support. The ISEL-12 can be scored by summing the items to create an overall social support score; three subscale scores representing appraisal, belonging, and tangible social support have also been proposed. Despite extensive use, studies of the psychometric properties of ISEL-12 scores have been limited, particularly among Hispanics/Latinos, the largest and fastest growing ethnic group in the United States. The present study investigated the reliability, and structural and convergent validity of ISEL-12 scores using data from 5,313 Hispanics/Latinos who participated in the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary study. Participants completed measures in English or Spanish, and identified their ancestry as Dominican, Central American, Cuban, Mexican, Puerto Rican, or South American. Cronbach's alphas suggested adequate internal consistency for the total score for all languages and ancestry groups; coefficients for the subscale scores were not acceptable.

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Confirmatory factor analyses revealed that the one-factor and three-factor models fit the data equally well. Results from multigroup confirmatory factor analyses supported a similar one-factor structure with equivalent response patterns and variances between language groups and ancestry groups. Convergent validity analyses suggested that the total social support score related to scores of social network integration, life engagement, perceived stress, and negative affect (depression, anxiety) in the expected directions. The total score of the ISEL-12 can be recommended for use among Hispanics/Latinos.

Keywords

ISEL; Hispanics/Latinos; Psychometrics; Validity; Reliability; Confirmatory Factor Analysis

Decades of research have supported a connection between social support and physical and mental health outcomes in a variety of populations (e.g., Barth, Schneider, & Von Känel, 2010; Holt-Lunstad, Smith, & Layton, 2010; Reblin & Uchino, 2008). Social support is posited to affect health through direct effects on physiological processes such as cardiovascular reactivity, immune functioning, and inflammation, as well as indirect mechanisms through links with behavioral (e.g., smoking, diet) and psychological (resilience to depression) factors that in turn influence these physiological pathways (Uchino, 2006; Uchino, Bowen, Carlisle, & Birmingham, 2012). Indeed, low levels of social support have been associated with greater incidence of a number of conditions including diabetes, cardiovascular disease, arthritis, chronic pain, and mood and anxiety disorders (Barth et al., 2010; Reblin & Uchino, 2008), poorer adjustment to diseases such as cancer, arthritis, multiple sclerosis, HIV/AIDS (Barskova & Oesterreich, 2009; Dennison, Moss-Morris, & Chalder, 2009), and greater all-cause mortality (Holt-Lunstad et al., 2010). Social support is considered so critical that even the DSM-IV-TR multiaxial system encourages clinicians to assess social and environmental functioning as factors central to a person's psychological health status. Importantly, conceptualizations of social support vary widely, and at the broadest level, can be distinguished according to whether they capture structural (i.e., objective aspects of social networks, such as the number of relationships or roles, or contact frequency) or functional (i.e., the perceived availability of specific supportive functions, such as tangible aid or emotional support, or, less often, social support functions actually received) components of support (Brisette, Cohen, & Seeman, 2000; Cohen & Wills, 1985; Lakey & Cohen, 2000).

A large number of instruments have been employed to assess perceived social support; however, the 40-item Interpersonal Support Evaluation List (ISEL; Cohen & Hoberman, 1983) has been, perhaps, the most widely embraced. The short form of this measure, the ISEL-12 (Cohen, Mermelstein, Kamarck, & Hoberman, 1985), has also been broadly adopted as a measure of social support. The ISEL-12 yields a total score that describes overall perceived social support, and three subscales representing perceived availability of *appraisal* (advice or guidance), *belonging* (empathy, acceptance, concern), and *tangible* (help or assistance, such as material or financial aid) social support (Cohen et al., 1985).

Although scores from the ISEL long form have shown good internal consistency reliability, test-retest reliability, convergent validity (Cohen & Hoberman, 1983; Cohen & Wills, 1985), and structural validity (Brookings & Bolton, 1988), less is known about the ISEL-12. Cohen (2008) has presented preliminary psychometric characteristics for the ISEL-12 among 1,399 predominantly non-Hispanic/Latino White respondents; however, it is unknown whether the ISEL-12 reliably and validly measures social support in diverse ethnic populations. Moreover, even though the ISEL and its short forms, including the ISEL-12, have been translated into several languages, including Spanish, the measurement properties of these adapted instruments have not been verified.

A key assumption of behavioral research is that instruments measure the same construct across groups; when this assumption is violated, interpretations of scores from that instrument will be misleading. It is well known that measures can perform differently across diverse cultural and ethnic groups due to either true group differences, or differences in the ways that different groups define, experience, and communicate psychological phenomena (Corral & Landrine, 2010; Geisinger, 1994; Groth-Marnat, 2009). For example, factor variance by language may signal variance by acculturation or nativity. However, differences may also reflect systematic response bias (Corral & Landrine, 2010; Geisinger, 1994; Groth-Marnat, 2009). If a survey instrument measures a construct differently across groups, then adaptations may be needed for cross-cultural application (Allen & Walsh, 2000; Geisinger, 1994; Groth-Marnat, 2009). Due to initial evidence of sound psychometric properties in majority populations, and availability of both English and Spanish language versions, the ISEL-12 is a particularly encouraging candidate for use with Hispanics/Latinos, the largest and fastest growing minority group in the United States. In fact, the measure has already been applied in several empirical reports involving samples comprised of Hispanics/Latinos (e.g., Arango-Lasprilla et al., 2009; Ornelas & Perreira, 2011; Salgado, Casteñada, Talavera, & Lindsay, 2012). To date there has been one psychometric evaluation of ISEL-12 scores among Hispanics/Latinos (Sacco, Casado, & Unick, 2011). This study used data from the National Epidemiologic Survey of Alcohol and Related Conditions and reported data from 1,109 older adult Hispanics/Latinos (national origins were not specified) and 6,347 non-Hispanic Whites. The findings suggested that Hispanics/Latinos may endorse 10 of the 12 items differently than non-Hispanic/Latino Whites. Specifically, eight items contained negative differential item functioning, suggesting that Hispanics/Latinos with comparable levels of support were less likely to endorse these items; two items contained positive differential item functioning, suggesting that Hispanics/Latinos with comparable levels of support were more likely to endorse these items. However, after accounting for differential item functioning in subsequent analyses, Hispanics/Latinos did not significantly differ from non-Hispanic/Latino Whites on mean social support scores, suggesting that the observed differences in ISEL-12 scores were due to differences in response patterns on the measure, rather than differences in the underlying construct of social support. As such, Sacco et al. warned that ISEL-12 scores should be interpreted with caution among Hispanics/Latinos.

