Psychometric properties of the Spanish adaptation of the Social Problem-Solving Inventory-Revised (SPSI-R)

Albert Maydeu-Olivares[a,*], Antoni Rodríguez-Fornells[a], Juana Gómez-Benito[a], Thomas J. D'Zurilla[b]

[a]*Faculty of Psychology, University of Barcelona, Passeig de la Vall d'Hebron 171, 08035 Barcelona, Spain*
[b]*State University of New York at Stony Brook, Stony Brook, NY 11790, USA*

Abstract

The Social Problem Solving Inventory-Revised (SPSI-R) has been translated and adapted to a Spanish population. Covariance structure analysis was used to replicate the five factor model for this questionnaire and to assess whether the Spanish and English versions were factorially invariant. The questionnaire was found to be only partially factorially invariant, as one of the dimensions measured by the questionnaire, impulsivity/carelessness style (ICS), appears to be measured differently across populations.

As a result, the correlations between the ICS scale and the remaining SPSI-R scales differ across populations. The correlations among the remaining SPSI-R scales are comparable across populations. Furthermore, the scales' means were found to be linearly related across populations and so were the scales' standard deviations. Hence, the scales' metrics can be linked linearly across populations.

The scales of the Spanish version of the SPSI-R showed adequate reliability and, as in North American samples, gender differences were found in NPO in the Spanish sample. © 2000 Elsevier Science Ltd. All rights reserved.

Keywords: Interpersonal problem solving; Problem-solving skills; Coping; Personality

---

* Corresponding author. Tel.: +34-93-402-1079; fax: +34-93-402-1362.
  E-mail address: amaydeu@psi.ub.es (A. Maydeu-Olivares).

1. Introduction

Social problem solving involves a process by which a person attempts to discover or invent effective or adaptive coping responses to specific problematic situations encountered in everyday living for which no effective response is immediately apparent or available (D'Zurilla & Nezu, 1982). Much of the research on social problem-solving (i.e. real-life problem solving) and problem-solving therapy has used the prescriptive model of social problem solving developed by D'Zurilla and his associates (D'Zurilla, 1986; D'Zurilla & Goldfried, 1971; D'Zurilla & Nezu, 1990; Nezu, Nezu & Perri, 1989).

In 1990, D'Zurilla and Nezu developed the Social Problem Solving Inventory (SPSI) in order to correct an existing deficiency in social problem solving research, where there was a lack of adequate, theory-based measures of social problem-solving ability (D'Zurilla & Maydeu-Olivares, 1995). The SPSI is a self-report measure of social problem-solving designed to assess the two major components of D'Zurilla and Nezu's social problem-solving model, problem orientation and problem-solving proper.

Problem orientation is the motivational component of the problem-solving process, involving the operation of a set of relatively stable cognitive-emotional schemas (constructive as well as dysfunctional) that reflect a person's general awareness and perceptions of everyday problems, as well as his or her own problem-solving ability. These schemas can facilitate or inhibit problem-solving performance in specific situations. *Problem-solving proper*, on the other hand, refers to the search for a solution through the application of specific problem-solving techniques that are designed to increase the probability of finding the 'best' solution or coping response for a particular problematic situation. In D'Zurilla and Nezu's (1990) model, there are four major problem-solving skills: (1) problem definition and formulation, (2) generation of alternative solutions, (3) decision making and (4) solution implementation and verification (i.e. monitoring and evaluation of solution outcomes). Each of these skilled tasks is assumed to contribute uniquely to the discovery or invention of effective 'solutions,' or adaptive ways of coping with particular problematic situations.