Given that psychological instruments cannot be assumed to perform equivalently across ethnic groups (Corral & Landrine, 2010; Groth-Marnat, 2009; Okazaki & Sue, 1995), it is critical to evaluate the reliability and validity of ISEL-12 scores among Hispanics/Latinos. Thus, the present study conducted a psychometric evaluation of ISEL-12 data among a

multi-site cohort study of Hispanics/Latinos from multiple ancestry groups (i.e., Dominican, Central American, Cuban, Mexican, Puerto Rican, or South American). The internal consistency reliability (i.e., intercorrelations among items) of the total score and the three subscale scores was examined for the full sample, English and Spanish responders, and in the Hispanic/Latino ancestry groups. Next, the structural construct validity/factorial validity (i.e., whether a measure reveals the same simple structure across samples and populations; Allen & Walsh, 2000; Reise, Waller, & Comrey, 2000) of the one-factor (i.e., total score) and three-factor (i.e., *appraisal, belonging, tangible*) models was tested to determine the best-fitting model. Evaluation of the structural construct validity has been specifically recommended as a preliminary method of establishing cross-cultural validity of a measure's scores (Allen & Walsh, 2000; Ben-Porath, 1990; Geisinger, 1994). If the internal structure is not upheld, concerns are raised regarding whether the resulting data can be validly interpreted in a new group. The invariance of the best fitting model (i.e., one-factor or three-factor) was then tested between English and Spanish responders and also among Hispanic/Latino ancestry groups. We hypothesized that the internal structure of the ISEL-12 would be upheld for all models, meaning that there would be no differences in the structural construct validity between groups. Convergent validity (i.e., the relationship between a measure and other theoretically related constructs; Foster & Cone, 1995; Groth-Marnat, 2009) with indicators of social network integration (i.e., structural support), life engagement, perceived stress, and negative affect was also tested, given the established correlations between these variables and the ISEL-12 (Cohen, 2008). We hypothesized that the best-fitting model would match the relationships evidenced by Cohen's (2008) samples by demonstrating positive associations of moderate/large magnitude with social network integration (i.e., number of roles of people with regular social contact), a positive and moderate association with life engagement (i.e., engagement in personally valued activities), and a negative and small association with perceived stress and negative affect (i.e., trait anxiety, recent symptoms of depression).

Methods

Participants and Procedures

The sample (N = 5,313) was derived from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) Sociocultural Ancillary study. The HCHS/SOL is a national cohort study that aims to establish the prevalence and risk factors for major chronic diseases among 16,415 Hispanics/Latinos recruited from four U.S. field centers (Miami, FL; San Diego, CA; Bronx, NY, NY; Chicago, IL). The sampling strategy (LaVange et al., 2010) and approach (Sorlie et al., 2010) have been detailed elsewhere. The HCHS/SOL Sociocultural Ancillary Study performed a separate, comprehensive assessment of socioeconomic, cultural, and psychosocial factors among approximately one third of the original cohort, with a target sample of 1,320 participants per field center. All HCHS/SOL participants were eligible for the Sociocultural Ancillary Study if they were able and willing to complete a second visit within 3-9 months of the parent study baseline clinic exam. The study began recruitment during the second wave of parent study enrollment and 5,313 (72.6%) of 7,321 parent study participants attempted for contact participated. The sample is considered to be a random sub-sample of HCHS/SOL participants, with the exception that participation was lower in

some higher socioeconomic strata. To accommodate the wide range of education and literacy levels, all self-report assessments were administered via interview using a standardized approach. Interviews were one to two hours in duration and comprised socioeconomic, social, psychological, and cultural assessments with hypothesized cardiovascular-metabolic health relevance. Standardized reviews of randomly-selected interview voice recordings were conducted periodically to ensure fidelity of protocol implementation and accuracy of instrument delivery. Participants were given $60 for their time and effort. The HCHS/SOL parent study and Sociocultural Ancillary studies were conducted with Institutional Review Board approval from all sites.

Measures

Demographic Variables—Demographic variables were collected during the HCHS/SOL baseline clinic exam, and included age, gender, Hispanic/Latino ancestry (self-identified), marital status, income, education, number of years living in the United States, and language preference (language in which a participant chose to complete the interview, either English or Spanish).

Interpersonal Support Evaluation List-12—(ISEL-12; Cohen et al., 1985). The ISEL-12 (see table 2) is derived from the long form of the ISEL and contains 12 items which assess the perceived availability of social support on a four-point scale ranging from “definitely false” to “definitely true.” All items are summed to yield a total score (scores range 0-36). Table 2 also describes the *appraisal*, *belonging*, and *tangible* subscales (scores range 0-12) comprised of four items each.

Social Network Index—(SNI; Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997). The 25-item SNI yields three scores: social network integration (scores range 0-12), number of regular social contacts, and embedded networks (scores range 0-8). The social network integration score, which reflects the number of social roles (e.g., friends, family, co-workers) with which a respondent has contact with at least once every two weeks, was used in the current study.

Life Engagement Test—(LET; Scheir et al., 2006). The six-item LET measures the extent to which an individual engages in personally valued activities. Respondents rate their extent of agreement on a five-point scale from “strongly disagree” to “strongly agree”. Total scores range from 6 to 30. Internal consistency reliability for the current sample was adequate ($\alpha = .74$).