Maydeu-Olivares and D'Zurilla (1995, 1996) investigated extensively the empirical data generated by the SPSI in relation to the theoretical model of social problem-solving on which it was based. They concluded that the best fitting model for the items of this inventory was a five factor model consisting of two problem orientation dimensions (positive and negative problem orientation) and three problem solving response styles (rational, impulsive-careless and avoidant). These authors describe *positive problem orientation* (PPO) as a constructive, problem-solving cognitive 'set', which involves the general tendency to appraise a problem as a challenge, believe that problems are solvable, believe in one's own personal ability to solve problems successfully, believe that successful problem solving takes time, effort and persistence and commit oneself to solving problems with dispatch rather than avoiding them. On the other *negative problem orientation* is a dysfunctional cognitive-emotional set which involves the general tendency to view a problem as a significant threat to well-being, believe that problems are unsolvable, doubt one's own personal ability to solve problems successfully and become frustrated and upset when confronted with problems in living.

As for the problem solving proper dimensions, *rational problem solving* (RPS) is a constructive dimension that refers to the rational, deliberate, systematic and efficient

application of effective or adaptive problem-solving skills and techniques, including problem definition and formulation (PDF), generation of alternative solutions (GAS), decision making (DM) and solution implementation and verification (SIV). In contrast, the *impulsivity-carelessness style* (ICS) is a dysfunctional dimension characterized by active attempts to apply problem-solving strategies and techniques, but these attempts tend to be impulsive, careless, hurried and incomplete. Finally, the *avoidance style* (AS) is also a dysfunctional dimension characterized by procrastination (putting off solving problems), passivity (waiting for problems to resolve by themselves) and dependency (attempting to shift the responsibility for problem-solving to others).

Based on these empirical studies, D'Zurilla, Nezu and Maydeu-Olivares (1999) have developed a revised Social Problem Solving Inventory (named SPSI-R). The present study reports some empirical results concerning the psychometric properties of the Spanish version of this inventory.

The remainder of this paper is organized as follows: first, we shall assess whether Maydeu-Olivares and D'Zurilla's (1996) five factor model shows a reasonable error of approximation to the Spanish data and whether this error of approximation is comparable to that obtained in American samples.

If we find that the model shows a reasonable error of approximation in the Spanish sample and, hence, that the five factor model of Maydeu-Olivares and D'Zurilla (1996) holds approximately in the Spanish population, then we shall investigate whether these factors are comparable across populations. Within the context of the common factor model, comparable measurement implies equal factor loadings across populations (factorial invariance) (Meredith, 1993). Thus, we shall compare the fit of a model in which the factor loadings are constrained to be equal across populations with the fit of a model in which they are not.

If the factor invariant model provides a close fit to the non-invariant model then it is reasonable to compare scale scores across populations and examine whether the inter-correlations among SPSI-R scale scores are equal across populations. Furthermore, in order to be able to relate studies performed with the Spanish and English versions of the SPSI-R we shall link the metrics of the scale scores by relating the scale means and variances across populations. Also, we shall assess whether the Spanish SPSI-R shows adequate reliability. Finally, we shall investigate whether there are gender differences in the Spanish population, as gender differences in one of the SPSI-R scales (negative problem orientation) have been consistently reported in North-American samples (D'Zurilla, Maydeu-Olivares & Kant, 1998).

2. Method

2.1. Subjects

To compare the psychometric properties of the Spanish and American versions of the SPSI-R we used two samples of college students. The Spanish sample consisted of 777 undergraduate college students (651 women and 121 men, with the gender of 5 participants missing) enrolled in an introductory course of Psychology at the University of Barcelona. The mean age for this group was 20.41 years (*S.D.* = 4.20). The American sample was obtained by

pooling sample 1 and sample 2 in Maydeu-Olivares and D'Zurilla (1996) ($N = 964$). These consist of college students enrolled in an introductory course of Psychology at the State University of New York at Stony Brook. The reader is referred to the original source for further details on this sample.

2.2. Measures

The SPSI-R (D'Zurilla et al., 1999) consists of 52 Likert-type items rated on a 5-point scale. The SPSI-R is organized into five scales: PPO (5 items), NPO (10 items), RPS (20 items), ICS (10 items) and AS (7 items).

The adaptation of the SPSI-R was done using the back-translation method, which is a judgmental procedure for investigating the conceptual equivalence (i.e. symmetry) of the original and translated versions, necessary for valid cross-cultural comparisons (Berry, 1980). First, a bilingual translator translated the American questionnaire into Spanish. Second, another bilingual translator translated back the Spanish SPSI-R into English. Finally, the original source and the back-translated items were compared for non-equivalence of meaning and any discrepancies were noted. This iterative process of translation and back-translation was continued until no semantic differences were noticed between both questionnaire forms (Brislin, 1980).

2.3. Procedure

The different models fitted in this study were estimated via maximum likelihood estimation as implemented in LISREL 8 (Jöreskog & Sörbom, 1993) using covariances as sample statistics.

To assess the degree of lack of fit of the models being estimated we shall employ the root mean squared error of approximation (RMSEA; Steiger, 1990) as a measure of discrepancy due to approximation per degree of freedom. Browne and Cudeck (1993) suggested that a RMSEA of about 0.05 reflects a close fit of the model in relation to its degrees of freedom, whereas a value of 0.08 or less reflects a reasonable error of approximation.

To assess the precision of the RMSEA point estimate we shall construct a 90% confidence interval around the RMSEA. These confidence intervals are unlikely to include zero (which would indicate that the model provides an exact fit to the data) given the large number of degrees of freedom of the models considered in this study and the large sample sizes employed. As LISREL 8 does not provide confidence intervals for the RMSEA for models with as many degrees of freedom as those considered here, these were obtained using Fisher's approximation to the non-central X^2 distribution (Patnaik, 1949).

3. Results

3.1. Fit assessment of the five factor model

The five factor model of Maydeu-Olivares and D'Zurilla (1996) was fitted to the Spanish

sample and for the sake of comparison, also to the American sample. This is an independent clusters solution in which each item is loaded by only one factor and all factors are inter-correlated. The resulting fit indices are provided in Table 1. As can be seen in Table 1, the five factor model shows a reasonable error of approximation in the Spanish sample, RMSEA = 0.060, and a close fit in the North-American sample, RMSEA = 0.050.

In Table 2 we provide descriptive statistics for the standardized factor loadings in each sample, as well as item-scale correlations. A list of the items loading in each factor and of the factor loadings in the American sample are reported in the test manual (D'Zurilla et al., 1999).

3.2. Factorial invariance

We shall next investigate whether the factor loadings for the five factor model are equal across populations using multiple group covariance structure analysis. In Table 1 we present the goodness of fit indices for a model with equal factor loadings across populations. The fit of this model is to be compared to a baseline model obtained by fitting both populations simultaneously without constraints across populations. The fit indices for the baseline model are also reported in Table 1. As it should be, the χ^2 and the degrees of freedom for the baseline model are equal to the sum of the χ^2 and degrees of freedom for the five factor model fitted to each population separately. The RMSEA for the baseline model is considerably lower than the RMSEA obtained from each of the populations separately due to the increment of degrees of freedom.

A nested test of exact fit of the factor loading invariant model reveals that this model is significantly worse than the baseline model, $\chi^2(47) = 334.66$, $p < 0.001$. Hence, the factor loadings are not exactly equal across populations. To investigate the degree of approximation of the model with equal factor loadings across populations to the model without these constraints, we obtained the RMSEA of the difference between these models, ΔRMSEA = 0.060. A nested test of close fit reveals that the model with equal factor loading does not fit

Table 1
Root mean squared error of approximation for the five factor model of the Social Problem Solving Inventory-Revised (SPSI-R)[a]

Index	χ^2	df	RMSEA	90% Confidence interval for RMSEA
North-American and Spanish samples separately				
American	4147.82	1264	0.050	(0.048; 0.052)
Spanish	4807.17	1264	0.060	(0.057; 0.063)
North-American and Spanish samples jointly				
Unconstrained	8954.97	2528	0.039	(0.038; 0.039)
Factor invariant	9289.63	2575	0.039	(0.038; 0.040)
Factor invariant except for items 3, 22 and 34	9205.80	2572	0.039	(0.038; 0.040)

[a] $N = 777$ (Spanish); $N = 924$ (American); RMSEA = root mean squared error of approximation. The unconstrained model refers to a model where all parameters are allowed to differ across samples, the factor invariant model refers to a model where all factor loadings are constrained to be equal across samples.

closely the baseline model, p (ΔRMSEA < 0.05) $= 0.003$. The factor loadings are not even close across populations.