Perceived Stress Scale—(PSS; Cohen, Kamarck, & Mermelstein, 1983). The 10-item PSS measures global perceived stress experienced across the past 30 days, on a five-point scale ranging from “never” to “always.” Total scores range from 0 to 40. Internal consistency reliability for the current sample was $\alpha = .84$.

Spielberger Trait Anxiety Inventory—(STAI; Spielberger, Gorsuch, & Lushene, 1970). The 10-item STAI measures trait anxiety, or the general tendency to experience anxious emotion-cognition. Respondents rate how they generally feel on a four-point scale ranging

from “almost never” to “almost always,” with total scores ranging from 10 to 40. Internal consistency reliability for the current sample was $\alpha = .80$.

Center for Epidemiologic Studies Depression Scale—(CES-D; Radloff, 1977). The CES-D measures frequency of depression symptoms experienced during the past week from “rarely or none of the time (< 1 day)” to “all the time (5-7 days).” An abbreviated 10-item version was used in the current study, with total scores ranging from 0 to 30 (Andresen, Malmgren, Carter, & Patrick, 1994). Internal consistency reliability for the current sample was $\alpha = .83$.

Statistical Analyses

To examine the internal consistency reliability of the ISEL-12 scores, Cronbach’s alpha was calculated for the full sample, the English and Spanish responders, and the ancestry groups. A coefficient ≥.70 was considered to represent adequate reliability.

To examine the factorial validity of the ISEL-12 scores, confirmatory factor analysis (CFA), a theory-driven factor analytic technique, was used. Multiple a priori models were specified and tested using maximum likelihood mean adjusted (MLM) estimation to correct for non-normality of the data. Missing data were handled via Full Information Maximum Likelihood method employed by Mplus (Muthén & Muthén, 2006), which makes use of all available data points. First, a one-factor model representing the ISEL-12 total score was tested. Next, a three-factor model representing the *appraisal*, *belonging*, and *tangible* subscale scores was tested.

The overall fit of each target model was determined by inspecting statistical and descriptive fit. The Satorra-Benter Scaled χ^2 (S-Bχ^2; Satorra & Bentler, 2001), a test of model fit when data is multivariately non-normal was utilized. Given that the likelihood ratio χ^2 test statistics have a number of limitations, including a dependence on sample size (see Hoyle, 2000), several descriptive fit indices were also employed (Bentler, 2007). Although the use of descriptive fit indices and cutoff thresholds is controversial (Marsh, Hau, & Wen, 2004), the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), Standardized Root Mean Residual (SRMR; Hu & Bentler, 1999), and Comparative Fit Index (CFI; Bentler, 1990) have been generally recommended to determine overall model fit (Bentler, 2007). However, given that CFI does not perform well with item-level data in an overall model (Beauducel & Wittmann, 2005), the RMSEA and SRMR, which are both absolute descriptive indices of overall model fit, were utilized for the current study. Cutoff thresholds for the indices were based on the widely-used recommendations by Hu and Bentler (1999): for both the RMSEA and SRMR, values ≤ .08 indicated acceptable model fit. The best-fitting model was also determined by inspecting statistical and descriptive fit measures between nested models (i.e., the one-factor model is nested within the three-factor model). Chi-square difference tests (ΔS-Bχ^2; Satorra, 2000) have been traditionally used to statistically determine whether nested models significantly differed, with a non-significant $\Delta\chi^2$ value ($p > .05$) reflecting that the nested model fits as well as the comparison model. However, $\Delta\chi^2$ tests have similar limitations to overall likelihood ratio χ^2 tests (Kelloway, 1995) given that they are biased against invariance with large sample sizes (i.e., higher

statistical power; MacCallum, Browne, & Cai, 2006). Thus, relative model fit was also determined via ΔRMSEA and ΔSRMR, where values < .015 indicated no difference between nested models (Chen, 2007; Cheung & Rensvold, 2002).

To examine the multigroup invariance of the ISEL-12 scores in English and Spanish, a series of nested models were fit to the data following the methods of Vandenberg and Lance (2000), with models becoming more restrictive at each step. Although multiple group CFA requires a large sample size and can be difficult to carry out with many groups, it has several advantages and thus is frequently used to test for measurement equivalence with continuous variables, and strongly parallels Item Response Theory modeling (IRT), another major approach to invariance testing (Chen, Sousa, & West, 2005). Specifically, multiple group CFA allows researchers to examine a CFA model in multiple groups simultaneously, enabling the investigation of group differences in factor means, factor loadings, item intercepts, factor variances/covariances, and residual variances/covariances (i.e., item uniquenesses) whereas other approaches (e.g., Multiple Indicator, Multiple Cause [MIMIC] models) are only able to test for differences in factor means and intercepts (i.e., differential item functioning).

Separate models for each language were simultaneously estimated, with equality constraints imposed upon relevant model parameters between groups. The configural invariance model, which is the least restrictive, tested whether the factor structure was equivalent across English and Spanish responders, with no equality constraints imposed. The metric invariance model tested whether each item loaded equivalently onto the same factor by constraining each item's factor loading to equivalence between language groups. The scalar invariance model tested whether the item intercepts for English and Spanish responders were the same by constraining each item's intercept to equivalence between groups. Finally, the factor variance invariance model added an additional constraint to the previous model to determine whether the English and Spanish language factors had equivalent variability. The overall fit of each model was determined using the S-B χ^2, RMSEA, and SRMR. Change in model fit between nested models was also tested by inspecting statistical (ΔS-B$\chi^{2)}$ and descriptive (ΔRMSEA, ΔSRMR) indices. This same procedure was also used to examine invariance among Hispanic/Latino ancestry groups (Dominican, Central American, Cuban, Mexican, Puerto Rican, and South American).

Convergent validity was examined via correlating ISEL-12 scores with scores on the validity measures of social role diversity, stress, anxiety, depression, and life engagement.

Results

Descriptive Analyses

Sample characteristics are reported in table 1. A relatively large proportion of the sample was of Mexican ancestry. Spanish was the most commonly preferred language. The majority of the sample (82.6%) was born outside the United States. The average ISEL-12 score was relatively high for the entire sample (M = 25.75, SD = 6.70). The means and standard deviations for each ISEL-12 item (full sample) are reported in table 2.

Internal Consistency Reliability

Cronbach's alphas for the ISEL-12 total score were all above .70 in the full sample, English and Spanish, and all ancestries (see table 4). Cronbach's alphas for the subscale scores were inadequate for the *appraisal* (α = .65), *belonging* (α = .62), and *tangible* (α = .57) for the full sample. For the English responders, internal consistencies for the *appraisal* (α = .71) and *belonging* (α = .76) subscale scores were adequate, whereas internal consistency for the *tangible* (α = .66) subscale score was not. For the Spanish responders, internal consistencies for all three subscale scores were inadequate (αs = .54 - .63). Internal consistency reliabilities for scores from the three-factor model were also inadequate for the Dominican (αs = .51 - .59), Central American (αs = .55 - .64), Cuban (αs = .64 - .69), Mexican (αs = .53 - .65), Puerto Rican (αs = .62 - .65), and South American (αs = .57 - .64) subsamples.

Confirmatory Factor Analyses: One vs. Three-factor Models

Table 3 presents fit indices for the one- and three-factor models for the full sample. Both models fit adequately according to the SRMR, although the RMSEA was not optimal. A ΔS-Bχ^2 test revealed that the three-factor model fit better statistically, but the descriptive fit indices (ΔRMSEA = .001, ΔSRMR = 0) indicated no difference between nested models.

For the one-factor model, all standardized factor loadings were generally large and statistically significant (λs = .37 - .66; *SE*s = .011 - .014). For the three-factor model, all standardized factor loadings were also large and statistically significant for the *appraisal* (λs = .40 - .72, *SE*s = .011 - .014), *belonging* (λs = .37 - .69; *SE*s = .011 - .015), and *tangible* (λs = .41 - .61; *SE*s = .013 - .015) factors. Interfactor correlations (*r*s = .85 - .90, *p*s < .001) and the correlations between each of the subscale scores and the total score (*r*s = .84 - .86, *p*s < .001) were all very high.

Given that the one-factor model was adequately reliable, model fit was similar, and there were high intercorrelations among the three-factors, the more parsimonious one-factor model was retained[1]. Table 4 presents descriptive statistics of the total scores for the full sample, and by language and ancestry group. Mean support total scores were somewhat higher for the English responders than for the Spanish responders (t [5284] = −7.56, p < .001). For the six Hispanic/Latino ancestry groups, mean total scores also differed (F [5, 5132] = 13.22, p < .001). Bonferroni post-hoc tests revealed respondents of Cuban ancestry had significantly higher social support scores than respondents of Dominican, Central American, Puerto Rican, and South American ancestry (*p*s <.05) and that respondents of Mexican ancestry had significantly higher scores than respondents of Central American, Puerto Rican, and South American ancestry (*p*s < .05). There were no other significant between-group differences.

[1]Although previous researchers have tested a hierarchical model (e.g., Brookings & Bolton, 1988), this was deemed unsuitable in the current sample given the inadequate internal consistency for the three social support subscales. Moreover, from a model fit perspective, both the 3-factor model and a second order factor model are equivalent.

Multigroup Confirmatory Factor Analyses: English and Spanish

Table 3 presents fit indices for the configural, metric, scalar and factor variance models across language for the one-factor model of the ISEL-12. First, configural invariance was examined by fitting the one-factor solution to the data for English and Spanish responders. Factor loadings were freely estimated; no parameter estimates were constrained to equality across languages. Table 5 presents the descriptive statistics and factor loadings from baseline models for both languages. For English responders, the baseline model fit adequately according to the SRMR. All unstandardized factor loadings were statistically significant (.72 - 1.09, *p*s <.001). The unstandardized factor variance was also significant (Φ = .33, p <.001). For Spanish responders, the baseline model also fit adequately according to the SRMR. All unstandardized factor loadings were statistically significant (.73 - 1.32, *p*s <. 001). The unstandardized factor variance was also significant (Φ = .21, p <.001). Loadings were significant and in the same direction for both languages; thus, configural invariance was met.

Second, metric invariance was tested (table 3). All factor loadings were constrained to equivalence between the English and Spanish responders. The metric invariance model fit adequately according to the SRMR. When the metric model was compared to the configural model, no statistical ($p >> .05$) or descriptive (all Δ values < .01) differences were noted. This suggests that the factor loadings are invariant across the language groups; that is, the associations between each item and the overall social support factor are the same regardless of language.

Third, scalar invariance was tested to determine whether there were item intercept differences across language versions (table 3). All item intercepts were constrained to equivalence between English and Spanish responders. The scalar model fit adequately according to the SRMR. This model did not differ from the less-constrained metric invariance model (all descriptive fit Δ values < .01). This suggests that the item intercepts are invariant for the ISEL-12 items across language groups.

Finally, factor variance invariance was tested to determine whether the factor demonstrated equivalent variability (i.e., the same range on the continuum of scores) for English and Spanish (see table 3). This was accomplished by constraining the factor variance to equivalence between languages, in addition to the factor loadings and intercepts, as in the scalar invariance model. The factor variance model fit adequately according to the SRMR, suggesting that English and Spanish responders may yield the same range on the continuum of ISEL-12 scores. No statistical ($p > .05$) or descriptive (all Δ values < .01) differences were noted between the scalar and factor variance invariance models. Thus, it was concluded that ISEL-12 score factor variances are equivalent across English and Spanish responders.