Furthermore, we observed that the largest discrepancies between factor loadings across populations appeared in items 3, 22 and 34, all included in the ICS scale. We then fitted a factor invariant model in which the loadings for these items were allowed to differ across populations, but all other factor loadings were equal across populations. This model provides a close approximation to the model without constraints across samples, ΔRMSEA $= 0.053$, p (ΔRMSEA < 0.05) $= 0.242$. Therefore, the SPSI-R is only partially invariant in its factor loadings (Byrne, Shavelson & Muthén, 1989). Scale scores in the SPSI-R can be compared across populations except for scores on impulsivity/carelessness which is measured differently across populations.

To investigate how the construct of impulsivity/carelessness differs in the North-American and Spanish samples, we examined the content of the items that were most responsible for the misfit: 'when making decisions, I do not carefully check all my options' (item 3), 'when solving problems, I cannot think of many ideas' (item 22), 'when making decisions, I do not take the time to think about the pros and cons of each option' (item 34). The factor loadings for these items are {0.58, 0.58, and 0.74} and {0.78, 0.23, and 0.56} in the North-American and Spanish samples, respectively. These loadings suggest that in the Spanish sample ICS is more strongly related to taking a decision quickly and less related to analyzing each option rationally (i.e. checking the available options and evaluating their consequences).

3.3. SPSI-R scale means, standard deviations and correlations

Having determined that the scale scores can be compared across populations except for ICS,

Table 2
Descriptive statistics[a]

	North-American sample				Spanish sample			
	minimum	maximum	$\bar{x}$	S.D.	minimum	maximum	$\bar{x}$	S.D.
Standardized factor loadings								
PPO	0.59	0.80	0.68	0.10	0.53	0.72	0.60	0.07
NPO	0.72	0.83	0.77	0.05	0.57	0.71	0.67	0.04
RPS	0.70	0.87	0.78	0.06	0.57	0.70	0.62	0.07
ICS	0.45	0.79	0.65	0.10	0.47	0.66	0.58	0.08
AS	0.63	0.91	0.81	0.11	0.54	0.75	0.67	0.08
Item-total correlations								
PPO	0.71	0.73	0.72	0.01	0.61	0.70	0.66	0.04
NPO	0.70	0.80	0.75	0.04	0.56	0.79	0.70	0.07
RPS	0.52	0.76	0.65	0.07	0.51	0.78	0.62	0.09
ICS	0.59	0.70	0.64	0.04	0.46	0.74	0.63	0.11
AS	0.64	0.84	0.76	0.07	0.70	0.85	0.80	0.08

[a] PPO = positive problem orientation, NPO = negative problem orientation, RPS = rational problem solving, ICS = impulsivity/carelessness style, AS = avoidance style.

we shall examine how their means, standard deviations and inter-correlations differ across samples. In Table 3 we present these statistics in both populations. We observe in Table 3 that the scale means in the Spanish sample are consistently higher except for ICS. Also, the standard deviations in the Spanish sample are consistently smaller. Furthermore, a plot of the scale means for both samples shows that these are almost perfectly related. The same phenomenon was observed with the scale standard deviations.

As for the scales' intercorrelations, since we found that the relationship among the ICS construct and their indicators is not equal across populations, this will be reflected on the inter-scale correlations involving the ICS scale score (which is an equally weighted composite). In fact, inspecting Table 3 we see that in the Spanish sample ICS is substantially less directly related to NPO and AS (0.22 and 0.35 versus 0.52 and 0.59) and substantially more inversely related to RPS (−0.61 versus −0.37). We also observe a small difference between the correlations between PPO and RPS across samples (0.50 versus 0.61). Although the magnitude of this difference is not large enough to be of substantive interest, it is likely to be statistically significant given the sample sizes employed.