Multigroup Confirmatory Factor Analyses: Hispanic/Latino Ancestry Groups

Table 3 presents fit indices for the configural, metric, and factor variance models across ancestry groups for the one-factor model[2]. Configural invariance was examined by fitting the one-factor solution to the data for each of the six ancestries simultaneously. Factor

loadings were freely estimated; no parameter estimates were constrained to equality across ancestries. The one-factor baseline model fit adequately according to the SRMR for all groups, except the Dominicans and South Americans. Table 6 presents the factor loadings and descriptive statistics for this model. All unstandardized factor loadings were statistically significant (see table 6, *p*s < .001). The unstandardized factor variances were statistically significant for the Dominican (Φ = .14), Central American (Φ = .21), Cuban (Φ = .34), Puerto Rican, (Φ = .25), Mexican (Φ = .21), and South American (Φ = .19) groups (all *ps* < .001).

Next, metric invariance was tested to determine whether the response patterns between the ancestry groups were equivalent (see table 3). All factor loadings were constrained to equivalence across the six groups. The metric invariance model fit adequately according to the SRMR. The fit of this constrained model was compared to the configural invariance model and found not to differ when descriptive indices were considered (all Δ values < .01), suggesting that factor loadings are invariant across ancestry groups.

Scalar invariance was then tested to determine whether there were item intercept differences across ancestry groups (table 3). All item intercepts were constrained to equivalence across the six groups. The scalar invariance model fit adequately according to the SRMR. The descriptive fit indices for this model did not differ from the less-constrained metric invariance model (all descriptive fit Δ values < .01). This suggests that the item intercepts are invariant for the ISEL-12 items across ancestry groups.

Finally, factor variance invariance was tested to determine whether the variance of the factor was equivalent across ancestry (see table 3). This was accomplished by constraining the factor variance to equivalence between ancestry groups within the scalar invariance model. The factor variance model fit adequately according to the SRMR, suggesting that all six ancestry groups yield the same range on the continuum of ISEL-12 scores. The scalar invariance model did not differ descriptively from the factor variance invariance model (all Δ values < .01). This suggests that the factor loadings and factor variances are equivalent across Dominican, Central American, Cuban, Mexican, Puerto Rican, and South American ancestry groups.

Convergent Validity

Correlations between the ISEL-12 total score and measures of social network integration, perceived stress, anxiety, depression, and life engagement were examined to establish a degree of convergent validity (see table 7). The patterns were similar across the full sample, language, and ancestry groups; and all were in the expected directions. Specifically, ISEL-12 scores correlated positively with network integration and life engagement, and inversely with stress, anxiety, and depression. All correlations were moderate in magnitude.

[2]144 respondents who denoted that they were of multiple or “other” Hispanic/Latino ancestries were excluded from the multigroup analyses.

Discussion

The current study supports the internal consistency reliability, multiple group invariance across language and ancestry, and convergent validity of the overall social support score of the ISEL-12 among Hispanics/Latinos. The total score was internally consistent for the full sample, and also when considered by language and Hispanic/Latino ancestry. However, the three subscale scores fell below the recommended minimum cut-off (.70) for the full sample. Further inspection of the coefficients revealed inadequate internal consistency for the three subscale scores in Spanish, the *tangible* subscale was also inadequate in English. Given that there were more Spanish (n = 4,166) than English (n = 1,138) responders, this was likely what drove the lower internal consistency of the subscale scores for the full sample and ancestry groups where English and Spanish responders were handled together. Additionally, the three subscales were not adequately reliable when considered across Hispanic/Latino ancestry groups.

When a one-factor model, representing the overall social support score, and a three-factor model, representing the three subscale scores were tested and compared, both fit the data similarly. However, high intercorrelations among the three factors suggested that the subscales are not unique. In the current study, these high intercorrelations, in conjunction with the poor internal consistency of the subscale scores, provided evidence that the total score was more appropriate for application to the current data.

Factor structure is only one indicator of a measure's performance. Although it is an important component of a measure's overall psychometric quality, factorial validity is not the only criteria for evaluating instruments that attempt to capture complex psychological phenomena (see Hopwood & Donnellan, 2010). As such, while results from this single study do not definitively suggest that the three-factor model should not be used in Hispanic/Latino populations, they do raise questions about whether the subscale scores are sufficiently reliable. There are several possible explanations for this. First, regardless of the ethnic group being studied, the three subscale scores may simply not be internally consistent, given that the formula for Cronbach's alpha favors longer scales. Additionally, the subscales may simply be intercorrelated, regardless of group. Few studies using the ISEL-12 have employed the subscale scores, with the majority relying on the total score (e.g., Berg et al., 2012). In addition, many studies that have utilized the subscale scores have failed to report Cronbach's alphas (e.g., Cooper, Ziegler, Nelesen, & Dimsdale, 2009); thus it is unclear whether the subscale scores were sufficiently reliable[3]. Notably, high subscale score intercorrelations (e.g., Businelle et al., 2010; Kendzor et al., 2009), in addition to high correlations between the subscale scores and the total score (e.g., Mar, Mason, & Litvack, 2012), have also been found in other samples. Second, the linguistic translation of the ISEL-12 may be sufficient to capture overall social support, but perhaps the finer points of appraisal, belonging, and tangible social support require cultural adaptation on the item level. Alternatively, cultural and/or acculturative differences in the definition and operationalization of these aspects of social support may underlie the psychometric

[3]However, adequate internal consistency of the subscale scores for the ISEL-12 has been reported in other studies (e.g., Businelle et al., 2010).

limitations of the three-factor model. While some cultures place more emphasis on emphatic acts of social support, others may favor social harmony and closeness instead. Notably, the ISEL-12 focuses more on the more former views of support (i.e., an example item, If I were sick, I could easily find someone to help me with my daily chores). Therefore, while the general construct of social support appears to be universal (Cohen et al., 1985), specific aspects may be nuanced and thus conceptualized differently in other cultures. In sum, the current findings do not disallow the three-factor model among Hispanics/Latinos, but do suggest that it needs further evaluation before being applied to substantive research or clinical questions.

Given the relatively poorer performance of the three-factor model, the total score was used for the remaining analyses. Multiple group analyses demonstrated that the ISEL-12 scores demonstrated configural, metric, scalar, and factor invariance. That is, the findings suggested that there is a single underlying factor, items load equivalently onto that factor, item difficulty was equivalent (i.e., the intercepts for each item were equal between groups), and there is an invariant range of scores that make up that factor, regardless of language or Hispanic/Latino ancestry. There were, however, statistical differences between language and several ancestry groups for the total score, although the clinical or practical relevance of such findings is unclear. Indeed, the mean differences between English and Spanish responders (1.96) and the ancestry groups with the smallest and largest scores (2.13) were quite small.

Convergent validity analyses suggested that the ISEL-12 scores were positively related to social network integration and life engagement, and inversely related to perceived stress and negative affect, confirming our hypotheses regarding the directionality of these relationships. Interestingly, structural aspect of the social network (i.e., number of social roles) yielded the lowest correlation with ISEL-12 scores, contrary to our hypothesis and previous findings (Cohen, 2008). Although social relationships are a necessary antecedent for functional social support, these constructs are not always highly related. That is, a person may have many social contacts, but may not feel supported by them, or, conversely, a person may derive adequate support from only one high-quality relationship (Cohen, Underwood, & Gottlieb, 2000). Interestingly, the correlations between overall social support with stress, anxiety, and depression were moderate in size, which is a somewhat stronger relationship than was anticipated given that Cohen's (2008) finding that ISEL-12 scores share a medium-sized relationship with stress, but that the strength of the relationships with depression and anxiety are somewhat mixed.

There are several limitations to the current study. First, only the ISEL-12 was administered, rather than the full 40-item ISEL. Participants self-identified with a particular ancestry group, and those who either chose not to identify with a group or those who identified with more than one group were not included in the multiple group analyses. Although there were relatively few people (2.7%) excluded from these analyses, this does highlight the inherent problems with ethnic categorization in research (Comstock, Castillo, & Lindsay, 2004). Additionally, language groups may differ on other factors such as acculturation, age, education, or other variables. Another potential limitation is the item-level response scales that range from "definitely false" to "definitely true." This response format is believed to

have less than optimal psychometric properties and to be associated with acquiescent response patterns in survey questionnaires (Saris, Revilla, Krosnick, & Shaeffer, 2010).

Given that social support is known to explain variability in mental and physical health, and thus represents an important construct in understanding Hispanic/Latino health, additional research regarding the utility of ISEL-12 scores is warranted. Future studies might evaluate other aspects of reliability and construct validity in both the overall and subscale scores in Hispanics/Latinos. Issues of translation/adaptation, education/literacy, and cultural differences in the nature of functional social support should also be explored as possible factors contributing to poor reliability of the three-factor model. Specifically, appraisals of the stability of scores over time, sensitivity to change, and other aspects of construct validity (e.g., divergent validity) are needed. The results do, however, provide preliminary evidence that the overall social support score of the ISEL-12 can be applied to Hispanics/Latinos in clinical and research settings.

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Table 1

Unweighted sample characteristics for the total sample and by field center (N = 5,313)

	Bronx, NY, NY (n = 1,342)		**Chicago, IL (n = 1,329)**		**Miami, FL (n = 1,315)**		**San Diego, CA (n = 1,327)**		**Total Sample (n = 5,313)**	
Age[2] (n = 5312)	46.24	(14.33)	46.53	(13.41)	48.52	(12.69)	45.30	(13.91)	46.64	(13.65)
Women[1] (n = 5313)	837	62.4%	807	60.7%	785	59.7%	870	65.6%	3278	61.7%
Hispanic/Latino Ancestry[1] (n = 5309)										
Dominican	493	36.8%	14	1.1%	22	1.7%	2	0.2%	531	10.0%
Central American	66	4.9%	153	11.5%	322	24.5%	10	0.8%	551	10.4%
Cuban	16	1.2%	8	0.6%	745	56.7%	6	0.5%	775	14.6%
Mexican	69	5.1%	752	56.6%	10	0.8%	1249	94.1%	2080	39.2%
Puerto Rican	570	42.5%	253	19.0%	40	3.0%	17	1.3%	880	16.6%
South American	67	5.0%	115	8.7%	149	11.3%	17	1.3%	348	6.6%
> one heritage	50	3.7%	31	2.3%	21	1.6%	20	1.5%	122	2.3%
Other	10	0.7%	2	0.2%	4	0.3%	6	0.5%	22	0.4%
Married or Cohabitating[1] (n = 5277)	595	44.5%	836	63.4%	745	57.0%	793	60.4%	2969	56.3%
Income[1] (n = 4872)										
$ < 10,000	285	23.3%	154	11.6%	287	21.8%	162	12.2%	888	16.7%
$ 10,001-20,000	431	35.3%	445	33.5%	468	35.6%	329	24.8%	1673	31.5%
$ 20,001-40,000	328	26.8%	478	36.0%	311	23.7%	460	34.7%	1577	29.7%
$ 40,001-75,000	139	11.4%	142	10.7%	46	3.5%	229	17.3%	556	10.5%
$ > 75,000	39	3.2%	36	2.7%	14	1.1%	89	6.7%	178	3.4%
Education[1] (n = 5206)										
< high school	523	39.0%	602	45.3%	351	26.7%	422	31.8%	1874	35.3%
High school/GED	332	24.7%	346	26.0%	363	27.6%	327	24.6%	1368	25.8%
> high school/GED	460	34.3%	355	26.7%	576	43.8%	549	41.4%	1939	36.5%
Years in United States[1]										