To quantify these observed trends, we fitted a two-group mean and covariance structure model with these restrictions,

Table 3
Means, standard deviations, reliability coefficients and intercorrelations among the scales of the Social Problem Solving Inventory-Revised (SPSI-R)[a]

	PPO	NPO	RPS	ICS	AS
Spanish sample (N = 777)					
PPO	1.00				
NPO	−0.49	1.00			
RPS	0.50	−0.14	1.00		
ICS	−0.19	0.22	−0.61	1.00	
AS	−0.44	0.62	−0.24	0.35	1.00
$\bar{x}$	12.69	16.50	49.44	14.28	9.60
S.D.	3.06	6.62	10.29	5.58	4.82
α	0.68	0.88	0.92	0.88	0.90
North-American sample (N = 924)					
PPO	1.00				
NPO	−0.49	1.00			
RPS	0.61	−0.16	1.00		
ICS	−0.26	0.52	−0.37	1.00	
AS	−0.49	0.69	−0.26	0.59	1.00
$\bar{x}$	11.82	15.58	43.19	13.85	9.99
S.D.	3.92	9.22	13.66	7.12	6.69
α	0.76	0.91	0.93	0.84	0.88

[a] All correlations are significant $p < 0.01$; PPO = positive problem orientation, NPO = negative problem orientation; RPS = rational problem solving, ICS = impulsivity/carelessness style, AS = avoidance style.

$$\mu_s = a\mu_a + b, \quad \Sigma_s = \text{Diag}(c\sigma_a + d)\mathbf{P}_s Diag(c\sigma_a + d),$$

$$\mu_a = \mu_a, \quad \Sigma_a = \text{Diag}(\sigma_a)\mathbf{P}_a Diag(\sigma_a)$$

(1)

where $\text{Diag}(\sigma)$ denotes a diagonal matrix with elements σ and the correlation matrices ρ_s and ρ_a are constrained to be equal except for the following correlations $\{\rho(\text{RPS, PPO}), \rho(\text{ICS, NPO}), \rho(\text{ICS, RPS})$ and $\rho(\text{AS, ICS})\}$ which are allowed to be different across populations.

This highly restricted model fitted the data reasonably well, $\chi^2(12) = 21.79$, $p = 0.040$, RMSEA = 0.031. As expected, the difference in the correlation between PPO and RPS was found to be significant, $\rho_{\text{dif}} = -0.11$, $\chi^2(1) = 11.05$, $p = < 0.001$. We therefore conclude that except for ICS the inter-relationships among the SPSI-R scales are comparable across both versions of the questionnaire and that the means and standard deviations of the SPSI-R scales are linearly related acroos samples. The following linear function can be used to compare scale scores across both versions of the questionnaire:

$$\hat{\mu}_s = -1.32 + 1.16\mu_a, \quad \hat{\sigma}_s = 0.21 + 0.74\sigma_a.$$

(2)

3.4. Reliability

We obtained the reliability estimates (coefficient alpha) for the scales of the Spanish SPSI-R. These are given in Table 2. For the sake of comparison, we also provide reliability estimates obtained from the North-American sample. As can be seen in Table 2, the reliability estimates are comparable across samples except for PPO. The reliability of this scale is somewhat lower in the Spanish sample. Note that this scale shows the lowest reliability because it is the shortest scale.

3.5. Gender differences

D'Zurilla et al. (1998) have recently investigated gender differences in social problem solving. They report that among North-American college students significant mean differences are found in PPO, NPO and in ICS. We have examined whether these gender differences appear with the Spanish adaptation of the SPSI-R. We found significant mean differences only in NPO, $t = -3.405$, $p < 0.001$. Like among North-American college students, Spanish women ($\bar{x} = 18.22$, S.D. = 6.52) show a significantly higher degree of negative problem orientation than men ($\bar{x} = 14.59$, S.D. = 6.77). That is, they are more likely to view problems occurring in their lives as a significant threat to their well-being.