	Bronx, NY, NY (*n* = 1,342)		Chicago, IL (*n* = 1,329)		Miami, FL (*n* = 1,315)		San Diego, CA (*n* = 1,327)		Total Sample (*n* = 5,313)	
(*n* = 5302)										
< 10	212	15.8%	227	17.1%	586	44.6%	222	16.7%	1247	23.5%
≥ 10	779	58.0%	898	67.6%	681	51.9%	780	58.8%	3138	59.1%
US Born	343	25.6%	203	15.3%	46	3.5%	325	24.5%	917	17.3%
Spanish language[1] (*n* = 5304)	867	65.0%	1054	79.3%	1246	94.8%	999	75.3%	4166	78.5%
ISEL-12 total[2] (*n* = 5188)	25.11	(6.91)	24.75	(6.10)	26.18	(6.80)	27.39	(6.44)	25.86	(6.65)
Appraisal	8.65	(2.66)	8.49	(2.51)	9.11	(2.67)	9.45	(2.58)	8.92	(2.63)
Belonging	8.35	(2.67)	8.11	(2.48)	8.43	(2.66)	8.97	(2.57)	8.47	(2.61)
Tangible	8.09	(2.76)	8.12	(2.46)	8.58	(2.65)	8.96	(2.45)	8.44	(2.61)
Social Network[2] (*n* = 5294)										
# roles	1.66	(130)	1.72	(1.342)	1.58	(126)	1.94	(138)	1.72	(133)
Perceived Stress[2] (*n* = 5176)	15.23	(7.09)	15.22	(6.67)	14.67	(6.86)	14.14	(6.71)	14.82	(6.85)
Anxiety[2] (*n* = 5168)	18.08	(5.62)	18.06	(5.09)	17.85	(5.35)	17.14	(5.22)	17.78	(5.34)
Depression[2] (*n* = 5208)	8.26	(6.34)	7.90	(5.59)	8.04	(6.48)	7.02	(5.53)	7.80	(6.02)
Life engagement[2] (*n* = 5262)	24.67	(3.51)	24.40	(3.42)	25.55	(3.28)	25.49	(3.30)	25.03	(3.41)

Note.

[1] *n* (% within center),

[2] *M* (*SD*)

Table 2

ISEL-12 item-level descriptive statistics for full sample (N = 5,313)

ISEL-12 item		*M*	*SD*
ISEL 1[b]	If I wanted to go on a trip for a day (for example to the beach, the country or mountains), I would have a hard time finding someone to go with me	2.10	.98
ISEL 2[a]	I feel that there is no one I can share my most private worries and fears with.	2.27	.97
ISEL 3[c]	If I were sick, I could easily find someone to help me with my daily chores.	2.09	.97
ISEL 4[a]	There is someone I can turn to for advice about handling problems with my family.	2.34	.88
ISEL 5[b]	If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.	2.16	.93
ISEL 6[a]	When I need suggestions on how to deal with a personal problem, I know someone I can turn to.	2.43	.80
ISEL 7[b]	I don't often get invited to do things with others.	1.89	1.04
ISEL 8[c]	If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (the plants, pets, garden, etc.).	1.89	1.09
ISEL 9[b]	If I wanted to have lunch with someone, I could easily find someone to join me.	2.32	.84
ISEL 10[c]	If I was stranded 10 miles from home, there is someone I could call who could come and get me.	2.38	.84
ISEL 11[a]	If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it.	1.88	1.10
ISEL 12[c]	If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.	2.08	1.03

Note.

[a] *appraisal* subscale,

[b] *belonging* subscale,

[c] *tangible* subscale

Table 3

Goodness of Fit Statistics for CFA models of the ISEL-12

	Model	S-B χ^2	*df*	*p*	SRMR	RMSEA	Reference Model #	ΔSRMR	ΔRMSEA	Δ S-B χ^2	Δ *df*	Δ *p*
1.	One-factor	2392.18	54	<.001	.069	.091	--	--	--	--	--	--
2.	Three-factor	2283.16	51	<.001	.069	.092	1	.000	.001	114.43	3	< .001
	English	498.02	54	<.001	.058	.086	--	--	--	--	--	--
	Spanish	2060.29	54	<.001	.075	.096	--	--	--	--	--	--
3.	Configural	2558.31	108	<.001	.067	.091	--	--	--	--	--	--
4.	Metric	2594.70	119	<.001	.074	.090	3	.007	.001	1.17	11	.999
5.	Scalar	2819.06	130	<.001	.076	.089	4	.002	.001	219.43	11	< .001
6.	Factor Variance	2822.19	131	<.001	.077	.089	5	.001	.000	3.13	1	.077
	Dominican	336.49	54	<.001	.081	.100	--	--	--	--	--	--
	Central American	209.81	54	<.001	.059	.073	--	--	--	--	--	--
	Cuban	364.66	54	<.001	.062	.088	--	--	--	--	--	--
	Puerto Rican	493.47	54	<.001	.075	.097						
	Mexican	1126.27	54	<.001	.078	.099	--	--	--	--	--	--
	South American	232.33	54	<.001	.081	.099	--	--	--	--	--	--
7.	Configural	2763.03	324	<.001	.073	.093	--	--	--	--	--	--
8.	Metric	3000.65	379	<.001	.080	.091	7	.007	.002	195.75	55	< .001
9.	Scalar	3204.59	434	<.001	.081	.087	8	.001	.004	145.09	55	< .001
10.	Factor Variance	3221.20	439	<.001	.084	.087	9	.003	.000	11.29	5	.046

Note. SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation

Table 4

Descriptive statistics for the ISEL-12 total score, for the total sample, language responders, and ancestry groups

	range	*M*	*SE*	α
Total	0-36	25.75	.09	.82
Language				
English	0-36	27.29	.20	.86
Spanish	0-36	25.33	.10	.80
Ancestry				
Dominican	2-36	25.65	.29	.80
Central American	4-36	24.85	.28	.81
Cuban	4-36	26.88	.24	.84
Mexican	0-36	26.14	.14	.81
Puerto Rican	0-36	24.75	.24	.83
South American	3-36	24.84	.35	.82

Table 5

Factor loadings and descriptive statistics from English and Spanish baseline models

Item	English			Spanish		
	Factor Loading		*M* (*SD*)	Factor Loading		*M* (*SD*)
	Unstandardized	Standardized		Unstandardized	Standardized	
1	1.00	.60	2.15 (.96)	1.00	.46	2.09 (.99)
2	1.09	.66	2.33 (.96)	1.21	.57	2.26 (.97)
3	.94	.57	2.21 (.96)	.97	.45	2.05 (.97)
4	.91	.62	2.41 (.86)	1.16	.60	2.32 (.89)
5	1.01	.67	2.27 (.87)	1.32	.64	2.13 (.95)
6	.87	.67	2.50 (.76)	1.19	.67	2.41 (.81)
7	.86	.54	2.20 (.93)	.73	.31	1.80 (1.06)
8	.89	.50	2.08 (1.04)	.86	.36	1.83 (1.09)
9	.91	.65	2.34 (.82)	1.12	.60	2.31 (.85)
10	.80	.58	2.48 (.80)	1.08	.58	2.35 (.84)
11	.72	.39	2.02 (1.06)	1.01	.41	1.84 (1.11)
12	.90	.57	2.32 (.92)	1.05	.45	2.02 (1.05)

Note. The unstandardized factor loading for the first item was fixed to 1 to set the metric for the latent variable; all *p*s < .00

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Table 6

Factor loadings and descriptive statistics from baseline models of the ISEL-12 among Dominicans, Central Americans, Cubans, Mexicans, Puerto Ricans, and South Americans

Item	Dominican			Central American			Cuban			Mexican			Puerto Rican			South American		
	factor loading		*M* (*SD*)	factor loading		*M* (*SD*)	factor loading		*M* (*SD*)	factor loading		*M* (*SD*)	factor loading		*M* (*SD*)	factor loading		*M* (*SD*)
	U	S		U	S		U	S		U	S		U	S		U	S	
1	1.00	.38	2.12 (.98)	1.00	.46	2.05 (1.00)	1.00	.60	2.22 (.99)	1.00	.47	2.12 (.98)	1.00	.50	1.96 (.99)	1.00	.48	2.08 (.92)
2	1.42	.52	2.20 (1.03)	1.39	.63	2.20 (1.00)	1.02	.64	2.37 (.93)	1.11	.55	2.33 (.94)	1.25	.62	2.16 (1.01)	1.23	.56	2.18 (.96)
3	1.12	.42	2.09 (1.01)	.95	.45	2.00 (.96)	.87	.56	2.22 (.92)	.88	.42	2.09 (.97)	1.14	.56	2.05 (1.02)	1.09	.53	2.01 (.91)
4	1.34	.61	2.41 (.83)	1.12	.59	2.32 (.85)	.83	.59	2.39 (.84)	1.13	.60	2.36 (.88)	1.17	.61	2.24 (.95)	1.20	.58	2.25 (.90)
5	1.72	.65	2.18 (.99)	1.26	.63	2.11 (.92)	1.00	.63	2.16 (.93)	1.26	.65	2.22 (.90)	1.22	.62	2.06 (.98)	1.43	.66	2.05 (.95)
6	1.46	.69	2.44 (.79)	1.11	.66	2.38 (.78)	.82	.66	2.53 (.73)	1.09	.63	2.45 (.79)	1.19	.68	2.34 (.87)	1.21	.70	2.37 (.77)
7	.85	.31	1.95 (1.04)	.74	.32	1.75 (1.04)	.64	.35	1.91 (1.06)	.82	.36	1.91 (1.05)	.85	.41	1.87 (1.03)	.95	.42	1.81 (1.00)
8	1.22	.42	1.81 (1.09)	.99	.43	1.74 (1.07)	.87	.47	1.97 (1.09)	.76	.33	1.94 (1.07)	1.02	.45	1.84 (1.13)	.86	.35	1.81 (1.09)
9	1.45	.63	2.35 (.86)	1.03	.59	2.28 (.81)	.74	.55	2.37 (.80)	1.13	.63	2.35 (.83)	1.05	.57	2.23 (.92)	1.26	.65	2.28 (.86)
10	1.46	.58	2.25 (.94)	1.00	.56	2.30 (.82)	.69	.57	2.56 (.71)	.97	.58	2.44 (.78)	1.13	.59	2.26 (.94)	1.33	.66	2.26 (.88)
11	1.03	.35	1.90 (1.09)	.99	.43	1.83 (1.04)	.97	.52	2.05 (1.10)	1.08	.45	1.87 (1.13)	.69	.31	1.78 (1.10)	.75	.31	1.81 (1.06)
12	1.16	.41	2.01 (1.05)	1.08	.50	1.98 (1.00)	.92	.55	2.23 (.98)	1.06	.47	2.10 (1.04)	1.06	.50	2.02 (1.06)	.89	.38	1.99 (1.03)

Note. U = unstandardized factor loadings; S = standardized factor loadings; The unstandardized factor loading for the first item was fixed to 1 to set the metric for the latent variable; all *p*s < .001

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Table 7

Correlations between ISEL-12 scores and validity measures

	Full sample	English	Spanish	Dominican	Central American	Cuban	Mexican	Puerto Rican	South American
Social Network Integration	.33	.33**	.30**	.33**	.31**	.35**	.32**	.34**	.42**
Life Engagement	.40**	.48**	-.39**	.36**	.40**	.41**	.39**	.42**	.37**
Perceived Stress	−.35**	−.36**	−.37**	−.33**	−.40**	−.42**	−.33**	−.34**	−.30**
Anxiety	−.43**	−.49**	−.43**	−.45**	−.42**	−.46**	−.41**	−.44**	−.50**
Depression	−.39**	−.45**	−.40**	−.41**	−.42**	−.47**	−.35**	−.42**	−.34**

Note.

** $p < .001$

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