4. Discussion and conclusions

Using covariance structure analysis, we have compared the adequacy of the five factor structure of the SPSI-R (Maydeu-Olivares & D'Zurilla, 1996) on a Spanish adaptation of the questionnaire. Although the fit of this model to the Spanish version of the inventory is not as

close as in the English version, the model still yields a reasonable error of approximation to the Spanish inventory.

The factor loadings obtained in the Spanish version of the questionnaire are a close approximation to those obtained in the American version except for ICS. This construct seems to be measured differently in these populations. As a result, the relationships between ICS scale scores and the remaining SPSI-R variables differ across populations. Linear functions that relate the means and standard deviations across samples were provided. These can be used to compare observed scale scores between the two versions of the questionnaire.

The reliability of the SPSI-R scales in the Spanish sample were moderately high as has been previously reported from original North-American samples (D'Zurilla et al., 1999). Finally, using this adaptation, gender differences were found in NPO. This replicates previous findings in North-American samples (D'Zurilla et al., 1998).

References

Berry, J. W. (1980). Introduction to methodology. In H. Triandis & J. W. Berry, *Handbook of cross-cultural psychology, Vol. 2* (pp. 1–28). Boston:Allyn & Bacon.

Brislin, R. W. (1980). Translation and content analysis of oral and written materials. In H. Triandis, & J. W. Berry, *Handbook of cross-cultural psychology*, Vol. 2 (pp. 389–444). Boston: Allyn & Bacon.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. S. Long, *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.

Byrne, B. M., Shavelson, R. J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: the issue of partial measurement invariance. *Psychological Bulletin*, *105*, 456–466.

D'Zurilla, T. J. (1986). *Problem-solving therapy: a social competence approach to clinical intervention*. New York: Springer.

D'Zurilla, T. J., & Goldfried, M. R. (1971). Problem solving and behavior modification. *Journal of Abnormal Psychology*, *78*, 107–126.

D'Zurilla, T. J., & Nezu, A. M. (1982). Social problem-solving in adults. In P. C. Kendall, *Advances in cognitive-behavioral research and therapy*, *Vol. 1* (pp. 201–274). New York: Academic Press.

D'Zurilla, T. J., & Nezu, A. M. (1990). Development and preliminary evaluation of the Social Problem-Solving Inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, *2*, 156–163.

D'Zurilla, T. J., & Maydeu-Olivares, A. (1995). Conceptual and methodological issues in social problem-solving assessment. *Behavior Therapy*, *26*, 409–432.

D'Zurilla, T. J., MaydeuOlivares, A., & Kant, G. L. (1998). Age and gender differences in social problem solving in college students, middle age and elderly adults. *Personality and Individual Differences*, *25*, 241–252.

D'Zurilla, T. J., Nezu, A. M., & Maydeu-Olivares, A. (1999). *Manual for the Social Problem-Solving Inventory-revised*. North Tonawanda, NY: Multi-Health Systems.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8. User's reference guide*. Chicago, IL: Scientific Software.

Maydeu-Olivares, A., & D'Zurilla, T. J. (1995). A factor analysis of the Social Problem-Solving Inventory using polychoric correlations. *European Journal of Psychological Assessment*, *11*, 98–107.

Maydeu-Olivares, A., & D'Zurilla, T. J. (1996). A factor-analytic study of the Social Problem-Solving Inventory: an integration of theory and data. *Cognitive Therapy and Research*, *20*, 115–133.

Meredith, W. (1993). Measurement invariance, factor analysis and factorial invariance. *Psychometrika*, *58*, 525–543.

Nezu, A. M., Nezu, C. M., & Perri, M. G. (1989). *Problem solving therapy for depression: theory, research and clinical guidelines*. New York: Wiley.

Patnaik, P. B. (1949). The non-central chi-square and *F*-distributions and their applications. *Biometrika*, *36*, 202–232.

Steiger, J. H. (1990). Structural model evaluation and modification: an interval estimation approach. *Multivariate Behavioral Research*, *25*, 173–180.